

Human considerations in the use of marine protected areas for biodiversity conservation

Michelle Voyer¹ and William Gladstone^{2*}

¹ School of International Studies, University of Technology Sydney, PO Box 123, Broadway NSW 2007, Australia

² School of Life Sciences, University of Technology Sydney, PO Box 123, Broadway NSW 2007, Australia

* Corresponding author: William.Gladstone@uts.edu.au

ABSTRACT

Marine protected areas (MPAs) are one approach, amongst many, for the protection of marine biodiversity. Although proven to be effective at protecting biodiversity and to be supported by local and wider communities, the implementation of some MPAs has been very contentious especially with fishing stakeholders. We researched the causes of these issues by examining the experience of implementation of the Batemans Marine Park in New South Wales, Australia. While MPA selection and management need to be based on rigorous science, a commensurate level of attention needs to be applied to understanding the social systems that also play a role in determining the protection measures and approaches. The most pressing issue that needs to be resolved early on in a planning process is the MPA's objectives, and whether these objectives are well understood and accepted by the local community. Building community support for MPAs also involves taking into account the different systems of knowledge and views of the natural world that exist within the community. Science alone is not sufficient to convince communities of the need for MPAs or their value in achieving conservation outcomes. Incorporating 'bottom-up' approaches into communication and engagement strategies will allow for a greater diversity of voices to be heard and acknowledged, protecting the planning processes against polarisation. Engaging local communities needs to go beyond large-scale consultation processes to include more rigorous, integrated social, economic and ecological assessment exercises, involving a collaborative participatory approach. Context is important and planning processes need to recognise the individual and unique needs of each affected community. Rigid ideas around the best means of achieving biodiversity protection combined with 'a one size fits all' approach to planning and community engagement are likely to exacerbate conflict and division and stimulate opposition.

Key words: Fisheries, Marine conservation planning, Marine reserve, No-take, Social impact assessment, Stakeholder participation

DOI: <http://dx.doi.org/10.7882/AZ.2015.029>:

Introduction

The Australian marine environment, encompassing the coastlines, nearshore waters, and offshore waters to the national maritime boundaries, includes enormous biodiversity values. Reports on the state of Australia's marine biodiversity have highlighted the impacts upon and threats to biodiversity from fishing practices, aquaculture, catchment run-off, marine debris, coastal urban development, tourism facilities, port facilities, mining and industry, shipping, oil and gas exploration and production, pest and introduced species, disease, recreational boating, and global climate change (State of the Environment 2011 Committee 2011; Beeton *et al.* 2012; GBRMPA 2014). Management responses to these threats and their impacts aim to remove or mitigate the threat, remediate damage already done, or protect biodiversity from future harm. The focus of this paper is marine protected areas (MPAs) for biodiversity conservation, although we recognise there are many other management approaches to biodiversity conservation. An MPA is 'An area of land and/or sea especially dedicated to the protection and maintenance of biological

diversity, and of natural and associated cultural resources, and managed through legal or other effective means' (ANZECC TFMPA 1999). In 1998 the governments of Australia with marine coasts (i.e. the Commonwealth, all States, the Northern Territory) agreed to establish by 2012 the National Representative System of Marine Protected Areas (NRSMPA). The NRSMPA would, it was envisaged, support the achievement of national goals for biodiversity conservation (Commonwealth of Australia 1996), and be a means by which Australia met its international obligations as a signatory to the Convention on Biological Diversity. The NRSMPA was an ambitious approach to biodiversity conservation that would represent examples of Australia's marine ecosystems in Commonwealth, State and Territory marine waters and intertidal areas.

The selection of sites to be MPAs was guided by goals and principles agreed to by all these governments, and formulated in the Guidelines for Establishing the National Representative System of Marine Protected

Areas (ANZECC TFMPA 1999). Site selection was guided by the primary goal of the NRSMPA, which was “to establish and manage a comprehensive, adequate and representative system of MPAs to contribute to the long-term ecological viability of marine and estuarine systems, to maintain ecological processes and systems, and to protect Australia’s biological diversity at all levels” (ANZECC TFMPA 1999 p. 15).

