

Citation: Authors list as below (2006) Paper title as below. Pp. 1511-1516. In: Proceedings of 10th International Coral Reef Symposium. June 28th to July 2nd 2004. Okinawa, Japan.

Weaving an “ideal” design of no-take Marine Protected Areas into the real world: the Great Barrier Reef case study

Leanne FERNANDES, Jon DAY, Belinda JAGO, James HALL, Kirsti SAMPSON, Darren CAMERON, James INNES, John TANZER, Adam LEWIS, Dave LOWE, Kerrie GORMAN and Bruce KINGSTON

Abstract Well-designed biophysical principles that operationalise a system-wide approach were an essential foundation for building a network of no-take areas within the Great Barrier Reef Marine Park. But they alone were not sufficient. People’s uses, knowledge and value systems needed to be explicitly and demonstrably integrated into the planning process for many reasons: to ensure all available information was considered; to avoid, as far as possible, negative social, economic or cultural impacts, and to generate the maximum possible level of ownership of the outcomes. Bringing these uses and values into planning was extremely resource intensive, difficult and imperfect, but for the Great Barrier Reef, there was no other option. A high degree of community engagement was achieved through:

- social, economic and cultural operational principles that coupled with the biophysical principles;
- public distribution of both sets of principles and other key planning components such as the map of bioregions;
- invitations for input as to where new no-take areas should and should not be located to help develop a draft zoning plan; and
- a second round of discussions and feedback to revise the draft plan.

Distribution of information occurred through a variety of means: meetings, letters, web, compact discs, email, advertisements in newspapers, media releases, community information sessions, community access points and a freecall (toll-free) number. A high level of engagement was also sought with key political players. All bases for zoning decisions were documented to reflect what was known about all the biological and human values that were relevant to the area being zoned.

Keywords: Marine park, Great Barrier Reef, zoning, socioeconomic, reef management

Introduction

The best designed Marine Protected Areas (MPAs) (or networks of MPAs) are useless if not implemented.

Some may advocate that we should dispel with efforts to plan for well-designed networks of protected areas in situations where rates of site degradation or availability are outstripping efforts for implementing a holistic planning regime (Meir *et al* 2004). This argument does not apply so well to the marine environment where rates of degradation and private ownership of the resources is a lesser issue (Davis 2004).

While the design principles behind the Great Barrier Reef Marine Park’s new network of no-take protected areas were not, in fact, “ideal”, they were recommended by scientists who possess over 200 years combined research experience in the Great Barrier Reef ecosystem and who used the latest available information. These eleven biophysical principles were a critically important part of delivering an ecologically meaningful output in terms of a new Zoning Plan for the Great Barrier Reef Marine Park. These principles included protecting a minimum of 20% of each of the 70 biological regions (“bioregions”) in no-take areas as well as protecting minimum amounts of the variety of habitats known to exist within these regions.

The recommended principles provided operationally useful guidance for managers of the Great Barrier Reef ecosystem. Theoretical design principles discussed in the literature, such as minimum size requirements, replication, protection of representative examples of habitats, protection of outstanding and special and/or unique sites or processes, provided a basis for the biophysical principles (see special issue of Ecological Applications 13(1) 2003 on the Science of Marine Reserves).

Although these biophysical operational principles played a critical role and helped to achieve an adequate network of no-take zones in the Great Barrier Reef Marine Park, they were by no means the sole determinant.

Christie *et al* (2003) assert the prerequisite of integrating social factors into the process of designing marine protected areas to a successful outcome. Early on in developing the biophysical operational

principles, the GBRMPA realised the importance not only of accommodating human issues into decision-making (this was already known) (White *et al* 1994, Alder 1996, Machlis *et al* 1997), but also of ensuring a parallel process whereby this occurred. This helped to *demonstrate* that the GBRMPA was aware of the importance of cultural, social and economic considerations in the Representative Areas Program (RAP). For other cases, it is likely to be similarly important not just to weave human uses and values into decision-making, but to be able to demonstrate, transparently, how this is occurring.

This paper discusses some of the other, more social, factors that ensured that the operational principles were actually implemented in the form of a new Zoning Plan that became law for the Great Barrier Reef Marine Park in 2004. It also relates the lessons learned in the case of the Great Barrier Reef for the broader marine resource management community.

