chapter five

Elements of international best practice

The design and operation of marine protected areas by numerous countries around the world has generated a wealth of experience from which New Zealand can draw. This chapter synthesises this experience to identify the elements of current international best practice, particularly focusing on the design of marine protected area networks, the identification of management tools, use of stakeholder processes and ongoing monitoring and enforcement.

Marine protected area design

When designing new marine protected areas there are a range of matters which need to be considered including the overall goals to be achieved, the scale of the areas, and the design principles to be applied.

Goals

There is general international agreement that marine protected areas should be designed so that they are capable of protecting a full range of the habitats, species and ecosystem processes present within regional or national jurisdictions. For example, the countries which are party to the OSPAR Convention for the north-east Atlantic have set out what the establishment of marine protected areas should achieve:[1]

a) *Protect, conserve and restore species, habitats and ecological processes which are adversely affected as a result of human activities*

b) *Prevent degradation of and damage to species, habitats and ecological processes, following the precautionary principle*

c) *Protect and conserve areas that best represent the range of species, habitats and ecological processes in the OSPAR area.*

Scale

Two main approaches have been adopted to achieve the goals sought for marine protection. The first has been to create large marine protected areas, and to incorporate a range of management measures within their boundaries, depending on the sensitivity of particular areas. The second has been to create a network of smaller protected areas which together aim to protect all the features of the ecosystem.

Very large marine protected areas are becoming increasingly common – the larger the area, the more likely that an adequately broad range of ecosystem features and processes will be protected. For example, at the time of writing, the Australian government has published proposals to create the world's largest marine protected area in the Coral Sea, extending over approximately 989,842 square kilometres. The proposal includes about half the total area in no-take reserves, with the rest being incorporated into multi-use, single-use and wilderness conservation areas where some recreational and commercial fishing may take place.[2]

Work is also being undertaken to develop marine protected areas in the Cook Islands (one million square kilometres) and in international waters in the Sargasso Sea (five million square kilometres). The United States-based Pew Environment Group is currently campaigning for the establishment of a 6,200 square kilometre 'ocean sanctuary' around the Kermadec Islands within New Zealand's exclusive economic zone.[3]

Significant benefits can be derived from developing large marine protected areas. As noted by the United States National Research Council, "[l]*arger reserves protect more habitats and populations, providing a buffer against losses from environmental fluctuations or other natural factors that may increase mortality and reduce population growth.*"[4] Furthermore, studies have indicated that the establishment and management cost per unit area, at least up to a certain point, can decrease substantially as the size of the marine protected area increases.[5]

Large marine protected areas can also serve to expand protective measures into the open ocean, and in doing so protect not only what we know, but also all the species and ecosystems in the area that are not yet fully understood by science.[6] In addition, they can result in the protection of remote, largely undisturbed areas, such as the lesser used outer parts of exclusive economic zones. This is case with New Zealand's benthic protection areas which exclude trawling and dredging from 17 areas, totalling 1.2 million square kilometres of seabed, with seven of the areas abutting the outer limits of the country's exclusive economic zone.[7] Areas like these are increasingly of scientific and management interest as technological developments enable greater access to these areas, both for scientific study and for exploitation.

Nevertheless there are practical and political barriers to the establishment of very large marine protected areas in many locations, as the needs of users must also be provided for. Policing and enforcement of the rules may also be difficult. The establishment of networks of smaller areas, chosen for their ability to protect different parts of the ecosystem, may be a more practical alternative. Thus the concept of an 'ecologically coherent network' has become the benchmark against

which to assess the effectiveness of marine protection. The IUCN states that "*An MPA network is an organised collection of individual sites, designed to link individual areas and to comprehensively represent the region's spectrum of marine life characteristics.*"[8]

Network design principles

The concept of 'ecological coherence' is still evolving, but a number of bodies have produced guidance for marine protected area projects on how to achieve it. The IUCN has developed criteria for the design of marine protected area networks, emphasising eight principal ecological design criteria:[9]