In New South Wales (NSW) the NRSMPA was implemented via the NSW Representative Systems of MPAs. The NSW system was integrated across marine parks, aquatic reserves, national parks, and nature reserves and its primary goal was representation and protection of marine biodiversity: “To establish a comprehensive, adequate and representative system of marine protected areas that includes a full range of marine biodiversity at ecosystem, habitat, and species levels” (NSW MPA 2001 p. 10). In 2015 in NSW there were six multiple use marine parks, 12 aquatic reserves, and the marine components of 62 national parks and reserves (<http://www.mpa.nsw.gov.au/> accessed 2 March 2015). There are also eight intertidal protected areas in the Sydney region that “protect rocky habitats and intertidal species”, but these are generally not considered in assessments of the State’s MPA network (<http://www.dpi.nsw.gov.au/fisheries/info/closures/ipa> accessed 2 March 2015). At the time of writing, the NSW Marine Estate Management Authority is undertaking an assessment of options to ‘enhance marine biodiversity conservation’ in the Hawkesbury Shelf bioregion (<http://www.marine.nsw.gov.au/key-initiatives/hawkesbury-shelf-marine-assessment> accessed 23 July 2015). The high population density of the Hawkesbury Shelf bioregion and the broad diversity of values that exist within these communities is likely to translate into a greater need for improved understanding of the social influences on MPA success.

MPAs for Biodiversity Conservation

The primary goal of the NRSMPA, and NSW’s implementation of it, was the conservation of marine biodiversity. A distinguishing feature of MPAs established under the NRSMPA was that they were “...established especially for the conservation of biodiversity” (ANZECC TFMPA 1999, p. 15). It is clear from the statements of the primary and secondary goals, and the design principles, of both the national and NSW systems that they were not established as a tool to support human activities, such as contribute to fisheries management. The social considerations of establishing the NRSMPA and the NSW network were addressed via the development and design principles. The NRSMPA principles required consultation, Indigenous involvement, and consideration of “both long-term and short-term environmental, economic, social and equity considerations” (ANZECC TFMPA 1999 p. 16). The NSW principles for establishing the State’s network of MPAs included “the social and economic effects...on

coastal communities and other stakeholders. Any decisions to declare new marine protected areas will balance the costs and benefits of declaration and share any impacts equitably along the coast” and consultation with community groups and Indigenous people (NSW MPA 2001 p. 11).

MPAs aim to protect biodiversity within their boundaries by spatially separating or excluding conflicting uses through zoning arrangements. Zones control access (e.g. by completely excluding humans permanently or temporarily), extractive activities (e.g. by excluding fishing or collecting), activities that damage habitats (e.g. by excluding trawling while allowing line fishing, excluding oil and gas exploration and production), or allow multiple, ecologically sustainable activities (e.g. in so-called multiple use zones) (Fernandes *et al.* 2005; Dobbs *et al.* 2008). MPAs also aim to protect biodiversity by managing specific activities by requiring environmental assessments and implementing sector-specific management practices (e.g. requiring boats to use moorings installed by the management authority, tourist education, mandating use of shipping lanes, national fisheries management practices) (Gladstone 2009). Recognising that biodiversity conservation within an MPA can also be dependent upon effective management of activities that occur in connected ecosystems outside its boundaries (e.g. in catchments that drain into MPAs), MPAs can require a broader ecosystem approach to achieve their goals of biodiversity conservation (Brodie *et al.* 2012; Bartley *et al.* 2014).

Studies assessing the effectiveness of MPAs for biodiversity conservation have largely focused on MPAs from which extractive activities (e.g. fishing) have been excluded. In these situations the outcomes for biodiversity can include: increased species richness, abundance, biomass, length, and fecundity of groups of species that continue to be fished outside the MPA (McCook *et al.* 2010; Edgar *et al.* 2014;); recovery of habitats through trophic cascades (Babcock *et al.* 1999); resistance to ecological disturbances (McCook *et al.* 2010); and spillover or export to areas outside MPA boundaries (Russ and Alcala 2011; Harrison *et al.* 2012). The existence and magnitude of these responses depends upon MPAs’ area, length of time since establishment, the extent of fishing exclusion, isolation from surrounding habitats, and compliance with management regulations (Ballantine 2014; Edgar *et al.* 2014; Kelaher *et al.* 2014).