Methods and Results

Setting objectives

Originally, staff of the GBRMPA defined the objectives of the Representative Areas Program (RAP) with regard to the objectives of the organisation as a whole, the 25 Year Strategic Plan for the Great Barrier Reef World Heritage Area (GBRMPA 1994), the National Ocean's Policy (Environment Australia, 1998), and the ANZECC guidelines (ANZECC 1998). This led to the following objectives:

To help

- a. maintain biological diversity at the ecosystem, habitat, species, population and genetic levels;
- b. allow species to function undisturbed;
- c. provide an ecological safety margin against human-induced and natural disasters;
- d. provide a solid ecological base form which threatened species or habitats can recover or repair themselves; and
- e. maintain ecological processes and systems.

Following the advice of approximately 70 Great Barrier Reef system scientists interviewed early in the program, the GBRMPA established an independent Scientific Steering Committee. Two of their main tasks were to provide information on the process and outputs of the Representative Areas Program. This included working with the GBRMPA planners to develop a map of bioregions, providing a description of the biological diversity of the Great Barrier Reef World Heritage Area, and providing biophysical operational principles to guide the program to achieve the objectives listed above. The Scientific Steering Committee advised that the objectives provided to them were too broad for them to be able to offer advice on how best to achieve them.

This led to the development of more detailed objectives. For example, helping to maintain biological diversity at the ecosystem level included maintaining coral reefs, *Halimeda* beds, seagrass habitats, inshore soft seabed communities, GBR lagoon communities, inter-reefal areas, algal gardens, planktonic systems, continental slope communities, continental trenches and other ecosystems. Ultimately, objective (a) above comprised 19 detailed objectives, objective (b) above comprised 27 detailed objectives and so on. For the purposes of the Scientific Steering Committee's request regarding the Representative Areas Program, the more detailed objectives were sourced from the *Great Barrier Reef Marine Park Act 1975* and *Regulations 1983*, the 25 Year Strategic Plan for the Great Barrier Reef World Heritage Area (GBRMPA 1994), the Corporate Plan (GBRMPA 1997) the GBRMPA internal Strategic Work Program and interviews with GBRMPA staff and many stakeholders.

Discussing the problem

Our communications strategy originally focussed on the value of biodiversity and how better to protect it; not the problem that the Great Barrier Reef was under threat. Our provision of a "solution" when the problem was poorly understood was an error (Thompson *et al* 2004). We refocussed on the problem including incorporation of the general public into our list of "target audiences". We described what biodiversity was, why it mattered to each of our target audiences and discussed the various pressures on the ecosystem that threatened to degrade the biodiversity of the reef system. Some of the messages were delivered through simple television community service announcements, others through existing mechanisms including meetings, periodic update newsletters and media releases.

A random telephone sample of the community to assess the effectiveness of our messages found an increase in the number of people who considered the Great Barrier Reef to be under threat (42% in 2001 (Moscardo 2001), 82% in 2004 (AEC 2004)). This provided a much stronger platform from which to launch the solution (or at least part of the solution), the Representative Areas Program.

Biophysical operational principles

As mentioned, the biophysical operational principles were not derived by the GBRMPA but by the independent Scientific Steering Committee in collaboration with other scientific experts. This committee was requested to provide scientific advice not tempered by cultural, social or economic considerations. It was explained that another independent expert group would derive the cultural, social and economic principles to guide the RAP.

The biophysical operational principles were also clearly defined as independent recommendations to the GBRMPA, not fixed rules from which there would never be any deviation. In short, the committee provided guidance for the decision-makers who remained the GBRMPA and, ultimately, the Federal Parliament (Day et al, 2003; Fernandes et al. in prep, http://www.gbrmpa.gov.au/corp_site/key_issues/conservation/rep_areas/info_sheets.html).

Social, economic, cultural and management feasibility operational principles

Through a similar process an independent Social, Economic and Cultural Steering Committee was established and, in a similar manner to the Scientific Steering Committee, delivered Social, Economic, Cultural and Management Feasibility Operational Principles (see http://www.gbrmpa.gov.au/corp_site/key_issues/conservation/rep_areas/info_sheets.html).

