DRAFT

Guidelines for the Design and Management of Large-scale Marine Protected Areas

Published in partnership by Big Ocean and the IUCN WCPA-Marine Large-Scale MPA Task Force

Contents

Executive Summary

Large-scale marine protected areas: an indispensable tool for healthy oceans

The Earth's oceans continue to face significant, pervasive threats such as overfishing, habitat destruction, and pollution. In addition, climate change, inclusive of sea temperature rise and ocean acidification, is altering the Earth's marine ecosystems in ways we may not fully understand for decades. Profound ecological changes are occurring and will continue to negatively impact our oceans, its resources, and the people and communities whose very survival is dependent upon the sea. In the face of these challenges, there is an urgent need to not only 'go big' with our marine conservation efforts, but to do so in ways that increase and strengthen models of best practice management across MPAs at all scales. Large-scale MPAs are important components of local, regional and international strategies aimed at comprehensively improving the efforts and outcomes of protected area networks and marine conservation globally.

Large-scale MPAs defined

For the purposes of these guidelines, LSMPAs are areas greater than 150,000 km^2. Based on research conducted by Big Ocean on the actual sizes of large-scale MPAs worldwide, just prior to launching the network in 2010, this size and extent served as a practical starting point to bring together managers whose needs were similar in scope and scale. Very large MPAs are certainly not more important than smaller ones, but many of their needs, challenges and benefits differ. The current definition is intended to make the improvement of large-scale MPA design and management targeted and effective versus excluding other MPAs from benefitting (see Box 1 for additional information).

LSMPAs meet IUCN's definition of a protected area and can utilise any of its six Management Categories (see page xx). In governance terms, they are currently established by national governments but can include state, provincial, or local governments in collaborative management with NGOs, research institutions, communities and other relevant organizations.

How are they distinctive?

Large-scale MPAs are distinctive from smaller MPAs in several ways. They can:

- Encompass entire marine ecosystems and ecological processes;
- Encompass areas large enough to protect critical habitats of many migratory species;
- Exemplify a precautionary approach in the face of major climatic uncertainties.
- Act as living laboratories and provide scientific baselines that can increase our understanding of the differences between local and global stressors.
- Protect extensive cultural spaces such as traditional voyage routes.

Why are they globally important?

Beyond the numerous ecological, economic, and cultural benefits that LSMPAs provide, they are our greatest hope for achieving marine conservation goals such as the Convention on Biodiversity's Aichi Target 11, which calls for at least 10% of marine and coastal areas to be conserved. The size of LSMPAs accentuates their inter-governmental and global significance; they can often affect international marine policies in ways that smaller scale MPAs cannot. The UN and other international groups are exploring the possibility of establishing MPAs on the high seas in areas beyond national jurisdiction, clearly signaling that large-scale marine conservation is of global importance.

Creating a starting point

Though the past two decades have seen an increasing call for marine protection on a larger scale, there are limited examples of effective long-term governance and management models 'at-scale' to draw from.

By combining lessons from both mature and recently established LSMPAs, these guidelines provide a starting point from which current managers can build, and are intended to complement current resources for MPA managers. Beginning in Chapter 1, with the connection between equitable and effective governance and successful ongoing management, the chapters that follow lead the reader from the first stage of site design through active management and evaluation. We recommend reviewing each chapter to understand how phases are interrelated.

The field is still evolving

Because guidance for the design and management of LSMPAs is still in development, and the needs of existing sites are not necessarily consistent, the advice provided should not be seen as final. These processes do not need to be implemented in a linear fashion, and many of the strategies and tools outlined will need to be, or should be, employed repeatedly in order for management to be sustainable and remain adaptive.

Benefits and Challenges

Based on information from current members, establishing an LSMPA can:

- Promote and preserve biodiversity across entire ecosystems.
- Protect entire cultural landscapes/seascapes, perpetuate cultural practices, and provide windows into environments that have inspired and sustained previous generations.
- Enhance food security by supporting commercial as well as artisanal fishers, and protect essential habitats from overfishing.
- Support international cooperation and the sharing of resources to enhance management and research.
- Enhance protected area networks and comprehensive national conservation strategies.

Existing managers consistently cite the following challenges. It can be difficult to:

- Achieve effective jurisdiction and interagency coordination.
- Maintain sufficient budgets and developing viable sustainable financing plans.
- Address stakeholder rights, including those of peoples and local communities.
- Conduct consistent, ongoing research and monitoring.
- Provide surveillance and enforcement.

Good design is essential

Chapter 2 advises designing an LSMPA as a series of interrelated steps that should be thoughtfully planned and executed. The experiences of the most seasoned LSMPA managers show that addressing the internal and external needs of a site in parallel is the best way to ensure that a site's purpose and the mission of management are complementary and achievable.

Key considerations:

- Assess the most critical needs and hire qualified staff early on.
- Make hiring a qualified science or research coordinator a priority.
- Build partnerships or at least establish a foundation to do so later.
- Assess the relationship between governance and management entities, and cultivate positive working relationships early on.
- Utilise existing legislation first, but also ensure that other options are clearly understood by those working to develop new legislation or regulations.
- Characterise the biophysical and social science aspects of the site in parallel.
- Employ systematic conservation strategies and adaptive management practices.
- Engage with empathy, and listen carefully, to those whose livelihoods, cultural practices and heritage are associated with the site.
- Be thoughtful in developing communications and outreach materials for the site, as the messages initially offered to the public will likely be permanent.

Management Planning

The design phase should provide the blueprint or framework for developing an effective management planning process and final document that reflects the values and perspectives of both management and the wider community. This is often accomplished through an integrated coastal management or marine spatial planning approach that involves all of the stakeholders. The planning should involve an environmental impact assessment that includes a cultural landscape or seascape approach. Chapter 3 explores important elements of management planning and the logistical considerations that should be made when developing a timeline for both individual elements as well as the overarching process.

A timeline for management planning for an LSMPA should be tailored to the political and social complexities of each area. Experience shows that it is not unusual for planning to take several years or longer. The scale of LSMPAs means there is usually a much larger group of rights holders and stakeholders involved. The importance of effectively engaging the public, including mandatory public comment periods for draft management plans, calls for revisiting timelines on a consistent basis (e.g. quarterly).

Elements that may affect the timing of a management plan include:

- Political uncertainties, including a change in administration.
- Multiple meetings (or similar substantive public scoping process) to adequately address a large stakeholder base, including rights holders, Indigenous peoples and local communities.
- Public comment periods for the draft management plan.
- Gathering sufficient scientific data.
- Defining rights of access and delineating use (zoning).
- Addressing the often-conflicting requirements of multiple management agencies.
- Reviewing and final approval of the plan.

Some of the most important considerations specific to developing the plan itself are the need to:

- Involve key stakeholders and the public early on; identify and build working relationships with both supporters and detractors.
- Hire or partner with professional facilitators; the issues surrounding a site are complex and there is a likelihood for conflict to arise, therefore many issues are better managed by a neutral party.
- Address rights holders' issues early and directly.
- Write vision and mission statements in a way that articulates the value of the site to humanity.
- Develop a research plan that includes Indigenous and local knowledge systems, as well as scientific systems.
- Develop goals, objectives and strategies of plans to be flexible enough to accommodate changing priorities over time.

Managing LSMPAs

While the principles of good management for MPAs of all scales are similar, the guidance outlined in Chapter 4 is a mix of scientific insights coupled with the experiences of the world's current LSMPAs. It is important to note that all but three existing LSMPAs have less than a decade of management experience. As such, active management will require using these guidelines along with self-judgment, existing guidance from smaller scale sites, personal experience, and input from others with specific knowledge about the LSMPA in question.

Helpful process principles to apply:

- Keep an open mind when approaching management activities and recognise that nearly all activities take longer than planned. Set realistic expectations and time horizons and revise as necessary throughout the implementation process.
- Be prepared and willing to engage in international affairs and diplomacy, including building international political and management partnerships, especially if a site includes trans-boundary waters.
- Grow and strengthen partnerships that provide financial and technical capacity, as needs in these areas may likely arise, particularly within developing countries where the lack of these capacities may inherently constrain implementation.
- Remain open to change and consider new ways of working and balancing competing priorities, particularly given funding and human resource limitations.
- Consider the use of advisory councils for stakeholder involvement at all stages.

In terms of daily operations, and ongoing management activities, priorities should include:

- Put an effort towards sustaining political will; maintain good relationships and communication channels with decision-makers and elected officials.
- Develop regulations to carefully establish or complement legislation, to avoid polices that can complicate management.
- Develop effective internal administrative systems that expedite paperwork processing.
- Prioritise data management and storage.
- Minimise staff turnover, hire committed individuals, and invest in ongoing staff development.
- Create informational materials that are clear and easily understood. Doing so will emphasise the value and importance of the site.
- Create a quality collection of high-impact visuals (e.g. photos, illustrations).
- Provide media training to all staff and partners, especially around contentious or complex issues.
- Develop and maintain partnerships for all areas of management.
- Encourage user compliance in combination with surveillance and enforcement efforts.