Although proven to be effective for biodiversity protection under a range of circumstances and to be supported by local and wider communities (Marine Parks Authority NSW 2008; Costello 2014; Sweeney Research 2014), MPAs have been very contentious especially with fishing stakeholders. The recent contentious history of MPAs in NSW has been documented (Gladstone 2014), and parallels some of the issues experienced by MPAs in Australia and elsewhere (Agardy *et al.* 2003; Voyer *et al.* 2012). All of the six marine parks in NSW involved a level of resistance from sections of the local community. This was particularly prominent

in the Batemans Marine Park (BMP), which was declared and zoned between 2005 and 2007 and experienced a great level of sustained resistance, which continues to this day (Voyer *et al.* 2015a). Analysis of the processes around marine protected area planning found a number of areas in which biological approaches to planning come into conflict with the social realms they seek to manage. For the remainder of this paper we explore some of the aspects of the BMP planning process and reflect on how it may be used to improve the understanding of the social impacts of establishing MPAs for biodiversity conservation and the lessons it suggests for future uses of MPAs. Our research focused on understanding the reasons for difficulties in some MPAs in NSW and the impacts on individuals, communities, and the political process.

Context

Establishing a representative system of MPAs require a consistent vision across jurisdictions, so that a network of complementary reserves can be established to provide the maximum conservation benefits. Therefore protected area planning processes across the country employ very similar approaches and share common objectives, as outlined in the relevant policy documents detailed above. Yet the NSW experience demonstrates that consistent approaches may not be appropriate when applied to the social realm if they are inflexible or fail to take into account contextual differences in the areas in which the MPA is implemented. While the BMP has experienced sustained resistance, this has not been the case for another NSW marine park – the Port Stephens Great Lakes Marine Park (PSGLMP) – which was declared and zoned at the same time as the BMP, but has now been largely accepted by the local community. The differential response to the PSGLMP and BMP can in part be understood by looking at the history of the two areas in the lead-up to implementation. PSGLMP was introduced into an area with a diverse employment base and a history of fighting for the protection of the area from industrialisation, mining and other developments. The BMP was established in a region facing many economic challenges and a narrow employment base. The area was built on fishing, farming and forestry, but all of these industries had suffered significant declines in the past few decades, including the closure of two major canneries in the area, the closure of a number of sawmills, the declaration of a raft of new national parks and the deregulation of the dairy industry. In addition the character of the region had undergone quite profound changes with an influx of retirees moving to the area from urban centres such as Sydney and Canberra. Conflict between new ‘green’ ideas and the traditional primary production roots of the town had been a feature of the region for some time prior to the introduction of the BMP, with a strong culture built up around protecting the south coast from ‘extreme green’ outside influences (Voyer *et al.* 2015a). Establishing a marine park in this area was always going to be challenging.

Social Impacts

Selection of the location for NSW marine parks and the zoning arrangements within them were primarily driven by biological assessments of the ecological communities along the NSW coast, with marine parks seeking to maximise the samples of marine biodiversity contained within park boundaries (ANZECC 1998). Assessments of the social and economic impacts of the planned MPA have historically been a secondary process. The BMP planning process included very little in the way of formal social impact assessment. While a somewhat cursory socio-economic impact assessment was conducted in the park – prior to the development of the zoning plans – this focussed almost exclusively on economic factors such as impacts on employment levels (Voyer *et al.* 2012). Yet many of the ways in which the community responded to the marine park are difficult to quantify in purely economic terms. Impacts were not distributed evenly across the community. While recreational fishers felt inconvenienced and annoyed by the restrictions the park imposed, small scale commercial fishers and Indigenous communities felt the brunt of the impacts. This was exacerbated by the cumulative loss of access to traditionally important fishing grounds, with the marine park coming on top of previously implemented management changes, such changes to access arrangements through national parks and the introduction of a number of recreational fishing only areas (Voyer *et al.* 2014, 2015a). Interviews amongst these stakeholder groups following the implementation of the BMP revealed stories of depression, family breakdown, suicide and an accidental drowning which the participants felt were all directly attributable to the stress and grief the marine park had caused (Voyer *et al.* 2014). While direct correlations between mental health impacts and an isolated event can be difficult to quantify the cumulative nature of successive management changes, and the regulatory uncertainty that results from multiple changes over an extended period of time have been documented in a number of studies from Australia and around the world (eg. see Minnegal and Dwyer 2008, Momtaz and Gladstone 2008, Pollnac and Poggie 2008, Britton and Coulthard 2013, King *et al.* 2014). In this case the changes that the marine park introduced went deeper than economic losses. They also involved what these groups saw as a direct attack on their sense of identity and their relationship with their environment.