These principles were made public together with the Biophysical Operational Principles during the first formal Community Participation phase, and the public were advised that both sets of principles were important components of the overall planning process.

Engagement of users and the community

A phased communication strategy was developed that defined objectives per target audience, key messages, communication tools and responsibilities across the agency and timelines.

Early consultation with the community started almost at the same time as the RAP in 1999, well before the first formal Community Participation phase in 2002. Hundreds of meetings were held in this time. Additionally, interested people were placed on a database and sent updates on the status of the RAP. Our website was developed and information was also provided through the web.

Simultaneously, community groups and other organisations became highly engaged in the process indicating a high level of interest and involvement albeit with a variety of motivations.

Ongoing interactions with users and the community

All interested people who wanted to be kept informed about the RAP were sent information about the GBRMPA's first formal Community Participation phase. Additionally, the GBRMPA:

- advertised our intent to revise the different levels of protection offered in the Great Barrier Reef Marine Park (termed "zoning", Day 2002) to improve the protection of biodiversity;
- provided a free call telephone number that people could access;

- provided all the relevant information on the website and at regional Marine Parks offices;
- convened information sessions in all 40 regional centres; and
- held meetings with a wide variety of stakeholder groups.

During the first formal Community Participation phase there were accusations that we already had developed new zoning maps for the Great Barrier Reef Marine Park, including comments like "*Why don't you just go public with the new zoning maps?*". . It was a "no-win" situation. If we had actually produced maps without formal public input that would have been even more negatively perceived. It would have led to consternation on the parts of users that they had not had a chance for early input and the initial maps could have been wildly off the mark regarding reflecting information about use that was not already available in datasets.

In the end, the GBRMPA received an unprecedented 10 190 formal submissions to help prepare a draft Zoning Plan. In the history of the GBRMPA, this was more than every single previous zoning process combined. Thousands of blank maps provided by the GBRMPA at a scale of 1:250 000 were sent in detailing people's uses, values and reasons for requesting that particular locations be protected from or remain available for extractive activities such as fishing.

Political engagement

Concerned citizens often turn to their elected representatives for answers to questions or solutions to problems, be they mayors, or members of State or Federal Parliaments. While the policy to increase protection of the Great Barrier Reef Marine Park had multi-party support, this did not mean that political representatives heard only the good news from their constituents. Quite the opposite. Those that were satisfied with the new proposals to protect the Reef were likely to be complacent and those that were unhappy or concerned were likely to make themselves known to their elected representatives. Knowing this, we implemented a targeted communication strategy to develop personal relationships with and provide information to all elected members with an interest in the Great Barrier Reef Marine Park rezoning, irrespective of their political affiliation. In this way, politicians both had the relevant information ahead of their constituents who might have questions and also had a personal contact within the GBRMPA who they could ask for advice, input or assistance on any matter. As far as possible, we also documented all our written and face-to-face meetings with elected representatives in the case that we were asked to prove that we had made the effort to keep relevant politicians sufficiently informed (subsequently we were asked to provide such evidence).

Community input into decision-making

The information provided formally through submissions, as well as data previously available in datasets, plus the years of knowledge that GBRMPA staff had gained regarding people's uses and values all significantly influenced development of the draft Zoning Plan that implemented the majority of the principles.

Upon delivery of the draft Zoning Plan for comment, over 20 000 users and interested parties provided even more detailed and specific information. This was for a number of reasons. For some, the rezoning of the Great Barrier Reef Marine Park and the RAP were not real until they saw a draft Zoning Plan. Others had perhaps been less than precise in supplying information on the surmise that it would not be used in good faith. When the GBRMPA tried to avoid areas they said they fished, for example, suddenly they found the areas they had not mentioned (which they actually fished) were proposed to be closed to fishing. For still others, having lines on maps to respond to meant they had a better idea of what kind of information they could supply on what locations to ensure the final Zoning Plan was even more reflective of their requirements.