Comprehensive evaluation

Among the small number of large-scale MPAs currently in operation, most are either still in the design or management planning phase and/or have yet to attempt performance measurement. At the time these guidelines were being written, only two large-scale MPAs (GBRMPA, PMNM) had sufficient management experience and longevity to allow for iterative attempts at measuring management effectiveness. Therefore, our guidance is based on limited experience of these two sites and should be regarded as preliminary.

When developing evaluation measures for LSMPAs, performance must be measured within commensurate temporal and spatial scales. Working on a larger scale means increased logistical challenges in consistent monitoring over a wide geographic area and over time, as well as higher field costs for management activities.

LSMPAs can serve as sentinel sites for understanding global-level changes that often occur over long periods of time, so despite the long-term commitment required to create substantive evaluation and monitoring protocols, the outcomes have relevance for global conservation efforts in the broadest sense.

Assessing the social processes associated with LSMPAs is critical. A number of methods and frameworks exist for this (e.g. Schreckenberg et al., 2010), though none of these have been applied in the context of large-scale MPAs to date. Social impact assessments and collaborative initiatives and research are being developed for large MPAs.

Measuring performance is vital for assessing the condition of natural and cultural resources of a site, as well as the effectiveness of management activities. Regardless of scale, to measure performance it is important that the site:

- Builds a multidisciplinary evaluation team that includes external stakeholders to bring transparency and integrity to the process.
- Carefully considers performance indicators that are methodologically sound and repeatable. Doing so is essential for consistent monitoring to be conducted over decades.
- Commit to fixed evaluation cycles to encourage consistent measurement and evaluation of the site.

Examples of successful management can be seen at several LSMPAs in the Pacific that have collaborated to achieve their management and scientific goals. These include bilateral agreements, learning exchanges, as well as research, monitoring and enforcement activities. By working together, Pacific LSMPAs have been able to overcome some of the management and scientific challenges associated with conserving vast areas of the oceans (Friedlander et al., 2016).

Using the Guidelines

What to expect

Regardless of whether readers are new to large-scale marine management or seasoned professionals, the hope is that these guidelines provide valuable insights and new perspectives (Table 2). General advice and real-world examples in the form of short case studies are provided. Full versions of the case studies are available online at [INSERT URL]. Due to the fairly recent history of LSMPAs – as well as their small number, diversity of experience, and the need for the field to mature – the full range of existing advice and best practice management standards should be considered and used in parallel with this publication. See Box 2 for additional resources.

Table 2. Purpose of these guidelines

These guidelines are…	These guidelines are not…
… focused on the big picture process for practical use, even by new managers	… highly technical or detailed
… a reflection of best available practice in large-scale MPAs; real-world experience plus technical expertise	… comprehensive/shared experience across all MPA sizes
… mostly based on experience from large-scale MPAs in the developed world	… equally grounded in both developing and developed world experience
… a living document, subject to change	… perfect guidance that is fully developed or accepted
… supportive of the critical and complementary value of smaller MPAs	… advocating or promoting larger MPAs over smaller ones
… flexible and capable of being applied in multiple ways	… rigid and linear, requiring a specified process for application

Where does the guidance come from?

Of the total LSMPAs globally, 16 are member sites of Big Ocean (at the time of publication). The management teams of these sites utilised the support of the network to develop this publication in order to share lessons learned. However, guidance is given generally and applicable to all LSMPAs. To assist in locating the LSMPAs that contributed to these guidelines, reference Figure 1 and Table 1.

Referencing LSMPAs

The full names of LSMPAs mentioned in the text will be used in addition to the respective acronyms.

Table 1 and the abbreviations and acronym list (page XIV) provide both sets of information.

Box 1

What is a large-scale MPA?

How big is 'big'? At the time Big Ocean was launched, research was conducted on the actual size of large-scale MPAs globally. Using various databases, there was natural clustering of LSMPAs that were 100,000 square kilometers or less and those that were 100,000 square miles or more. The clear dividing point was between the five largest existing and two proposed areas, and that of the eight next largest. Ultimately, 150,000 km^2 is the size of the smallest LSMPA that falls within these general parameters. **It is important to note that this figure was a practical starting place to help focus the efforts of Big Ocean.**

Big Ocean's definition also includes the condition that LSMPAs are *"actively managed for protection across the entire geographic boundary of the area … the term does not apply to geographic designations of habitat, foraging areas or harvest restrictions that are not also accompanied by a corresponding management regime, agency or consortium of agencies."* This definition was chosen for a variety of reasons but mainly to emphasize active management. As a network by and for protected area managers, Big Ocean aims to enhance standards of best practice and to work with others who are endeavoring to do the same in order to achieve the purposes and goals of their respective LSMPAs, not to promote large-scale MPAs or grapple with the various definitions.

Box 2

Other useful resources

As these guidelines are meant to build upon existing guidance, it is critical for those with an interest in improving large-scale marine governance and management to draw from the full suite of relevant resources and to utilise information and strategies that will improve both the biophysical and the sociocultural components of large-scale MPAs.

Following are some key resources. See Appendix 2 for the full list.

Great resources for managers working at any scale:

- Kelleher and Kenchington (1992) Guidelines for establishing MPAs;
- Kelleher (1999) Guidelines for MPAs;
- Salm et al., (2000) Marine and coastal protected areas: a guide for planners and managers;
- C. R. Margules & R. L. Pressey (2000) Systematic Conservation Planning;
- Hocking, M., Stolton, S. and Dudley, N. (2000). Evaluating Effectiveness: A Framework for Assessing the Management of Protected Areas. IUCN
- Thomas, Lee and Middleton, Julie, (2003). Guidelines for Management Planning of Protected Areas. IUCN
- Pomeroy, R.S., Parks, J.E. and Watson, L.M. (2004) How is your MPA doing?;
- Fernandes et al., (2005) Establishing representative no-take areas in the Great Barrier Reef: large-scale implementation of theory on marine protected areas;
- Leslie (2005) A Synthesis of Marine Conservation Planning Approaches;
- Federal Geographic Data Committee's (FGDC) Marine Boundary Working Group (2006) Marine Managed Areas: Best Practices for Boundary Making;
- IUCN-WCPA (2008) Establishing resilient marine protected area networks¬: making it happen;
- Day et al. (2012) Guidelines for applying the IUCN protected area management categories to marine protected areas;
- Green et al., (2013) Designing MPA networks to achieve fisheries, biodiversity and climate change objectives in tropical ecosystems: a practitioner guide;
- Special Issue of the Coastal Management Journal: Establishing a Region-wide System of MPAs in the Coral Triangle (2014);
- Vu Hai Dang (2014), Towards Marine Protected Areas Network in the South China Sea: Charting a Course for Regional Cooperation;
- Supplement of the Aquatic Conservation: Marine and Freshwater Ecosystems journal: Building Networks of MPAs: new insights from IMPAC 3 (2014) Regional Conservation Resources; and

Note: see Box 13 for resources specific to social and cultural aspects of establishing MPAs.

"Our advice to managers and communities is to keep an open mind, do the best they can with the resources they have, and remember their passion for the ocean."

– BIG OCEAN PLANNING TEAM

Important resources and adaptive planning processes

Although the guidance outlined in this document is presented in a linear fashion (i.e. first design, then planning, then management and eventually, evaluation), every site will follow its own progression. Managers (and stakeholders when applicable) will need to cycle back through various aspects of the design and management process such as public engagement, again and again, over time. Some current large-scale MPAs have actually been developed in an unplanned, adaptive manner without the benefit of design and management guidance. Even with guidance, it is likely that the development of these areas will have to be adapted to the prevailing conditions.

In terms of planning at the site level, management teams will need to continually assess the available resources and capacity relative to their highest priority needs and goals. Table 3 provides a quick reference to the most common tools that Big Ocean site managers consider important at various points in design and management.

Table 3. Important tools that complement the five basic processes in the large-scale MPA management cycle.

	1: DESIGN Create a site with a clear purpose and mission	**2: PLAN** Develop managment stratgies & activities	**3: IMPLEMENT** On-the-ground operations	**4: EVALUATE** Assess managment effectiveness	**5: LEARN** Document lessons, share and adpat processes
Managment Tools					
Admin and operations	●	●	●	●	●
Enabling legislation	●	●	●		
Policy	●	●	●	●	●
Public engagement	●	●	●	●	●
Communication/ community awareness	●	●	●	●	●
Partnerships	●	●	●	●	●
Scientific research	●	●	●		
Compliance		●	●	●	●
Site planning		●	●		●
Impact assessment		●	●	●	
Permits and licenses		●	●	●	
Economic instruments and valuation		●	●		

Adaptive and systematic planning

Managers from the LSMPAs that contributed directly to these guidelines are finding that adaptive, systematic planning processes can be used with the full spectrum of management—such as raising community awareness in the design phase, developing a stand-alone plan in the management planning phase, or creating the framework for ongoing outreach activities as a site matures. Adaptive planning processes are cyclical, seek to engage multiple perspectives, and offer repeated opportunities for review and refinement of a project or strategy's purpose, objectives and outputs.