- **Representativeness** – Networks should represent the range of marine and coastal biological diversity (from genes to ecosystems) and the associated physical environment within the given area. Whereas previously the focus tended to be on habitats and species that are rare or unusual, best practice suggests that design should aim to protect both the range of species and habitats present in the region as well as species and habitats that are rare, threatened or declining.
- **Replication** – All habitats in each region should be replicated within the network and be distributed spatially throughout it. For example, the ecological network guidance for the English marine conservation zones requires the identification of two or more examples of each protected feature.
- **Viability** – Networks should incorporate self-sustaining geographically dispersed component sites of sufficient extent to ensure population persistence through natural cycles of variation. These sites should be independent (as far as possible) of activities in surrounding areas.
- **Precautionary design** – Network designers should base their decisions on the best available information, rather than delaying measures to await more and better information. Where information is limited, designers should adopt a precautionary approach.
- **Permanence** – Network design should provide long-term protection to effectively conserve diversity and replenish resources.
- **Maximum connectivity** – Network design should seek to maximise and enhance the linkages among individual marine protected areas,

groups of marine protected areas within a given region, or networks in the same and/or different regions.

- **Resilience** – Networks should be designed to maintain the natural states of ecosystems and to absorb shocks, particularly in the face of large scale and long term changes (such as climate change). A network will be resilient through the inclusion of replicates of representative habitats within the network, connectivity between sites within the network, ensuring all sites are of a viable size, and effective protection of features within the network.
- **Size and shape** – Individual marine protected area units within the network must be of sufficient size to minimise adverse impacts from activities outside the protective area (avoiding what is called the 'edge effect').

The aim of achieving 'representativeness' is likely to be an aspirational goal, as our understanding of the complexity of the marine environment likely precludes the establishment of marine protected areas which protect examples of all its features. Furthermore, some species are more likely to be effectively protected by spatial measures than others.

The question of how to ensure the long-term resilience of marine protected areas needs to be carefully considered. Allison *et al* have shown that marine protected area design should include buffers which provide insurance against catastrophic events, such as natural disasters and oil spills, which have the potential to prevent marine protected areas from achieving their goals. They argue that although catastrophic events may appear unlikely, in fact over the long term they are common, and thus should be considered in design. Mitigation can be achieved by reducing the risk (for example, through reducing the likelihood of oil spills by carefully managing oil extraction) or by expecting losses, for example by compensating for them through increasing the scale of marine protection by a certain magnitude, to reflect the risk that some will be lost.[10]

In recent times, driven by targets set out at international fora, there has been a focus on the need to establish marine protected areas over specified percentages of marine space. Whilst a commitment to achieve these goals provides useful impetus for improved marine protection, it is not the 'be all and end all'. Rather, the focus needs to be on the establishment of marine protection measures which reflect the values of the marine area in question.

Management measures

Whilst 'traditional' notions might envisage that marine protected areas must be spaces in which all extractive activities are prohibited, current thinking suggests that more flexible measures may be appropriate. This can allow for the protection of larger areas whilst minimising the impact that this has on users. The identification of different areas or 'zones' within marine protected areas, to which different management rules apply, can also fit well within broader marine spatial planning approaches applied to the larger marine system. This approach can also enable marine protected areas to achieve 'secondary' purposes which reflect cultural and social values, so that in addition to the main purpose of protecting the environment, the areas can be managed for the achievement of other goals.

Zoning

Zoning has become a well-established tool for providing effective protection of marine ecosystems whilst also allowing for sustainable use. Such an approach permits different levels or types of activity to occur in different areas, in accordance with what the ecosystem can tolerate. Thus a 'recreational use zone' might prohibit commercial fishing but allow all non-extractive activities and some recreational fishing. Importantly however, taken together, the zones should provide for effective protection of the ecosystem as a whole.

In fact zoning has been used for many years. Despite its tiny size, the first statutory marine reserve in the United Kingdom, Lundy Island, incorporated a zoning system when it was established in 1986. Nowadays, zoning might be incorporated into a network of marine protected areas, where different parts of the network are assigned to different categories. It might also be applied to enable the establishment of large marine protection areas, in a situation where this would be unachievable, if marine protection meant that all activities had to be excluded from the area. The Great Barrier Reef Marine Park provides an excellent example of how zoning can be used to provide protection for a large marine area whilst also enabling sustainable use of the marine environment. Similarly, New South Wales operates six marine parks, where each park is divided into separate zones providing for different levels of use.