Environmental Knowledge

The reaction to the BMP, however, cannot be understood by looking only at impacts. An understanding of impacts alone, for example, does little to explain the vehement opposition still held to the park by some sections of the recreational fishing community despite reports that fishing opportunities within the park have improved since its implementation (Paxevanos 2015). Some of the most significant objections to the BMP were rooted in the way it elevated scientific knowledge to the superior or primary knowledge source. There was minimal acknowledgement of

locally based traditional and cultural ecological knowledge, and consultation exercises concentrated largely on minimising controversy over the placement of zoning boundaries rather than actively seeking community input into where protection was most needed and what form it should take. While the planning process did seek to accommodate Indigenous uses and values, this was viewed cynically by the traditional owners and other Indigenous groups that make use of the BMP. Other forms of locally based knowledge – for example knowledge held by commercial and recreational fishers – tended to focus on ‘fishing knowledge’ and involved suggestions for improved management which would improve fishing opportunities. This form of knowledge was largely marginalised in the planning process, for reasons outlined below. This was personally offensive to many of the stakeholders in this area who considered themselves authoritative voices in relation to their local marine environment (Voyer *et al.* 2014).

This conflict can largely be traced back to competing ideas over the objectives for the park. As previously mentioned the objectives of the NRSMPA focus on biodiversity protection. In keeping with these objectives the Government, conservation scientists and conservation groups sought to maximise protection of representative samples of existing marine biodiversity. Zoning boundaries were designed to achieve this with the minimum level of disruption to the community. Yet most of the messages about the marine parks related to fisheries management, with both advocates and opponents of the parks engaging in protracted debates over whether the marine park would be good for fishing (Voyer *et al.* 2013a, Voyer *et al.* 2015a). This confusion over the actual objectives of the park was generated in part by media coverage and in part by deliberate messaging on both sides of the debate to support their arguments. It meant that there was a lack of consensus within the community over what the marine park was trying to achieve before planning even commenced, making the task of implementing management approaches exceptionally difficult (Voyer *et al.* 2015a). The media played a crucial role here by focusing on, and in some cases exacerbating, the conflict and drama between stakeholders. In addition to arguments centred around the value of the marine parks, the media became the battleground for much deeper ideological disputes between media spokespeople that went beyond the marine park and were rooted in fundamental differences in the worldviews and values of the individuals involved (Voyer *et al.* 2013b).

Community Values

The social system into which protected areas are introduced includes a wide variety of ways of seeing the world, of valuing place and the activities practiced within that place (Thompson 2007; Rees *et al.* 2013; Song *et al.* 2013; Voyer *et al.* 2015b). While protected area planning processes often dedicate significant resources to understanding the natural system to be managed,

in order to make appropriate management decisions, the same level of rigour is less often applied to the social system. This is despite the acknowledged inter-relationship between social and ecological systems and the importance of social acceptability in determining the success of management interventions (Christie 2004; Abernethy *et al.* 2013; Voyer *et al.* 2014). NSW marine park planning processes were consistent with protected area planning practices across the country and the world, in which the complex dynamics of the social system are simplified by categorising or segmenting the community into stakeholder groups along the lines of use type. This fits nicely with the biological approach to planning because it allows planners to directly assign specific ecological threats to a distinct group of people, and therefore managing the threat becomes a relatively simple matter of managing those people. Unfortunately this approach is problematic because it tends to assume these groups are distinct, homogenous collections of people with similar values, beliefs, ideas and practices. In fact, there can be as much diversity within user groups as there is across them (Voyer *et al.* 2015b). In addition, focussing on use type alone, and labelling some as being a ‘threat’ can lead to value judgements being made about the users as well as the use – creating ‘good guys’ and ‘bad guys’ within a debate, polarising the community and mobilising lobby groups. This was certainly the case in the BMP where the animosity between fishers and the conservation sector became so intense that property was damaged, threats were made against individuals, a conservation group was ‘infiltrated’ and an attempted takeover staged and the local newspapers were flooded with enraged, often vicious letters from both sides (Voyer *et al.* 2013b).

The make-up of the social system is far more complex than a simple segmentation based on use type alone allows. In fact a range of ‘mental models’ or worldviews can exist within and across stakeholder groups and people’s adherence to them can be fluid, intersecting and sometimes contradictory (Thompson 2007; Voyer *et al.* 2015b). While some within the community gain a sense of peace and comfort from seeing areas closed to human extraction, others view this as an assault on their identity and their relationships with their environment and social networks. These areas of conflict are important to understand, but perhaps more important are the surprising number of shared values that appear to exist across use types that can be used as the basis of consensus building and empathy (Sweeney Research 2014; Voyer *et al.* 2015b).