One good planning example (Figure 2) is from the Open Standards for the Practice of Conservation by the Conservation Measures Partnership (CMP), a consortium of conservation organizations that has developed a set of Open Standards to aid conservation project management. These Open Standards have been designed to act as a roadmap for conservation actions, with the goal of increasing the effectiveness of conservation projects. Although Open Standards are represented graphically as a cycle, we suggest thinking about the project management process as iterative and dynamic.

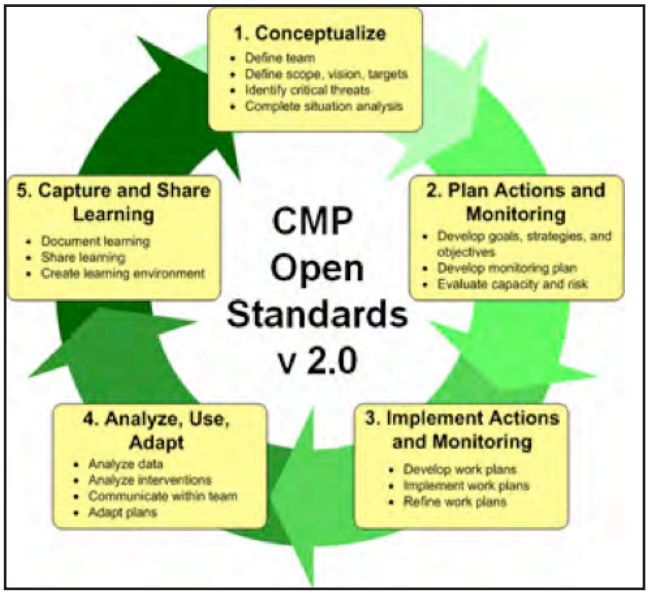

Figure 2. Conservation Measures Partnership Open Standards Process

Each step in Figure 2 has numerous sub-steps and the diverse nature of conservation projects and conservation actions necessitates that adaptation from Open Standards may be required. CMP has concluded that throughout every step of the Open Standards process, a set of general principles should be followed that includes involving stakeholders, developing and cultivating partnerships, embracing learning, documenting key decisions, and adjusting as necessary.

Suggested steps for developing an LSMPA site management plan include Step 1: create the Plan's overarching framework; Step 2: develop objectives, activities, and initial work plans that consider the capacity of the planning team; Step 3: refine work plans, cost and time requirements; Step 4: assess the plan and seek internal review; and Step 5: share the plan publically, allow document input, and prepare to repeat the process, as the planning team conceptualises the next version of the plan based on feedback and moves into the second step once a full analysis is made.

For updated versions of materials that support the *Standards* and for more information about CMP, please go to their website: www.conservationmeasures.org. CMP also encourages feedback from anyone who uses these Open Standards – please e-mail them: CMPinfo@conservationmeasures.org.

"Not everyone is naturally good at project management and budget tracking, but having staff with these skills is vital to creating successful outcomes over time and sustainability for management. Investing in building staff capacity in these areas is priceless."

– MOANI PAI, PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT

Part 1
Background

1. Background

The past two decades have seen **an increasing call for marine protection** – especially at larger scales (Box 3) and including the high seas (marine areas beyond national jurisdiction, or ABNJs). Operating at a large scale offers a range of potential benefits that include, but are not limited to, the protection of entire ecosystems and vital ecological processes, the creation of refuges for migratory species, a buffer for habitat shifts that may occur as a result of climatic changes, and the preservation of pristine areas that serve as scientific baselines for identifying stressors and levels of degradation in the marine environment.

Due to these benefits, support for large-scale marine protection abounds and is provided in numerous scientific studies, consensus statements, international agreements and declarations, as well the conservation literature, including best practice handbooks.

An increasing number of scientific papers have also reviewed the reasons why MPAs are needed, why very large MPAs must be included, and what the criteria are for ensuring that they will function as intended (e.g. Claudet et al., 2008; Graham and McClanahan, 2013; Edgar et al., 2014; White and Costello, 2014). The biological effects and benefits of LSMPAs have been demonstrated both in general terms and for specific instances (e.g. Lester et al., 2009; Sheppard et al., 2012). As with smaller MPAs, large MPAs improve biodiversity and productivity of the systems included within them, providing sources and reservoirs of many species of importance. It is widely understood that a lack of protection leads to significant and sometimes rapidly depleted resources (Fenner, 2014), and that pelagic areas, which have too often been neglected or under-represented in protected area systems, are as crucial as the sometimes more iconic shallow areas (e.g. Game et al., 2009).

Calls for increasing marine protection abound. The most influential is the Convention on Biological Diversity's **Aichi Target 11** (Box 4) In 2010, the parties agreed to protect at least 10% of the world's marine and coastal ecoregions by 2020. With just 3% of the world's oceans currently protected, effective conservation, cross-sector partnerships, and large-scale MPAs will play a critical role in achieving this target.

Box 3

Defining marine protected areas

At one time IUCN recognised that, at a minimum, an MPA must meet the following definition of a protected area: A protected area is a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values (IUCN, 2008).

IUCN currently recognises that in some cases, the following types of marine-managed areas may not necessarily qualify as MPAs (Day et al., 2012), though it is noted that many areas will have several objectives:

- Fishery management areas with no wider stated conservation aims.
- Community areas managed primarily for sustainable extraction of marine products.
- Marine and coastal management systems managed primarily for tourism.
- Wind farms and oil platforms that incidentally help to build up biodiversity around underwater structures by excluding fishing and other vessels.
- Marine and coastal areas set aside for other purposes but that have an indirect conservation benefit (e.g. military training areas, disaster mitigation zones, communications cable and pipeline protection areas, shipping lanes).
- Large areas (e.g. regions, provinces, countries) where certain species are protected by law across the entire region.

There is increasing recognition of areas that are managed through voluntary and ancillary conservation efforts (see the Governance of Protected Areas, IUCN Guidelines Series No. 20, for further detail). These may fall within the definition of a protected area, or they may complement other protected areas in the wider coastal and marine system, a core aspect of achieving Aichi Target 11. As our knowledge and experience with MPAs increases, it is likely that we will have a much better collective understanding of the full range of objectives and the ways in which diverse MPAs contribute to conservation.

Image 3. Large-scale MPAs like PIPA protect important ecosystem-level functions, including preserving unique habitat and promoting biodiversity. © Keith Ellenbogen and New England Aquarium.

Box 4

Aichi Target 11

By 2020, at least 17% of the world's terrestrial and inland water areas and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascape. (CBD, n.d.)

Many believed Aichi Target 11 to be overly ambitious; at the time, MPAs encompassed only about 1% of marine habitats (Wood et al., 2008; Toropova et al., 2010; Marinesque et al., 2012; Spalding et al., 2013). However, momentum quickly began building around large-scale marine protection efforts. The trend in scaling-up marine protection has continued and has been highlighted as a fundamental part of the marine conservation strategy (Secretariat for the Convention on Biological Diversity 2012, Strategic Plan for Biodiversity 2011–2020 and the Aichi Targets: Living in Harmony with Nature, 2013). Not only did the rate of establishment increase, but so did the size and scale of the MPAs. The more recently established LSMPAs are near or exceed 1,000,000 km^2, three times larger than the Great Barrier Reef, Papahānaumokuākea Marine National Monument, and the Phoenix Islands Protected Area (see Table 1). On 19 June 2015, the UN General Assembly (UNGA) started the process to develop a treaty for the conservation of marine biodiversity on the 'high seas' that will likely include conservation measures such as marine protected areas (UNGA Resolution 69/292).

> "By going Big with marine protection we are evolving our nations' thinking and practices relating to ocean governance."
>
> – SUE TAEI, CONSERVATION INTERNATIONAL

Large-scale MPAs continue to be proposed by both governments and NGOs worldwide; as these vast areas are formally established, progress toward global conservation targets will be closer to attainment. It is critical, however, that long-term management plans, grounded in best practice management standards, are developed and implemented to ensure that these gains in conservation area translate into meaningful conservation outcomes and benefits that can be felt in the daily lives of the communities most closely connected to these LSMPAs.