Classification systems

The design of management measures for each marine protected area can be done on a case-by-case basis. For example, the English legislation provides for

the development of detailed guidance about how marine protected areas should be designed and what management measures should achieve, but the actual management measures are to be established at a later date, once the identification of areas for protection has taken place. This approach has been criticised by stakeholders for failing to provide certainty about what the establishment of a marine protected area might mean for the activities that take place there.

Alternatively, a simple and transparent means by which to assign different levels of protection, is to establish pre-determined categories to be applied marine protected areas, which reflect the management measures to be implemented in them.

Thus the IUCN classifies six sub-categories of marine protected areas according to the purposes for which they are managed, keeping in mind that "*only those areas where the main objective is conserving nature can be considered protected areas; this can include many areas with other goals as well, at the same level, but in the case of conflict, nature conservation will be the priority.*"[11] These categories have been applied to the Australian Commonwealth marine protected area programme:

- *Category I – Protected area managed mainly for science or wilderness protection (Strict Nature Reserve/Wilderness Area);*
- *Category II – Protected area managed mainly for ecosystem protection and recreation (National Park);*
- *Category III – Protected area managed mainly for conservation of specific natural features (Natural Monument);*
- *Category IV – Protected area managed mainly for conservation through management intervention (Habitat/Species Management Area);*
- *Category V – Protected area managed mainly for landscape/seascape conservation and recreation (Protected Landscape/Seascape);*
- *Category VI – Protected area managed mainly for the sustainable use of natural ecosystems (Managed Resource Protected Area).*[12]

Under this system the appropriate management measures in each zone category will vary according to the purpose of the zone. For example, in areas managed mainly for wilderness protection, all extractive activities and perhaps public access will be prohibited. In areas managed for seascape conservation and recreation, non-extractive activities may be permitted. A particular marine protected area may have zones in different categories within its boundaries. For example, the

Great Barrier Reef Marine Park has been described as category VI in the IUCN system for the overall area, but it contains zones in categories Ia, Ib, II, III and IV.[13]

Importance of no-take zones

Even with the use of flexible zoning systems, no-take zones need to be at the core of marine protection. Such areas can provide unique benefits to scientists, marine managers and society as a whole. They are important for providing a benchmark for assessing the state of the environment and against which the health of the rest of the marine area and the success of management regimes can be measured. They can assist scientists to better understand how ecosystems function. They contribute significantly to the recovery and protection of marine ecosystems. In addition, they have an important educational and inspirational function, demonstrating what our marine space could be like with better management or lower levels of anthropogenic interference.

Care is needed to ensure that no-take zones are adequate in size and design, and are adequately enforced. A requirement for the identification of no-take zones has been included in the design of a number of marine protected area networks overseas. For example, the ecological network guidance which informed the English marine conservation zone identification project demanded the inclusion of two 'reference areas' where extractive activities are prohibited for each identified species and habitat within the exclusive economic zone.[14]

Integration with marine spatial planning

To achieve the best possible value from the establishment of marine protected areas, they need to be designed in the context of an ecosystem-based approach applied to the management of the broader marine area. A means of achieving this is through undertaking marine spatial planning, a process which provides for all uses of the marine area, including marine protection, considering the needs of each activity and their impact on the marine environment in an integrated manner.

In this way, managers can ensure provision for a range of activities, both present and future. This approach can also ensure that the potential for activities outside marine protected areas to damage areas within them is minimised. Marine spatial planning, whilst a relatively novel concept, has been, and is currently being undertaken in a range of different locations including England, Massachusetts,

British Columbia, the Netherlands, Sweden, Belgium, Norway and prospectively the Hauraki Gulf in New Zealand. An independent review of marine parks in New South Wales has recently recommended that the marine parks system be replaced by a holistic system for managing all activities in the marine estate.[15]

Marine spatial planning does not necessarily mean parcelling up all marine space into zones for different activities. Rather, such planning can be at a strategic level. For example, the Australian Commonwealth government's marine bioregional planning process provides for the making of plans for large parts of the marine area. These set out the Australian government's objectives for conservation and environmental management measures such as marine protected areas, listed marine species protection and sustainable fisheries.