Conclusions

It is important that conservation planning, and protected area selection and management be based on rigorous, comprehensive and well-designed scientific research. The knowledge gained through the natural sciences about the systems to be managed is crucial to informing the best possible approaches to protecting them. A commensurate

level of attention, however, needs to be applied to understanding the social systems that also play a huge role in determining the best protection measures and approaches. An integrated approach, across the biological and social sciences, may provide a new way of meeting some of the challenges of protected area planning. So what does the BMP experience teach us that will assist in future MPA selection and planning?

One of the most pressing issues that needs to be resolved early on in a planning process is the objectives that a protected area is trying to achieve, and whether these objectives are well understood and accepted by the local community. A major influence on the social acceptability of the BMP centred on arguments around its necessity and effectiveness, a debate largely carried out in conflicting realms based on different conceptions of what the park was (or should be) trying to achieve. This problem was partly about communication and partly about a lack of initial consensus building within the local community. Effective communication around the importance of protecting marine biodiversity is important but these communication efforts need to take into account the different systems of knowledge and views of the natural world that exist within the community (Gill 2003; Lakoff 2010). Science alone is not sufficient to convince communities of the need for MPAs or their value in achieving conservation outcomes. Planning processes therefore need to acknowledge and accommodate alternative forms of knowledge, going beyond education to encourage two-way dialogue and exchange of ideas (Gill *et al.* 2009; Coffey and O'Toole 2012). Different groups within the community will have different ideas of the values they wish to see protected in their area and how that should be achieved. Involving the community in setting local objectives means that the planning process begins with a common understanding of what it is trying to achieve. Once some level of consensus is reached on MPA objectives they can provide a framework to guide the serious work of making trade-off decisions.

Incorporating 'bottom-up' approaches into communication and engagement strategies will also allow for a greater diversity of voices to be heard and acknowledged, protecting the planning processes against the level of polarisation seen in the BMP. An understanding of the different value systems that operate within the community can help to break down misunderstandings and stereotypes across different sectors, ensure representation of a greater diversity of voices in MPA negotiations and begin to challenge the value judgements of sectoral interest groups based solely on their type of use.

The BMP experience also demonstrates that engaging local communities also needs to go beyond large-scale consultation processes to include more rigorous, integrated social, economic and ecological assessment exercises, involving a collaborative participatory approach (Sayce

et al. 2013). This involves extensive and comprehensive engagement of local communities, stakeholders and interested parties, as a means of informing social assessment rather than as a proxy for social assessment (IUCN 2000; Bright *et al.* 2003, Interorganisational Committee on Guidelines and Principles 2003; Vanclay 2003; Bureau of Rural Sciences 2005; Andre *et al.* 2006, Voyer *et al.* 2012; Sayce *et al.* 2013). MPA exercises such as those in NSW, used large scale public consultation as a way of identifying potential social impacts and mitigating their effects by avoiding, minimising or providing compensation for the loss of highly valued areas (eg. see Fox *et al.* 2013). This technique has not always been successful, however, in adequately assessing or predicting the nature and extent of impacts within a given community. The social impacts of the BMP fell disproportionately on the smallest user groups in the area – small scale commercial fishers and Indigenous communities. While consultation with these groups was extensive, these processes appeared to largely follow a 'deficit model' of public engagement. This model aims to build support for a proposal through education, based on the assumption that opposition can be attributed to limited knowledge, rather than alternative, yet rational, interpretations of the available information (Gill *et al.* 2009). So while the public may have had numerous opportunities to 'have their say', stakeholders felt their views had not been heard or considered (Voyer *et al.* 2014). In addition, the needs and voices of smaller groups within the community were often overwhelmed by a larger ideological debate between the two biggest stakeholder groups – the recreational fishing and conservation sectors (Voyer *et al.* 2012, 2014). This approach can also have significant implications for the biological success of MPAs if it translates into avoiding controversial areas, which may also be important areas of biodiversity or be in greatest need of protection (De Santo 2013; Hunt 2013; Pressey 2013). The enormous expense involved in large scale consultation exercises may therefore be better directed towards targeted, rigorous social analysis including long term data collection strategies around social values and uses.