1.1 Governance sets the foundation

Governing human activities in the world's oceans has evolved significantly during recent decades and has shifted from an approach that generally lacked conservation objectives to one that is now supporting management to take an ecosystem-based approach, even for areas located in the high seas (e.g. Crowder et al., 2006) (Box 5). This shift, as well as increased international best practice guidance for effective and equitable governance, has been a key driver in the establishment of global-level targets and the furthering of international marine resource laws, particularly in the form of international conventions (e.g. the International Maritime Organization conventions on ocean dumping and discharges from vessels and the Law of the Sea Convention. Coastal nations have also begun to more effectively govern and sustainably manage larger portions of their EEZ.

Box 5

What is governance? Why is it important?

Principles of good governance are critical at any scale. Governance refers to who makes decisions and how those decisions are made. Governance also describes who has the influence, authority and accountability with respect to the rights of all legitimate parties. Governance is important within the management framework for a protected area from planning and design through implementation. Ensuring that all governing entities are committed to the core purpose and goals of an MPA is important in effective and equitable management (Jones et al., 2011). A number of publications, particularly IUCN Guidelines No. 20 (Borrini-Feyerabend et al., 2013), provide a comprehensive review of these principles more broadly in the context of protected areas.

Working towards effective and equitable management of MPAs requires governance systems that are also effective, inclusive, diverse, and vibrant. Decisions must consider both the ecological and social aspects of the conservation initiative. Ultimately, governance can be the main variable that determines whether countries will be able to expand the coverage and effectiveness of their protected areas and other conservation measures (Borrini-Feyerabend et al., 2013).

Governance within the context of the high seas is also an important consideration for working with LSMPAs. Of the world's oceans, 64% are in areas beyond the reach of national laws. The future of marine protection across important biological and ecological areas of the oceans will require cooperation amongst nations. For several years, the Convention on Biological Diversity (CBD) has supported a process to identify ecologically and biologically important areas in national and international waters that meet international criteria (see https://www.cbd.int/ebsa). Shared governance of the significant marine resources and ecosystems in our oceans will help support functional processes for the health of the marine realm and all of us who rely on it for subsistence, cultural, economic and other reasons.

Only a **few direct examples of long-term effective governance and management models exist 'at-scale'** in the relatively recent history of large-scale MPAs (Box 6). Looking to the terrestrial realm for examples can be helpful, as conservation practices have existed in these protected areas for over a century. However, it may be too early to develop definitive governance models as the purposes and objectives of existing LSMPAs are transitional, and sites are increasingly prioritising the perpetuation of cultural practice and community welfare. While early LSMPAs, like Papahānaumokuākea, were designed as co-managed, no-take protected areas, newer proposals are integrating community governance to a far greater extent, and are zoned as mixed-use areas, containing both large no-take areas and areas where fishing and other human uses are regulated.

LSMPAs are not a panacea. Based on the experience of marine managers who have worked at-scale for at least a decade, marine governance and management of these areas can be challenging. They can often overlay multiple jurisdictions and community and customary boundaries. They can impact access to important natural and cultural resources, which in turn can affect cultural practices and livelihoods in ways that smaller scale MPAs do not. Some have also argued that the flaws of target-driven conservation are exacerbated in very large areas, especially in situations where countries with overseas territories scale up their marine protection in far-off locations to avoid the more contentious and challenging task of designating areas closer to home (DeSanto, 2013). However, LSMPAs will often be designed for areas that are relatively remote because they are not subject to as much exploitation, industry and development. These guidelines emphasise appropriate size, scale and placement in parallel with comprehensive, quality management that is keenly aware of challenges and long-term commitments. Despite the challenges, LSMPAs can provide unique benefits and help reach global targets in meaningful ways when developed within the context of an overarching national or regional ecosystem-based approach to ocean governance that includes managing society's interactions within ecosystems (Wilhelm et al., 2014).

For LSMPAs that require formal establishment through national legislation, managers may have little influence on the overarching governance mechanisms affecting the areas, but they can and should **cultivate strong, positive relationships with governing entities**. Based on the experience of current LSMPA managers, it may also take more time than anticipated to develop and effectively implement regulations and policies that comprehensively support governance, management and the wider community. The key is for all players to commit to effective and equitable governance and management that seeks to conserve biodiversity in parallel with influencing, for the better, the economic, social and political drivers that affect ecosystem management, nature-based livelihoods, and the rights and responsibilities for nature (IUCN, 2012).

1.2 Management at a large scale

"In our Pacific Islands Ocean region the ocean unites and divides, connects and separates, sustains and threatens our very survival. For all those who venture within this, the world's largest ocean, and who have made it their home, the ocean influences every aspect of life. It has done so for millennia."

– H.E. ANOTE TONG, PRESIDENT OF KIRIBATI

The perception that large-scale MPAs are not a realistic management tool for developing countries is challenged in practice, as evidenced by the Phoenix Islands Protected Area in Kiribati and Marae Moana in the Cook Islands.

At an ecosystem level, large-scale MPAs can:

- **Promote conservatio**n through the protection of a greater diversity of genes, species, habitats and ecosystems (Lester et al., 2009).
- **Encompass entire ecosystems and a greater diversity of seascapes** (e.g. pelagic and deep benthic habitats), characteristics typically not shared with smaller areas (Sheppard et al., 2012).
- Include significantly larger areas where the impacts of humans are minimised, thus providing resilience from global stressors such as climate change (Micheli et al., 2012).
- **Contain relatively pristine, regionally or globally relevant ecosystems,** which serve as natural laboratories, sentinel sites or scientific baselines that can be used to assess the status of ecosystems in more populated and impacted areas (Friedlander & DeMartini, 2002; Sandin et al., 2008; Sheppard et al., 2008).
- **Encompass larger-scale ecological processes**, such as connectivity (migratory corridors, larval recruitment), and harbour entire life cycles of many species (Koldewey et al., 2010; Toonen et al., 2011).
- **Enable differentiation between global (e.g. climate change) and local stressors**, as local stressors are often absent in remote LSMPAs (Knowlton & Jackson, 2008).

"Broad-scale integrated management is more effective than a series of small, isolated, highly protected areas within a broader, unmanaged area."

– JON DAY, ARC CENTRE FOR CORAL REEF STUDIES, JAMES COOK UNIVERSITY (PREVIOUSLY GREAT BARRIER REEF MARINE PARK AUTHORITY)

At a **cultural** level, large-scale MPAs can:

- **Identify and consider the diverse socio-economic, historical, and cultural values** and interests of the public in the area, particularly those of Indigenous peoples and other local communities.
- **Engage and empower connections to a wider diversity of human cultures** that may be overlooked at smaller scales.
- **Provide access to complete cultural landscapes and seascapes**, including heritage that represents the combined works of nature and humans, in order to perpetuate intergenerational traditional practices.
- **Promote local and national food security and nutrition interests** and address related socio-economic issues by supporting artisanal, seasonal and small-scale fisheries, which are not only rooted in local communities but often long-standing cultural practices, traditions, and values.

Image 4. Large-scale MPAs can help support small-scale fisheries. A fisherman holds up his catch in PIPA. © Cat Holloway

- **Secure livelihood options** that support sustainable national economic development agendas.
- **Increase knowledge** and the public's understanding of ocean systems, and the full range of their potential benefits, through the application of biocultural research approaches across entire ecosystems and cultural landscapes.
- **Protect sacred areas or regions**, while also allowing for the perpetuation of spiritual and religious practices.
- **Support national policy interests** relating to the establishment of protected areas, and the enhancement of protected area systems for natural and cultural heritage.
- **Enhance a nation's efforts to address wider social and economic issues** (poverty, human rights, tenure, food security, human welfare, gender equity, etc.).
- More **directly reflect comprehensive national policy interests** relating to marine resource management and governance, including spatially defined targets for protection.
- **Contribute to national tenure systems** and provide an opportunity to better understand how to manage natural resources equitably, especially those around fisheries and sharing of benefits.
- **Encourage nations to assume fuller responsibility** for the protection and management of their marine resources, better control foreign extractive interests (e.g. fishing, oil drilling, and mining) to prevent over-exploitation, and actively contribute to the global management of our oceans.
- **Facilitate policy debate and political will** at multiple levels, while also advancing public interest and commitment to marine protection.
- **Support regional collaboration and international cooperation** in ocean management through leveraging resources and aggregating capacity and information.

Box 6

Addressing climate change at scale

In a 2011 survey of the six founding Big Ocean member LSMPAs (GBRMPA, PMNM, PIPA, MTMNM, MMHMP, BIOT), responses from 14 veteran LSMPA managers and scientists showed that the most commonly shared scientific knowledge gaps, as well as the highest priority research themes, included climate change and addressing the unknown effects caused by impending changes in temperature, weather, circulation, ocean water chemistry and sea levels (Big Ocean, 2013).