Some of the most significant impacts on the marine area are terrestrial in origin. For example, in New Zealand, many coastal marine areas suffer from damage caused by sediment runoff and pollution originating from land. The loss of coastal habitat can cause additional problems. Managing such issues continues to pose a challenge for marine managers and effective tools are required to integrate catchment and marine management.

There have been some efforts overseas to deal with the issue, notably in the Monterey Bay national marine sanctuary, where the non-legislative management plan addresses the issue of sediment runoff from farm land and attempts to include farmers in dialogue about how the impacts should be managed.[16] Closer to home, the Hauraki Gulf Marine Park Act 2000 recognises the linkage between catchments and the marine park through bringing together management agencies with jurisdiction over both areas in the Hauraki Gulf Forum and requiring them all to apply the same management objectives to the area. The proposed marine spatial plan being developed for the Gulf is intended to address impacts on the marine area derived from catchments, as well as those originating from marine uses. Nevertheless, it is clear that in most jurisdictions, significant work is required to address the impacts of terrestrial activity on the marine environment.

Process for designing new marine protected areas

Many nations, including New Zealand, have expressed an intention to establish a representative network of marine protected areas within a specified time period. Thus, they have adopted initiatives aimed at meeting these goals in a timely manner, rather than relying solely on the establishment of marine protected areas

on an *ad hoc* basis. There are some important lessons that can be learnt from these experiences.

Leadership and decision-making

Experiences overseas indicate that success is dependent on strong commitment being demonstrated by the relevant government agencies.[17] This commitment is particularly important given the diverse range of interests potentially affected by the implementation of spatial regulation in the marine environment. Initiatives may meet with significant opposition from certain stakeholders, so the government agencies must show strong leadership in managing this.

Another key success factor is the development of clear policy and effective legislative instruments which set out how the network design and establishment process should be undertaken. Government agencies involved in the initiative must be in agreement about how such instruments should be interpreted, not least to ensure that a clear message is received by stakeholders.

Resourcing

The provision of adequate resources is vital. In California, the first two attempts at the establishment of a marine protected area network collapsed, at least in part because of a failure to resource the initiative adequately. Success was achieved once it was recognised that much greater levels of resources were required.[18] Each of the initiatives surveyed in this paper reported the need for a huge amount of work in data collection and processing, public engagement, project management and science advice.

Stakeholder involvement

Historically, marine protected areas in economically developed jurisdictions with mature legal, bureaucratic and political systems, have tended to employ a government-led approach to the establishment of marine protected areas.[19] However, in the last decades, the notion that stakeholders should be involved in their design and management has been growing in strength.[20]

Stakeholder involvement may be achieved in a number of ways. Central government may undertake the identification and implementation of marine protected areas alone, seeking periodic stakeholder involvement. This 'consultative' approach has the advantage of increasing the likelihood that decisions will be made on the best available evidence, because those involved are

more likely to be experts with a good understanding of the scientific and technical aspects of the issue, and able to see the bigger picture.

Some jurisdictions have adopted collaborative initiatives which aim to incorporate stakeholder-led decisions into conventional government processes. These processes may be characterised as both 'top-down' and 'bottom-up', in the sense that they are led by central government, but provide for stakeholders to take key decisions.

There are a number of reasons for encouraging greater stakeholder involvement in, and ownership of, marine protected area decision-making. First, the introduction of spatial regulation in our oceans is relatively recent, and it is absent from most areas of marine space. The notion of the ocean as a commons, to which we all have rights, still underpins the public consciousness. Fishing, in particular, is a 'way of life' as well as being undertaken for employment and recreation purposes.

As a result, in many places including New Zealand, discourse about the marine area and how it should be used is characterised by fraught, polarised argument. Conservationists care passionately about protecting marine species and habitats from human impacts, whilst users of the oceans defend their right to undertake their activity equally passionately. Theoretically, collaborative processes can help stakeholders to move past the 'conservationists versus users' dichotomy by uniting diverse interests towards a common goal.