Finally, the BMP experience demonstrates that context is important and that planning processes need to recognise the individual and unique needs of each affected community (Vanclay 2012; Jones *et al.* 2013). Rigid ideas around the best means of achieving biodiversity protection combined with 'a one size fits all' approach to planning and community engagement are likely to exacerbate conflict and division and stimulate opposition. Customising planning exercises to take into account the diversity of ways in which communities interact with their environment may make these processes more complex. Looking to the complexity within the human environment, however, will teach us important lessons on how we can do things better – in a way that celebrates the diversity of the human condition in the same way we celebrate the diversity of marine life.

Acknowledgements

We wish to thank the organisers of this special issue of *Australian Zoologist*, in particular Pat Hutchings, for the invitation to submit this paper. The final version of this paper was improved by helpful comments from reviewers. We acknowledge the contributions of our colleagues who collaborated with us in our research and contributed to the development of the ideas presented

in this paper: K. Barclay, T. Dreher, N. Gollan, and H. Goodall. The research was conducted with the approval of the UTS Human Research Ethics Committee. We wish to also acknowledge the participants in the research that underpinned this paper, the fishers and community members in the Port Stephens Great Lakes and Batemans Marine Parks.

References

- Abernethy, K., Daw, T., Cinner, J., Robinson, J. and Allison, E. 2013. Small-scale fishers' responses to spatial closures: The coevolution of rules, ecology and behaviour. University of Exeter, University of East Anglia.
- Andre, P., Enserink, B., Connor, D. and Croal, P. 2006. *Public Participation International Best Practice Principles* (International Association for Impact Assessment: Fargo, USA).
- ANZECC (Australian and New Zealand Environment and Conservation Council). 1998. *Guidelines for Establishing the National Representative System of Marine Protected Areas* (Environment Australia: Canberra).
- ANZECC TFMPA (Australian and New Zealand Environment and Conservation Council Task Force on Marine Protected Areas). 1999. *Strategic Plan of Action for the National Representative System of Marine Protected Areas: A Guide for Action by Australian Governments* (Environment Australia: Canberra).
- Babcock, R.C., Kelly, S., Shears, N.T., Walker, J.W. and Willis, T.J. 1999. Changes in community structure in temperate marine reserves. *Marine Ecology Progress Series* 189: 125–134.
- Bartley, R., Corfield, J.P., Hawdon, A.A., Kinsey-Henderson, A.E., Abbott, B.N., Wilkinson, S.N. and Keen, R.J. 2014. Can changes to pasture management reduce runoff and sediment loss to the Great Barrier Reef? The results of a 10-year study in the Burdekin catchment, Australia. *The Rangeland Journal* 36: 67–84.
- Beeton, R.J.S., Buxton, C.D., Cutbush, G.C., Fairweather, P.G., Johnston, E.L. and Ryan, R. 2012. *Report of the Independent Scientific Audit of Marine Parks in New South Wales* (NSW Department of Primary Industries and Office of Environment and Heritage: NSW).
- Bright, A.D., Cordell, H.K., Hoover, A.P. and Tarrant, M.A. 2003. *A Human Dimensions Framework: Guidelines for Conducting Social Assessments* (United States Department of Agriculture Forest Service, Southern Research Station: Asheville NC).
- Britton, E. and Coulthard, S. 2013. Assessing the social wellbeing of Northern Ireland's fishing society using a three-dimensional approach. *Marine Policy* 37: 28–36.
- Brodie, J.E., Kroon, F.J., Schaffelke, B., Wolanski, E.C., Lewis, S.E., Devlin, M.J., Bohnet, I.C., Bainbridge, Z.T., Waterhouse, J. and Davis, A.M. 2012. Terrestrial pollutant runoff to the Great Barrier Reef: An update of issues, priorities and management responses. *Marine Pollution Bulletin* 65: 81–100.
- Bureau of Rural Sciences. 2005. *Socio-economic Impact Assessment Toolkit: A Guide to Assessing the Socio-economic Impacts of Marine Protected Areas in Australia* (Bureau of Rural Sciences: Canberra).
- Christie, P. 2004. Marine Protected Areas as biological successes and social failures in Southeast Asia. *American Fisheries Society Symposium* 42: 155–164.
- Coffey, B. and O'Toole, K. 2012. Towards an improved understanding of knowledge dynamics in integrated coastal zone management: A knowledge systems framework. *Conservation and Society* 10: 318–329.
- De Santo, E.M. 2013. Missing marine protected area (MPA) targets: How the push for quantity over quality undermines sustainability and social justice. *Journal of Environmental Management* 124: 137–146.
- Dobbs, K., Fernandes, L., Slegers, S., Jago, B., Thompson, L., Hall, J., Day, J., Cameron, D., Tanzer, J., Macdonald, E., Marsh, H. and Coles, R. 2008. Incorporating dugong habitats into the marine protected area design for the Great Barrier Reef Marine Park, Queensland, Australia. *Ocean & Coastal Management* 51: 368–375.
- Edgar, G.J., Stuart-Smith, R.D., Willis, T.J., Kininmonth, S., Baker, S.C. et al. 2014. Global conservation outcomes depend on marine protected areas with five key features. *Nature* 506: 216–220.
- Fernandes, L., Day, J., Lewis, A., Slegers, S., Kerrigan, B. et al. 2005. Establishing representative no-take areas in the Great Barrier Reef: large-scale implementation of theory on marine protected areas. *Conservation Biology* 19: 1733–1744.
- Fox, E., Miller-Henson, M., Ugoretz, J., Weber, M., Gleason, M., Kirlin, J., Caldwell, M. and Mastrup, S. 2013. Enabling conditions to support marine protected area network planning: California's Marine Life Protection Act Initiative as a case study. *Ocean & Coastal Management* 74: 14–23.