This information helped managers of these often remote and comparatively pristine ecosystems realize that these areas could and should be used as modern day baselines for comparison to other time periods and to quantify human impacts in other more populated areas. Through development of a Shared Research Agenda for Large-Scale Marine Managed Areas, managers hope to better understand and utilize the benefits derived from the LSMPAs they care for. As most current LSMPAs do not experience the many local stressors associated with human activities, research on global anthropogenic impacts like climate change would not be compounded by other local anthropogenic impacts. As LSMPAs are far more likely to encompass and protect critical habitat or processes that maintain populations and ecosystem stability, they can also prove to be more resilient to large-scale disturbances like climate change (Toonen 2013).

Through the Shared Research Agenda, Big Ocean sites hope to identify historic and ongoing data sources from as many member LSMPAs as possible and to synthesize this data. Once the variables are measured and their sampling frequency established, managers will better understand how temporal trends are being quantified at each site. Subsequently, this data can be used to improve the design and management of LSMAPs globally, and to enhance management efforts at MPAs of all scales to more effectively adapt to the changes being brought on by climate change.

- **Focus increasing surveillance** and enforcement interests beyond inshore waters.
- **Enhance a more streamlined policy** and regulatory development and implementation.
- **Focus global attention** on important social, environmental, and economic issues.

> "We need to go large, but we must start small and get the support of our people first."
>
> **– ALIFERETI TAWAKE, FIJI LOCALLY MANAGED MARINE AREA NETWORK**

1.3 The case for 'Going Big'

The following section is a synopsis of the current rationale that on-the-ground managers and decision-makers have identified as benefits of LSMPAs. Based on surveying managers of the largest MPAs in the world (e.g. the Big Ocean member sites), eight reasons are frequently cited for expanding the size of MPAs for marine protection. Each of these is briefly discussed below and summarised in Table 4.

Table 4. Reasons for increased size of MPAs

Benefits of establishing large-scale MPAs	
i.	Tackles wide-scale threats
ii.	Contributes to a diverse and robust national system of MPAs, of varying sizes, that can enhance the resilience of both natural and cultural resources, including communities.
iii.	Meets global obligations to increase marine protection
iv.	Perpetuates and preserves cultural heritage and traditions
v.	Utilises large and interconnected areas to protect natural diversity
vi.	Supports economic contributions from large-scale areas
vii.	Highlights the unique value large areas provide to humanity
viii.	Matches scale of large ecosystems

i. *MPA expansion tackles wide-scale threats*

The creation of LSMPAs offers an opportunity to address the depth, breadth and cumulative impacts of **multiple threats** to the marine environment at a range of scales. Managing at large scales means there is both greater opportunity and risk due to the size of the MPA (Wilhelm et al., 2014). In recent decades, an increase in the number and severity of anthropogenic impacts has threatened the oceans, including:

- **Climate change impacts** (e.g. ocean acidification, increase in sea surface temperature, sea-level rise and more severe storm events; see Box 6);
- **Unsustainable use of marine resources** through extractive practices such as overfishing, oil drilling, and mining;
- The **spread of invasive alien species**;
- The **global spread of marine debris**;
- Increasing **downstream impacts from land-based sources of pollution**;
- **Habitat destruction and degradation**; and
- **Underwater noise**.

The number of managers and scientists in the marine conservation community advocating for the use of large-scale MPAs to buffer marine resources against impacts from such threats is growing. Successful early examples, such as the Great Barrier Reef Marine Park and Papahānaumokuākea Marine National Monument, appear to have increased the willingness of nations to consider scaling-up ocean governance and management processes; this trend is reflected in the increased number and size of formally established LSMPAs. For example, the Republic of Kiribati chose to create an LSMPA to address the overexploitation of fishery stocks by industrial fishing fleets, including expanding IUU fisheries.

ii. *MPA expansion contributes to a diverse and robust national system of various-sized MPAs, which can enhance the resilience of both natural and cultural resources, including communities.*

While the creation of LSMPAs provides significant progress towards achieving the Aichi Target 11, this does not mean less emphasis should be placed on creating effective smaller MPAs. **Managing large-scale MPAs is compatible and complementary to the management of smaller MPA and networks of MPAs**. Marine conservation must occur at multiple scales and protection levels to reflect local ecological,

> "Large-scale marine protection allows a country, even a small one, to be recognised as a global marine conservation leader by passing on a legacy that will benefit future generations around the world. It makes for a true gift to the planet."
>
> **– ATTENDEE AT 2012 WORLD CONSERVATION CONGRESS**

social, cultural and governance imperatives (Toonen et al., 2013; Edgar et al., 2014). Current experience tells us that managing both small-scale and large-scale MPAs is necessary to achieve comprehensive and resilient marine resource management. For example, in the Pacific Islands, governments and Indigenous communities are declaring and implementing both locally managed marine areas (LMMAs) and large-scale MPAs (e.g. Fiji Islands, Cook Islands, New Caledonia, Hawaiian Islands, U.S. Pacific Remote Islands). Some small-scale MPAs have actually paved the way for the declaration of larger areas. For example, reinvigorated *ra'ui* (customary marine managed areas) across the Cook Islands served as the foundation for the concept of Marae Moana (Vierros et al., 2010).

LSMPAs offer an opportunity for nations to **evolve and enhance their current systems** of spatial planning and marine management by building in larger efforts that complement and amplify smaller-scale investments. This becomes highly relevant when attempting to demonstrate the effects and possible management options for human impacts at the ecosystem scale. In particular, LSMPAs help **ensure there is replication and redundancy in terms of the protection of species, habitats, and ecosystems, as well as increased social resilience**. Functionally, large-scale MPAs can serve as an insurance policy for the future by protecting ecologically functional swaths of ocean that may be more resilient to multiple and unknown impacts, particularly given the uncertainty of climate change impacts, increases in human use, and the cumulative impacts of all of these stressors.

For example, in Motu Motiro Hiva and the Great Barrier Reef Marine Park, nationally directed management initiatives occur at scales commensurate with ecosystem-level pressures and threats, such as controlling levels of commercial fishing and minimising broad-scale downstream impacts from land-based sources of pollution. At the same time, the Australian and the Queensland state governments recognise the value of, and actively manage, smaller MPAs around this area.

From a sociocultural standpoint, when appropriately utilised within a larger national network **LSMPAs can amplify the work of and benefits from smaller-scale areas** and make significant contributions to the social and cultural resilience of communities through increasing the capacity of and alliances within networks of communities, diverse stakeholders or rights holders, and managers (IUCN WCPA, 2008). These kinds of benefits are already shown in LMMAs across Asia and the Pacific that have been successfully sharing knowledge and building community capacity to improve marine governance and management for more than a decade (White et al., 2006; Govan et al., 2008). From a large-scale management perspective, Big Ocean member site managers are working to create similar networks and alliances between and amongst LSMPAs, as well as with other entities interested in improving management at-scale, like LMMAs, NGOs and research institutions.

iii. *MPA expansion meets global obligations to increase marine protection*

Between 2000 and 2014, **the extent of the world's oceans under protection more than doubled** (from less than 1% to 3.4%; Juffe-Bignoli et al., 2014). This significant increase was mainly due to the establishment of seven LSMPAs (Table 1). However, to continue this legacy of growth, LSMPAs require substantial support and enabling mechanisms.

Image 5. Boobie birds nest atop a ceremonial shrine on Mokumanamana in PMNM, a site that acts to protect both cultural and natural heritage.
© Kaleomanuiwa Wong

Although increased coverage of ocean protection is an important reason for establishing LSMPAs, managers of these vast areas have an increasing need to build capacity around adaptive, relevant, and effective management that can address wider social issues. Giving attention to ecosystem quality as well as quantity (De Santo, 2013) can ensure targets are on their way to being met appropriately. Protection must be spread across all biogeographic regions and areas where human benefits are particularly high (often near population centres) (Spalding et al., 2013), recognising that LSMPAs will not be appropriate or viable in all areas.

iv. *MPA expansion perpetuates cultural heritage and traditions*

There is an inextricable link between biological and cultural diversity (Posey & Overal, 1990), and modern environmental conservation is rooted in the traditional knowledge and practices of ancient cultures across the globe. Several existing LSMPAs have been designed with the explicit intent of perpetuating traditional knowledge and cultural practices as well as strengthening Indigenous peoples' identities, in parallel to safeguarding important ecosystems. For example, Papahānaumokuākea Marine National Monument is mandated to support cultural access and does so through its management plan and integrated permitting system. PMNM has created opportunities for Indigenous communities to connect with cultural heritage, including providing access to significant archeological and historical sites.