Some community groups collaborated on formal submissions in response to the draft Zoning Plan combining input from recreational fishers, town councils, commercial fishers and other community groups with consideration of the requirements of the biophysical operational principles. Hundreds or thousands of signatures supported some of these group submissions. Obviously, where unanimous local submissions provided solutions that satisfied the biological requirements of the program they were extremely influential in the decision-making process. The process of creating the Zoning Plan is described in more detail in (Great Barrier Reef Marine Park Authority, in prep, Fernandes et, al in press)

Discussion

The process and outcomes for the Great Barrier Reef Marine Park had many relatively unique aspects for a marine park including:

- the power of strong federal legislation (the *Great Barrier Reef Marine Park Act 1975*);
- the few jurisdictions involved (despite the enormous area, only one State government and the Federal Government);
- the comparatively high, albeit still imperfect, level of knowledge;
- comparatively stable economy and political environment; and
- the reasonable level of resourcing of the management agencies responsible for it.

Other Marine Park initiatives struggle far more due less favourable exogenous factors (Alder 1996).

None-the-less, the process implemented in this case study and the outcomes generated have generic relevance to other Marine Park planning processes in that lessons were learned that apply beyond the case of the Great Barrier Reef.

External, independent advice from trusted experts proved to provide an absolutely essential foundation for the rezoning process in two ways:

- subsequent decisions were then based upon the very best available information and,
- the independence of the advice, and the clear separation of the scientific advisors from the management agency and the decision makers, gave that advice more credibility and influence in the process.

This may be true for other marine park managers. One extremely useful piece of guidance offered by these experts has generic application: to be specific and detailed as to the objectives of the program. Specific and detailed objectives enabled delivery of specific and detailed advice in terms of planning principles. Additionally, now that the new Zoning Plan is law, they provide clear directions for what can and should be monitored to indicate achievement of the zoning objectives. These obvious insights have been recognised before (e.g. Hockings et al 2000, Pomeroy *et al* 2004) but are not, in some cases, actioned. External, expertise-based pressure to ensure well-defined objectives can be influential and, finally, helpful to the success of the program.

Development of both sets of operational principles was vital to the program on the Great Barrier Reef and may prove useful elsewhere. Most principles are generic and not necessarily prescriptive for particular areas especially if one has biodiversity or ecosystem conservation objectives versus species-specific objectives (e.g. ANZECC 1998, Botsford et al 2003, Palumbi 2003). While useful, these higher-level principles may or may not be appropriate or provide the operational detail needed for management of each one of the wide variety of marine habitats and communities. To augment such general advice, others may also find it powerful to develop expertise-based, ecosystem-specific and operational principles that are site appropriate and can be implemented on the water. The independence of the advice that led to the biophysical operational principles from the advice that led to the social, economic and cultural operational principles was also extremely useful. It made any trade-offs between them explicit and transparent. In decision-making, any reduction in implementation of, say, a biophysical principle was in favour of a social principle. This enabled the management agency to demonstrate their responsiveness to people's needs. Similarly, where zoning choices favoured ecological values over people's uses or values, the compromise could be clearly articulated. If the biological scientific advice provided had already been modified by the

scientist's own considerations of cultural, social or economic factors then it would have been difficult, if not impossible, to demonstrate the balancing of decisions between biological and human impact considerations. Enabling explicit trade-offs through separate definition of the variety of objectives and principles may be useful for other managers.

The independence of the experts from the decision-makers, coupled with an environment of trust, ensured full and frank advice. The trust existed in part due to pre-existing relationships but also through open sharing of information, concerns, uncertainty: vulnerabilities in fact. This was further fostered through acceptance of the scientists' need to provide a context to, and qualification of, their recommendations.

Initial efforts at community engagement were not as effective as was ultimately required to deliver the RAP. The GBRMPA had made assumptions about people's understanding of what biodiversity was, why it mattered and why it was under threat. Bunce *et al* (1999) showed the value of a strong understanding of the community within which managers are operating. In the case of the Great Barrier Reef, we originally failed to communicate the problem. In 2001, for example, Moscardo found that only about 42% of a random sample of local Queensland and other Australians thought the Great Barrier Reef might be in worse condition in the future. Recognition of, and addressing, this failure to communicate the problem – and thereby enhancing the acceptability of the management response – was a cornerstone in our final success and a basic lesson in communications for all. By 2004, when the new Zoning Plan became law, 82% thought the Great Barrier Reef ecosystem was under threat and were therefore more supportive of a "solution" (AEC 2004).