- Gill, N. 2003. Environmental (re)education and local environmental knowledge: statutory ground-based monitoring and pastoral culture in central Australia. *The Rangeland Journal* 25: 85–104.
- Gill, N., Waite, G. and Head, L. 2009. Local engagements with urban bushland: Moving beyond bounded practice for urban biodiversity management. *Landscape and Urban Planning* 93: 184–193.
- Gladstone, W. 2009. Conservation and management of tropical ecosystems. Pp. 565–605 in *Ecological Connectivity among Tropical Coastal Ecosystems*, edited by I Nagelkerken (Springer: Dordrecht).
- Gladstone, W. 2014. Criticisms of science, social impacts, opinion leaders, and targets for no-take zones led to cuts in New South Wales' (Australia) system of Marine Protected Areas. *Aquatic Conservation: Marine and Freshwater Ecosystems* 24: 287–296.
- GBRMPA (Great Barrier Reef Marine Park Authority). 2014. *Great Barrier Reef Outlook Report 2014* (GBRMPA: Townsville).
- King, T.J., Kilpatrick, S. and Willis, K. 2014. Staying Healthy: Industry Organisations' Influence on Behaviours and Services used by Fishers. *Report to the Fisheries Research and Development Corporation*. Project No. 2012/402, Canberra.
- Harrison, H.B., Williamson, D.H., Evans, R.D., Almany, G.R., Thorrold, S.R. et al. 2012. Larval export from marine reserves and the recruitment benefit for fish and fisheries. *Current Biology* 22: 1023–1028.
- Hunt, C. 2013. Benefits and opportunity costs of Australia's Coral Sea marine protected area: A precautionary tale. *Marine Policy* 39: 352–360.
- IUCN (International Union for Conservation of Nature). 2000. *Policy on Social Equity and Sustainable Use of Natural Resources* (International Union for Conservation of Nature Council: Gland).
- Interorganisational Committee on Guidelines and Principles. 2003. Guidelines and principles for social impact assessment. *Impact Assessment and Project Appraisal* 21: 231–250.
- Jones, P.J.S., Qiu, W. and De Santo, E.M. 2013. Governing marine protected areas: Social-ecological resilience through institutional diversity. *Marine Policy* 41: 5–13.
- Kelaher, B.P., Coleman, M.A., Broad, A., Rees, M.J., Jordan, A. and Davis, A.R. 2014. Changes in fish assemblages following the establishment of a network of no-take marine reserves and partially-protected areas. *PLoS ONE* 9(1): e85825. doi:10.1371/journal.pone.0085825
- Lakoff, G. 2010. Why it matters how we frame the environment. *Environmental Communication: A Journal of Nature and Culture* 4: 70–81.
- McCook, L.J., Ayling, T., Cappo, M., Choat, J.H., Evans, R.D. et al. 2010. Adaptive management of the Great Barrier Reef: A globally significant demonstration of the benefits of networks of marine reserves. *Proceedings of the National Academy of Sciences* 107: 18278–18285.
- Marine Parks Authority NSW. 2008. *Solitary Islands Marine Park. Summary of Social, Cultural and Economic Uses* (Marine Parks Authority NSW: Sydney).
- Minnegal, M. and Dwyer, P.D. 2008. Managing Risk, Resisting Management: Stability and Diversity in a Southern Australian Fishing Fleet. *Human Organization* 67: 97–108.
- Montaz, S. and Gladstone, W. 2008. Ban on commercial fishing in the estuarine waters of New South Wales, Australia: Community consultation and social impacts. *Environmental Impact Assessment Review* 28: 214–225.
- NSW MPA (New South Wales Marine Parks Authority). 2001. *Developing a Representative System of Marine Protected Areas in NSW – an Overview* (Marine Parks Authority: Sydney).
- Paxevanos, R. 2015. Balancing fishing and conservation: It's not one or the other. Fishing with Rob Paxevanos. www.robpax.com.
- Pollnac, R.B. and Poggie, J.J. 2008. Happiness, well-being and psychocultural adaptation to the stresses associated with marine fishing. *Human Ecology Review* 15: 194–200.
- Pressey, R.L. 2013. Australia's new marine protected areas: why they won't work. *The Conversation* (<http://theconversation.com/australias-new-marine-protected-areas-why-they-wont-work-11469>).
- Rees, S.E., Rodwell, L.D., Searle, S. and Bell, A. 2013. Identifying the issues and options for managing the social impacts of Marine Protected Areas on a small fishing community. *Fisheries Research* 146: 51–58.
- Russ, G.R. and Alcala, A.C. 2011. Enhanced biodiversity beyond marine reserve boundaries: The cup spillith over. *Ecological Applications* 21: 241–250.
- Sayce, K., Shuman, C., Connor, D., Reisewitz, A., Pope, E., Miller-Henson, M., Poncelet, E., Monié, D. and Owens, B. 2013. Beyond traditional stakeholder engagement: Public participation roles in California's statewide marine protected area planning process. *Ocean & Coastal Management* 74: 57–66.