Cultural landscapes and their links to conservation were formally recognised under the 1972 UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (The World Heritage Convention). Of the existing LSMPAs worldwide, three are World Heritage Marine Sites: the Great Barrier Reef Marine Park, Phoenix Islands Protected Area, and Papahānaumokuākea Marine National Monument. Of these three, Papahānaumokuākea is a mixed natural/cultural site and was the first to be inscribed as 'seascape' or a marine area with high biodiversity and tight integration of cultural values and ecologically sustainable use (UNESCO, 2010; Abdulla et al., 2013).

v. *MPA expansion utilises large and interconnected areas to protect natural diversity*

LSMPAs allow for extensive biodiversity protection by encompassing biodiversity hot spots, areas with high species richness, or areas important for reproduction (e.g. Atkinson et al., 2011; Selig et al., 2014). Furthermore, LSMPAs allow for the protection of a greater number of species, including highly migratory species, by encompassing many species' routes or larval dispersal corridors (Ebel et al., 2011; Rivera et al., 2011). Given the high mobility of many marine species, implementing dynamic management that connects MPAs with other ocean management processes can enhance their effectiveness (Corrigan et al., 2014).

Larger areas can be designed to protect geological, chemical and oceanographic diversity as well. This may include features such as deep-sea vents and abyssal trenches, critical chemical processes such as oxygen and nutrient cycling and carbon dioxide sinks, or physical oceanographic characteristics, such as upwelling and currents. Larger protected areas can also buffer external impacts, thereby allowing an inner core area to remain relatively pristine.

Preserving the full range of natural marine diversity benefits nature. Some of the most pristine ecosystems on the planet occur in many large and remote MPAs, where they provide scientific baselines for understanding wildlife in its natural state (Sheppard et al., 2012; Big Ocean, 2013; Toonen et al., 2013). These relatively undisturbed ecosystems serve as important natural barometers for Earth's oceans and, as such, are increasingly of scientific interest.

vi. *MPA expansion supports economic contributions from large-scale areas*

A driving rationale behind the creation of some LSMPAs is the advancement of national development agendas. Common examples include promotion of sustainable fisheries, increased tourism revenue, and designated areas for deep-sea mining and drilling. LSMPAs can foster these activities by catalysing integration and collaboration across industry sectors (e.g. fishing, mining, shipping, energy, and recreation). Using spatial allocation management models to differentiate between ocean demands, needs and impacts from a range of sectorial interests works well at a larger scale, particularly when MPAs include a variety of management objectives, such as biodiversity, social, cultural and economic protection.

The language used in the enabling legislation and declaration documents of **LSMPAs can support ecologically sustainable activities that also allow for sustainable economic development**, including commercial, recreational, traditional and research activities. Furthermore, the creation of very large MPAs can set a national approach for waters beyond the territorial sea, including the EEZ, deep-water habitat, seamounts and offshore continental shelf.

vii. *MPA expansion highlights the unique value large areas provide to humanity*

Remote areas provide an opportunity to enhance management controls over wide-scale threats because of their distance from many anthropogenic impacts. In the face of increasing global climate change, **these areas may also serve as critical lifelines by acting as biodiversity refuges**. In some cases, managers will also be able to abate a specific threat for the first time in remote regions. For example, within the Hawaiian Islands, managers introduced and refined controls over archipelago-wide threats, such as invasive alien species and fishing pressure, within the remote north-western islands of Papahānaumokuākea Marine National Monument, in the hope that such models will strengthen implementation of similar measures around the densely populated main islands. Scientists at this same site are also comparing ocean acidification and sea-level rise in the uninhabited north-western islands to those in the inhabited main islands, where such global changes have the potential to immediately impact society.

viii. *MPA expansion matches the scale of large ecosystems*

LSMPAs are capable of protecting significant phenomena or features in marine ecosystems. A number of large MPAs were established because of large ecosystems associated with a coral reef system (e.g. Great Barrier Reef) or large trenches (e.g. Marianas Trench Marine National Monument). The Sargasso Sea, which has been called a golden floating rainforest, is another good example of a large ecosystem that has inspired calls for protective measures to conserve the rich biological communities based upon Sargassum weed that provides food, shelter and a nursery for important species, including many that are threatened or endangered (Laffoley et al., 2011).

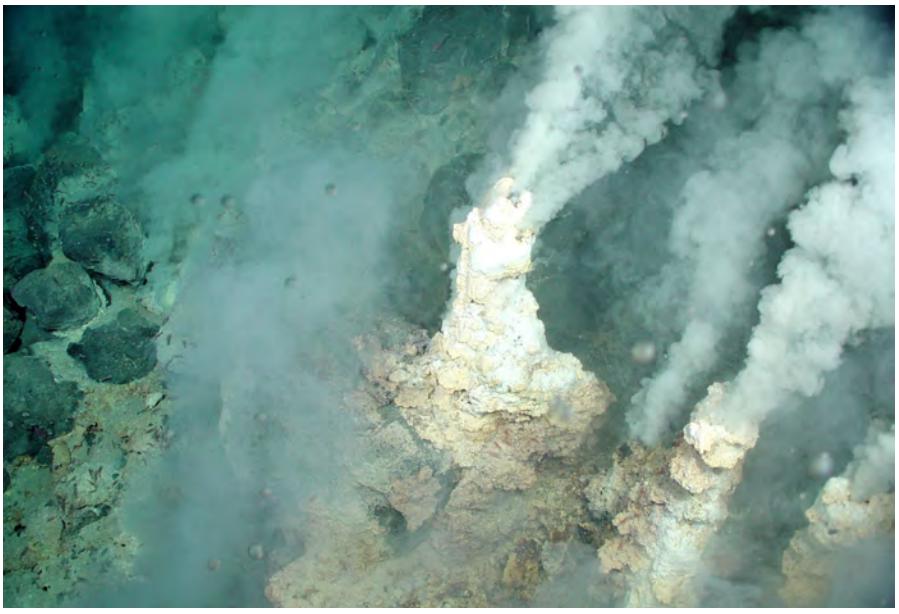

Image 6. Large and unique geologic features such as the deep-sea trenches and vents of MTMNM require protection at large-scale. Photo: NOAA Pacific Marine Environmental Laboratory.

1.4 Challenges

The known **governance and management challenges** of LSMPAs apply to MPAs of all sizes, but the factors' size and scale almost inevitably amplifies them. Because these guidelines have emphasised that LSMPAs can increase efficiency in use and distribution of resources, including manpower, it may seem contradictory that size and sale also add complexity. Yet it is important to recognise that despite the increased planning, logistics and expense there can still be an increase in the benefits derived per square mile or per hour worked or per dollar spent over time.

Table 5 describes the challenges identified through lessons learned by current managers of the world's largest MPAs. Invariably some of the challenges overlap into one or more categories.

Table 5. Key considerations for decision-makers and managers

i. Governance
National jurisdictions may overlap or there may be conflicting legal mandates for neighbouring or trans-boundary LSMPAs.
Effectively and equitably addressing the full range of diverse stakeholders, and all legitimate parties, especially Indigenous peoples and traditional or local communities.*
ii. Management
The amount of funding required can be significant.
Enforcement and surveillance can be costly and logistically challenging.
Finding qualified staff with skills and experiences relevant to large-scale MPAs can be difficult.
Political support can change from one political administration to another.
Acquiring and managing data requires a significant, long-term investment.
iii. Social
It may be difficult to showcase the contributions of LSMPAs to the social and economic well-being of communities, and to highlight differential and secondary impacts of management on segments of the population; this is even more the case for remote areas.
Adequately supporting culturally related access and the perpetuation of key cultural practices and knowledge systems.
Due to a higher public profile, large-scale MPAs can come under a great deal of public scrutiny, be affected by misinformation, and can be held to a higher standard.
iv. Research and monitoring
A lack of sufficient technical capacity and expertise often arises due to the sheer size of the area and number of priority research questions.
Specialised equipment and technology is costly.
It may be cost prohibitive and logistically impractical to acquire sufficient sample sizes to characterise the entire MPA.
The limited pool of research institutions in any single country can make developing science partnerships challenging, and engaging with international partners is costlier.
v. Cross-cutting issues
There is an inherent uncertainty around making informed management decisions.
Additional time and effort are required for nearly every management action.
Ongoing financial constraints.
Multiple languages spoken.
Few comparable examples from which to derive lessons learned.

**This is a key cross-cutting issue but successfully addressing this issue begins with a governance framework that supports managers in this endeavour.*

i. *Governance*

Multiple jurisdictions and conflicting or competing legal mandates of governing entities are inescapable and crucial considerations for achieving and maintaining effective management. The participation of multiple government agencies may complicate communication among all management interests, create new or more complex bureaucracies, and increase inter-agency jurisdictional conflicts and rivalries. For trans-boundary LSMPAs or those that are adjacent to or within the high seas, where legal clarity, national jurisdiction and guidance may be lacking or contested, the issues could be even more complex. As the field of large-scale marine management matures, as more LSMPAs are established, and as integrating management across protected area systems increases, these challenges will evolve.