In the planning process, we were satisfied that inviting input to the decision-making process was a superior avenue to effective community engagement and delivered a better outcome in terms of zoning. This approach was derived from years of experience both in the Great Barrier Reef (Kenchington 1990, Day 2002) and that gleaned from other parts of the world (White *et al* 1994, Roberts and Hawkins 2000, Treby and Clark 2004). After presenting the problem at hand, the community's energy focussed on where best to locate new no-take areas. While we invited discussion regarding the principles and they were made widely available, they were not subject to revision by the public. We believed that we had gathered the very best advice to craft the recommendations and that public review of the principles would provide the opportunity for vested interests to change the principles without the purpose of furthering the greater public good. The principles were, in fact, largely accepted partly due to the fact that the final location of any no-take areas was of far greater interest than the mechanisms whereby we might decide on the location. And the mechanisms

outlined, that is, the principles, were sufficiently flexible to accommodate the majority of people's uses and values. Hence another brick in the foundation of the planning program was laid.

Using community input in decision-making assisted along multiple dimensions:

- it helped design the best possible network of protected areas in terms of both biological and socio-economic/cultural objectives because we were able to access accurate, detailed and timely information about local uses and values whether human-related or biological;
- because the management agency was then able to minimise impacts on areas important for say, local fishers, and could demonstrate this in the final map of zoning, local communities were more willing and able to comply with the final outcomes;
- seeing their input reflected in at least part of the final outcome (and no community or individual's needs were perfectly reflected) demonstrated their power in the process of improving management of the environment and this increased control and ownership is helping to enhance stewardship. For example, public reporting of incidents of potential non-compliance to marine park rules has increased over the years the community has been more engaged in helping to rezone the Great Barrier Reef Marine Park. This kind of result has been recognized more broadly as a positive consequence of effective community participation (Webler *et al* 1995).

The executive of the management agency realised the importance of relevant politicians as both influential with their constituencies and with their governments but also as a source of information for constituents. Recognition of this component of the ecosystem management has been discussed (Machlis *et al* 1997). It was ensured that they were kept highly informed and connected to the management agency regardless of their political persuasion or level of support for the RAP. This helped mitigate against two things:

1. misinformed politicians who felt beleaguered from particular constituents and who felt they had nowhere to go for assistance; and
2. accusations that the GBRMPA made no effort to maintain communications with these representatives of the people.

All of the GBRMPA's efforts did not, however, lead to a completely supportive community and political environment. Inevitably there remained unhappy constituents who had a variable degree of success motivating politicians to act on their behalf – even after the new zoning became law. A key lesson here, which highlighted a known fact rather than revealed new insights, is that a coral reef manager cannot expect to

adequately protect a large ecosystem that is heavily used without conflict and dissidence to some degree.