- Song, A.M., Chuenpagdee, R. and Jentoft, S. 2013. Values, images, and principles: What they represent and how they may improve fisheries governance. *Marine Policy* 40: 167–175.
- State of the Environment 2011 Committee. 2011. *Australia State of the Environment 2011. Independent report to the Australian Government Minister for Sustainability, Environment, Water, Population and Communities* (DSEWPoC: Canberra).
- Sweeney Research. 2014. *Marine Estate Community Survey – Final report* (NSW Marine Estate Management Authority: Sydney).
- Thompson, R. 2007. Cultural models and shoreline social conflict. *Coastal Management* 35: 211–237.
- Vanclay, F. 2003. International principles for social impact assessment. *Impact Assessment & Project Appraisal* 21: 5–11.
- Vanclay, F. 2012. The potential application of social impact assessment in integrated coastal zone management. *Ocean & Coastal Management* 68: 149–156.
- Voyer, M., Dreher, T., Gladstone, W. and Goodall, H. 2013a. Carving the stake: dodgy science or global necessity? Local media reporting of marine parks. Pp 153–168 in *Environmental Conflict and the Media*, edited by L Lester and B Hutchins (Peter Lang: New York).
- Voyer, M., Dreher, T., Gladstone, W. and Goodall, H. 2013b. Who cares wins: The role of local news and news sources in influencing community responses to marine protected areas. *Ocean & Coastal Management* 85 (Part A): 29–38.
- Voyer, M., Gladstone, W. and Goodall, H. 2012. Methods of social assessment in Marine Protected Area planning: Is public participation enough? *Marine Policy* 36: 432–439.
- Voyer, M., Gladstone, W. and Goodall, H. 2014. Understanding marine park opposition: the relationship between social impacts, environmental knowledge and motivation to fish. *Aquatic Conservation: Marine and Freshwater Ecosystems* 24: 441–462.
- Voyer, M., Gladstone, W. and Goodall, H. 2015a. Obtaining a social licence for MPAs – influences on social acceptability. *Marine Policy* 51: 260–266.
- Voyer, M., Gollan, N., Barclay, K. and Gladstone, W. 2015b. 'It's part of me'; understanding the values, images and principles of coastal users and their influence on the social acceptability of MPAs. *Marine Policy* 52: 93–102.