Adequately addressing the rights of all parties, especially Indigenous peoples and local communities, can be a challenge from a resource standpoint, as facilitating these processes can require a significant amount of time, effort and money. These challenges also require certain skills including facilitation, conflict resolution and negotiation. Moreover, the sheer number of stakeholders and their varying (and possibly conflicting) perspectives requires experience in handling these kinds of public engagement processes. The power relations between interest groups with actual land or access rights to a site may need to be managed at multiple scales, and sometimes between governments when the issues cross national boundaries. Many other interested parties may need to be included, such as international groups, industry representatives, corporate interests, and ministries of energy, tourism, finance, national security or the coast guard.

Engaging local communities is a skilled and difficult task. It takes time to build trust and mutual understanding; in many instances these communities will also require support and capacity-building in order to be able to engage with governance bodies effectively, and to understand highly technical marine spatial planning processes that are attempting to integrate different knowledge systems. When engaging Indigenous peoples and local communities, clear protocols must be followed, including the need to obtain free, prior and informed consent, ensuring the fair and equitable sharing of benefits arising out of the process (or the genetic resources that are utilised), as well as respecting the intellectual property rights regarding the use, application, and sharing of traditional knowledge. Managers should address these issues with all stakeholders consistently over time.

ii. *Management*

One of the most commonly recognised challenges of effectively managing LSMPAs is the **significant level of funding required**. This issue becomes even more complicated for remote areas, which, among other elevated costs, also face high transport and fuel costs. Furthermore, even if adequate funding is secured initially, maintaining the minimum level of financing typically becomes problematic, particularly if the public thinks a site is no longer under threat or if decision-makers or donors call into question the relevance of sustaining such levels of funding. The long-term challenge of both political and NGO commitment is that voters and donors are generally more inclined to fund new initiatives rather than continue funding existing ones.

Enforcement and surveillance are other commonly cited management challenges. In large areas, maintaining an on-site presence (patrol boats, ships, etc.) may be cost-prohibitive and logistically impossible during certain times of the year (Brooke et al., 2010). Remoteness creates additional logistical and response time issues, particularly when attempting to decrease violations where illegal fishing is known to occur. As a result, managers often face the difficult decision of focusing limited enforcement and surveillance resources (e.g. equipment, personnel, funding) in one area or spreading them thinly across a very large area. There is no easy answer to this dilemma. Engaging local communities to aid in enforcement and surveillance at smaller-scale MPAs has been shown to be effective (Christie et al., 1994) but this strategy is not as easily applicable at a large-scale, especially for areas that are remote.

Image 7. As of 2014 Kiribati's Maritime Police unit had only one vessel to patrol over 3.5 million square kilometres of EEZ, including the California-sized PIPA, making enforcement a logistical challenge. © Regen Jamieson and NEAQ.

A collaborative approach that actively involves local resource users and community members should be used whenever possible. Community-based management often evolves in response to the failure or ineffectiveness of more centralised approaches. In cases where stakeholders can't realistically participate in on-the-water surveillance, such as remote LSMPAs, managers can still engage community both in education and outreach efforts, as well as in the development of enforcement regulations and protocols at a central operations location; this will help ensure management and policy makers consider community-derived rules (Christie & White, 1997).

Emerging technologies, such as remote sensing, satellites, and unmanned aerial vehicles (UAV), may offer potential solutions to enforcement and surveillance challenges, particularly as they become more cost-effective and technologically advanced (Brooke et al., 2015). The adoption of Vessel Monitoring Systems (VMS) and Automatic Identification Systems make

tracking legal fishing vessels easier while making it more difficult for illegal vessels to avoid detection.

At this stage, many remain untested or under-tested—or have not tested well at the spatial scale necessary to be effective for use in LSMPAs—and it is understandable that managers may hesitate to invest without firm evidence of their utility. Furthermore, given overall resource limitations, there may be concerns that spending limited funding on remote LSMPAs may not be as practical or beneficial as focusing resources towards more accessible ones. While the likelihood of vessels fishing illegally within the perimeter of a reserve is high, the risk of detection increases as vessels navigate further into a large-scale reserve, and thus a large-scale reserve may find great benefit in the creation of buffer zones. Surveillance of large-scale protected areas can actually be cheaper on a per-area basis than smaller MPAs (MPA News, 2013), and technological advances are increasing the value of new partnerships, such as Global Fishing Watch (see http://globalfishingwatch.org/).

Change in government leadership is another challenge identified by LSMPA managers. As LSMPAs require far more support at the national government level, changes in administration can slow momentum in the process towards establishment. If already established, LSMPAs can be affected in terms of shrinking financial resources, legal protections, and even public support, sometimes very rapidly and dramatically. As management of LSMPAs is led by government agencies, decreased support and funding frequently translate into decreased staffing and capacity at the site level, delaying critical processes like management planning. Managers of LSMPAs must adapt to changing government leadership in ways that smaller-scale MPA managers with less visibility, smaller budgets, and smaller scale needs may not necessarily have to.

Lack of professional capacity can be both a quantitative and qualitative challenge. Managers may not have the necessary staff to carry out the tasks required for day-to-day management. Lead managers may also need to enhance their own capacity if, for example, they lack a background in LSMPA management or in natural resource management generally. Additionally, managers may not have the suite of technical knowledge and skills required to effectively manage these large areas, even if staffing levels are seemingly sufficient. If budgets are tight, developing the capacity of existing staff may also be limited or not possible. When developing programmes to increase capacity, it is important to consider how training and education can: 1) be employed equitably as the education of males/females in the area may not be equal to begin with and there may be fewer women qualified to be staff, mentors and trainers (especially in rural areas), and 2) include measures that ensure those trained will return their skills to MPA management. Experienced LSMPA managers also emphasise the need to retain staff, as this is the only way to develop institutional memory. Given the relatively recent history of LSMPAs, it is critical to find systems and processes for managers to pass on lessons and have the ability to understand key management decisions, and why actions did or did not work.

Acquisition, management and utilization of relevant data and information can also test even the most experienced MPA manager when they move from overseeing a smaller scale site to an LSMPA. Lack of socioeconomic and biophysical data may make it difficult to make well-informed management decisions that account for the primary drivers of conservation: the choices people make, and the implications of these choices for local, regional and global economies and ecosystems. On the other hand, large amounts of data can be equally difficult to utilise for managers who lack staff with the capacity to analyse it. Collecting data can be challenging from both technological and social standpoints. Some data will require the use of advanced technologies that can be cost prohibitive for some MPAs, including upfront costs and long-term maintenance. Partnering with others who manage big datasets will help ease this challenge.

Traditional and local knowledge should be included in the datasets for LSMPAs; however, management teams must acquire and manage such data appropriately. Determining in advance whether there are any pre-existing rights, leases, licences, permits, agreements, or other significant interests in the area and its resources is critical. There may be laws and protocols that should be followed as well as the requirements to respect the intellectual property rights regarding the use, application and sharing of traditional knowledge. Managers should ensure their ongoing efforts towards effective stakeholder engagement include these issues specifically.

iii. *Social*

One of the most common challenges LSMPA managers face is how to engage in a balanced dialogue to increase understanding around the contributions their vast areas make to their respective nation's social and economic well-being. Not only do the benefits of LSMPAs often develop too slowly for people to appreciate, strategies to communicate the benefits of LSMPAs with the public will need to be customised for the needs of each LSMPA. Factors that influence this dialogue include remoteness, limits or restrictions to access, how closely livelihoods are tied to the site, and whether relevant stakeholders have had positive or negative experiences with previous conservation actions. Creating a trusted understanding across multiple communities or society at large takes time, effort and adequate funding, as well as a strategic approach, especially when social and economic rights may be affected. The governance and management structure of an LSMPA should support human rights and social equity and create new or increased opportunities for sustainable livelihoods. Managers should seek to work with diverse stakeholders and local communities from the earliest phases of design and establish a process or mechanism, like an advisory council, to continue the dialogue after the MPA is established. Such a forum can help to minimise conflict, clarify misunderstandings and maintain engagement over time.

Managers must work to mitigate adverse effects to livelihoods and culture and consider issues of fair compensation. This process can be even more complex when multiple agencies or rights holders are involved or if migratory species and cross-boundary issues are applicable. Addressing such issues requires working hand-in-hand with the relevant governing entities and considering internationally recognised laws and policies. The boundaries of an LSMPA should consider people's access and migratory species routes, and in cases where it seems they will be at odds, strategies such as monetary compensation are important potential solutions. However, developing alternative livelihoods can only be successful if viable, accessible areas are identified for practices like small-scale or artisanal fishing, and if the local economy is assessed and has opportunities for those compensated to spend the money.

Ideally, all large-scale MPAs would be designed to enhance cultural identity and provide access for traditional practices. When this is not done, LSMPA managers may find themselves inadvertently at odds with their own community or in direct conflict with those holding legal rights or legitimate interests in the lands or waters of the site. The designation of an LSMPA may be perceived as loss of inherent cultural rights to conduct certain activities in the site's waters (Leenhardt et al., 2013). Even where limiting access does not infringe on existing livelihoods, management decisions based on science can infringe upon or misappropriate the rights and knowledge of Indigenous peoples. Accordingly, the impact on traditional practices and access to LSMPAs that encompass or contain sacred areas must be carefully considered when developing management plans and regulations, including a long-term research plan. LSMPAs that do not effectively support ongoing cultural access or the appropriate incorporation of Indigenous and local knowledge in site management may see the support generated by initial stakeholder engagement processes quickly erode.