References

- AEC (2004) Great Barrier Reef Marine Park Authority – Coastal Research – 2004. Townsville, AEC.
- Alder J (1996) Have tropical Marine Protected Areas worked? An initial analysis of their success. *Coastal Management* 24: 97-114.
- ANZECC Task Force on Marine Protected Areas (1998) Guidelines for establishing the National Representative System of Marine Protected Areas. Canberra, Environment Australia.
- Botsford LW, Micheli F, Hastings A (2003) Principles for the design of marine reserves. *Ecological Applications* 13(1): 25-31.
- Bunce L, Gustavson K, Williams J, Miller M (1999) The human side of reef management: a case study analysis of the socioeconomic framework of Montego Bay Marine Park. *Coral Reefs* 18:369-380.
- Christie P, McCay BJ, Miller ML, Lowe C, White AT, Stoffle R, Fluharty DL, McManus LT, Chuenpagdee R, Pomeroy C, Suman DO, Blount BG, Huppert D, Eisma R-LV (2003) Towards developing a complete understanding: A social science research agenda for marine protected areas. *Fisheries* 28(12): 22-25
- Davis J (2004) Using computer software to design marine reserve networks. *MPA News* 6(4): 1-2.
- Day, J.C. (2002) Zoning – Lessons from the Great Barrier Reef Marine Park *Ocean & Coastal Management* 45:139-156.
- Day, J.C, L Fernandes, A Lewis, G De'ath, S Slegers, B Barnett, B Kerrigan, D Breen, J Innes, J Oliver, TJ Ward and D Lowe (2003) The Representative Areas Program for protecting biodiversity in the Great Barrier Reef World Heritage Area. Proc. 9th Int. Coral Reef Symp., Bali, Indonesia, October 2000, Vol 2.
- Environment Australia (1998) Australia's Oceans Policy. Canberra, Commonwealth of Australia.
- Fernandes L, Day, J, Kerrigan B, Breen D, Mapstone B, Coles R, De'ath G, Done T, Marsh H, Poiner I, Ward T, Williams D, Kenchington R (in prep) Biophysical principles to design a network of no-take areas: the Great Barrier Reef case study. International Marine Protected Areas Congress 2005. Australia.
- Fernandes L, Day J, Lewis A, Slegers S, Kerrigan B, Breen, Cameron D, Jago B, Hall J, Lowe D, Innes J, Tanzer J, Chadwick V, Thompson L, Gorman K, Simmons M, Barnett B, Sampson K, De'ath G, Mapstone B, Marsh H, Possingham H, Ball I, Ward T, Dobbs K, Aumend J, Slater D, Stapleton K (in press) Establishing representative no-take areas over 1/3 of the Great Barrier Reef: large-scale implementation of Marine Protected Area theory with lessons for global application. *Conservation Biology*.
- Great Barrier Reef Marine Park Authority (GBRMPA) (in prep) Report on Zoning. Townsville, GBRMPA.
- GBRMPA (1994) A 25 year strategic plan for the Great Barrier Reef World Heritage Area. Townsville, GBRMPA.
- GBRMPA (1997) The Great Barrier Reef Marine Park Authority Corporate Plan 1997-2001. Townsville, GBRMPA.
- Hocking M, Stolton S, Dudley N (2000) Evaluating effectiveness: a framework for assessing the management of protected areas. Gland, Switzerland and Cambridge UK, IUCN.
- Kenchington RA (1990) Managing marine environments. New York, Taylor and Francis.
- Machlis GE, Force JE, Burch WR (1997) The human ecosystem Part I: The human ecosystem as an organising concept in ecosystem management. *Society and Natural Resources* 10: 347-367
- Meir E, Andelman S, Possingham HP (2004) Does conservation planning matter in a dynamic and uncertain world? *Ecology Letters* 7: 615-622.
- Schimel D (ed) (2003) The science of marine reserves. *Ecological Applications* 13(1)S
- Moscardo G (2001) Public perceptions of the management of the Great Barrier Reef 2001. Cooperative Research Centre for the Great Barrier Reef World Heritage Area Project B2.5 Data Summary Report. Townsville, Reef CRC.
- Palumbi SR (2003) Population genetics, demographic connectivity and the design of marine reserves. *Ecological Applications* 13(1): 146-158.
- Pomeroy RS, Parks JE, Watson LM (2004) How is your MPA doing? A guidebook of natural and social indicators for evaluating marine protected area management effectiveness. Gland, Switzerland and Cambridge UK, IUCN.
- Roberts CM and Hawkins JP (2000) Fully protected marine reserves: as guide. Washington DC, USA, WWF and York, UK, Univeristy of York.
- Thompson L, Jago B, Fernandes L, Day J (in prep.) Barriers to communication – how these critical aspects were addressed during the public participation for the rezoning of the Great Barrier Reef Marine Park.
- Treby EJ, Clark MJ (2004) Refining a practical approach to participatory decision-making: an example from coastal zone management. *Coastal Management* 32:353-372.
- Webler T, Kastenholtz H, Renn O (1995) Public participation in impact assessment: a social learning perspective. *Environmental Impact Assessment Review* 15:443-463.
- White AL, Hale LZ, Renard Y, Cortesi L (1994) Collaborative and community-based management of coral reefs. Lessons from experience. Connecticut USA, Kumarian Press.