Furthermore, stakeholders can contribute valuable data, knowledge and experience which is critical to making effective management decisions in an inaccessible, poorly understood environment. The involvement of stakeholders can also ensure that socio-economic concerns are better addressed.[21] Equally, where marine protected areas include management measures that involve restricting the activities of ocean users, implementation and enforcement of the rules is theoretically easier when stakeholders have been engaged in their design and as a consequence understand their meaning and the reasons for them. Politicians may be more likely to approve marine protected area proposals if they are confident that stakeholders' views have been heard and accommodated where possible. This helps to reduce the political risk of taking action.

Collaborative marine protection initiatives have met with some success, producing proposals for networks of marine protected areas in New Zealand, England and California, amongst others. However, ambitious collaborative processes can be expensive, as demonstrated by the Californian experience which only succeeded once significant financial support from a private foundation was secured.[22]

Where lay participants take responsibility for decision-making, science-based priorities may be compromised. Stakeholders with no scientific expertise, and who are also concerned for their own interests, may be unable to make robust decisions which are supported by the available science.[23] Such problems have led some to argue that, whilst these types of processes are most effective in relation to small-scale, local marine protected area projects, they are not appropriate where there are significant economic activities to be considered, or where complex multi-activity management is necessary.[24]

Furthermore, whilst collaborative processes seek to tap into benefits not normally available in traditional top-down governance, there is a limit to the amount of responsibility that governments are prepared (and able) to cede to the collaborative process. There is no guarantee that a collaborative group, given free rein, will produce decisions which are palatable to political sensibilities. The use of collaborative decision-making goes against the grain of traditional governance in Anglophone countries such as New Zealand, where government decision-making processes and consultation requirements are well established in existing legislation. If recommendations achieved through collaborative decision-making are rejected or altered significantly by the government, the resources invested in the process are wasted and stakeholder commitment to the initiative will be undermined.

Information

The absence of complete scientific data about the marine area is one of the key challenges facing marine managers wishing to develop new marine protected areas. In most areas, understanding of the ecosystem and the ecological processes and values which should be protected, is partial at best. Accordingly, it is difficult for managers to make informed decisions about effective management.

Critics may argue that the absence of complete data sets is a reason not to make, or to postpone, management decisions. However, in many areas enough is known for it to be apparent that better protection for the ecosystem is required. If a decision is made to proceed with the development of marine protected areas, all parties involved in the process need to accept that, whilst the available knowledge is not perfect, a decision will be made on the basis of the available data. In this situation, a feedback mechanism should be deployed, to allow for periodic review and amendment of measures – a form of adaptive management.

Monitoring and enforcement

Efforts focused on the establishment of new marine protected areas, in order to reach percentage-based goals, risk the establishment of 'paper parks' – areas which are technically marine protected areas but where activity continues as normal. This can occur either because the regulatory measures associated with the protected area are weak, or because the rules are not adhered to by users.

The design of marine protected areas needs to reflect the capacity of the administering authority to enforce the rules, and ensure that the rules are simple enough so that users can understand them. Equally, a robust monitoring and review programme is required, so that management measures can be evaluated on an ongoing basis, and adapted where appropriate. However, review programmes need to be carefully designed, to ensure that management measures are robust enough to endure, and that they cannot be arbitrarily weakened in the future by those who oppose the measures.

Figure 5.1: Summary of key elements of international best practice

- Marine protected area networks should aim to protect the full range of habitats, species and processes present within the marine ecosystem
- Marine protected areas typically take the form of either large areas which incorporate finer-scaled management measures, or networks of smaller but more highly-protected areas
- Ecological design principles normally include the concepts of representativeness, replication, viability, precaution, permanence, connectivity and resilience
- Zoning is a well-established tool to enable both protection and sustainable use within marine protected areas
- A classification system can set out a range of protection levels which can be applied to marine protected areas, provided that a minimum area is protected in no-take marine reserves
- Marine protected areas may be most effective when incorporated into wider marine spatial planning approaches
- Strong leadership and commitment from government is essential for success
- Stakeholders should be involved in marine protected area design from the outset
- There are pros and cons to the use of collaborative initiatives to identify marine protected area networks, but if collaborative decision-making is to be used, the process must be carefully designed and well-resourced
- Marine protected areas need to be designed to facilitate compliance, effective enforcement and ongoing monitoring and review

Endnotes

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