In many instances, communities will also require support and capacity building in order to be able to engage with governance bodies effectively, and to understand highly technical marine spatial planning processes that are attempting to integrate different knowledge systems. As these processes do not inherently include gendered knowledge systems (e.g. pertaining to divisions of responsibilities and defining community roles around use and management of natural resources), it is important to incorporate this factor into the design of community engagement processes. This is especially true in rural Pacific island communities where there are often specific resources that women or men have more interaction with and knowledge about, depending on the culture (Kronen, 2002). In Yap, for example, women have a better understanding of near-shore mangrove systems and their use, but certain fishing practices, especially those for pelagic fisheries, are more often conducted by men.

> "Some large MPAs may affect livelihoods such as fisheries, even at a small scale. Managers must consider the potential hardships for families and communities."
>
> **– TUKABU TEROROKO, MANAGER, PHOENIX ISLANDS PROTECTED AREA**

Sustaining political will and securing long-term champions for LSMPAs can be a significant challenge. Managers will generally encounter efforts from special interest groups that seek to influence elected officials and government and to devalue the justification for establishing the MPA in the first place. There may also be a perception by the public that because of a site's near pristine condition, limited resources for management should be diverted to other priorities. Additionally, it can be more difficult to generate public support for remote areas, as they tend to be out of sight and out of mind. The proximity of smaller, coastal MPAs can create a sense of community or public ownership that may not be as easy to achieve for large, remote MPAs.

One of the most challenging aspects of large-scale management is dealing with public scrutiny and criticism. While this is not unique to LSMPAs, their larger budgets and potential to affect access to vast areas of natural and cultural resources can make them more vulnerable to public scrutiny and criticism than smaller MPAs. LSMPA managers have reported difficulties in coping with misinformed media representatives, unscrupulous user groups who spread misinformation, donors with questionable or conflicting agendas, and academic-driven inquiry that creates or grows f alse dichotomies. Yet managers should not try to oversell the benefits of a large site, as this can also lead to a backlash if expectations or commitments are not met, or documented benefits are not produced in a timely manner.

iv. Research and monitoring challenges

Science requirements of LSMPAs are not limited to the biophysical. Knowledge and understanding of social and economic sciences (Big Ocean, 2013) is also important. Even when a management team is fortunate enough to have full-time scientific capacity, there may still be a lack of technical capacity and expertise to meet minimum research needs because of the sheer size of the area or the total number of priority research questions needing to be addressed. It is important that LSMPAs use all available sources to collect and analyse data, such as citizen-science, traditional and local ecological knowledge, fishery-dependent data, and expert opinion. When engaging local communities, it is also important to help people understand the technical tools being employed so they can engage more effectively.

Even with an adequate number of qualified scientific staff and modest financial resources, a manager's research teams may not have the ability to access remote and deep study areas without highly specialised equipment and technology (Brooke et al., 2010; Big Ocean, 2013). Some LSMPAs are so big that it may be logistically cost-prohibitive to obtain sufficient sample sizes to adequately characterise the entire LSMPA. This can result in some managers taking a coarse approach in data collection, which can decrease the level of confidence and accuracy in findings.

Finally, building large-scale scientific research partnerships (e.g. with universities, technical institutes, etc.) is essential, but may be inherently challenging even within a manager's own country. This is further complicated given the limited pool of experience and institutional readiness to partner internationally in support of ocean-scale research (Big Ocean, 2013). Management will likely be made easier through these partnerships as they can help provide a more complete picture of a site's ecosystems, and this in turn can create efficiencies in research activities (e.g. multiple projects sharing samples and data). Across the board, managers should commit to the sharing of data to benefit future projects, enhance LSMPA management more broadly, and to improve marine conservation globally.

v. Cross-cutting challenges

The inherent uncertainty that accompanies the management of LSMPAs can complicate efforts toward informed decision-making, management-related research and consultation with stakeholder groups. For LSMPA managers and scientists, a critical consideration to keep in mind is that more time and effort will be required to

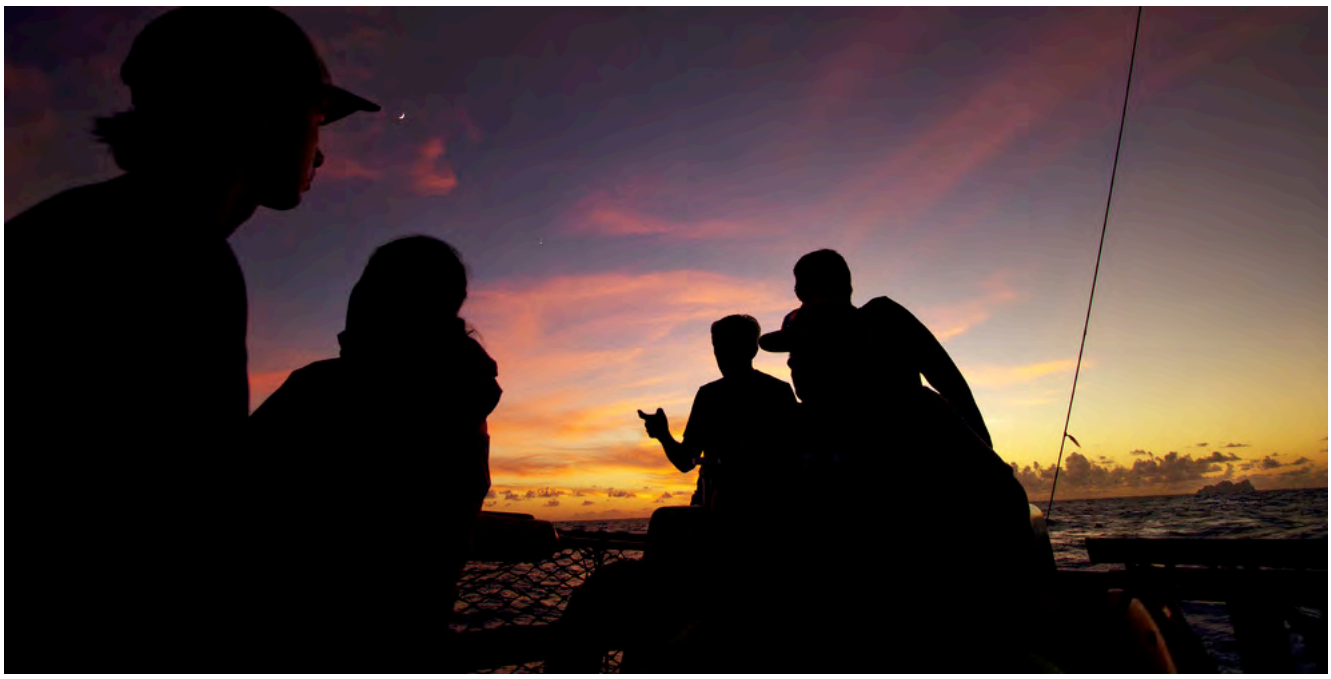

Image 8. Young navigators aboard the Hōkūle'a are able to enhance their traditional wayfinding skills in the waters of PMNM, which provides the only sailing routes close to the main Hawaiian Islands that can simulate an open ocean, long distance voyage. © Polynesian Voyaging Society

achieve success because of the area's enormous size and complexity. Managers have very few comparable MPAs from which to derive lessons across the full spectrum of management activities.

Financial constraints are one of the most persistent challenges managers face and this potential limitation cuts across all aspects of LSMPA design and operations. Assessing the finances required for a vast marine area will determine both whether it can be established and whether it can be maintained over time. Increased resources may become available in the future, underscoring the importance of having prioritised management goals and objectives, so that unfunded activities can be reconsidered as new opportunities arise.

This need for consistent funding is shows the importance of the justification of financial resources over time. For LSMPAs that are very often established in near pristine areas, sustaining and even requesting increased financial support annually can be a challenge if policy makers do not full understand the overarching benefits of protecting large, biologically diverse marine areas to the whole of a nation's domain or to humanity. Managers should track (to the best of their ability) the actual flow of benefits both to the LSMPA as well as the wider society, and work to translate this cycle in an easily understood manner to key stakeholders and the wider public.

Even for LSMPAs that have a sufficient budget, adequately resourcing research and monitoring activities is critical. Managers currently working at-scale have noted that it may be necessary to provide scientific data upfront to manage and justify the budget, so finding a means to conduct research early on is not only critical, but mandatory. As national budgets often fluctuate year to year, it is important to create partnerships that develop or contribute to sustainable financing.

For LSMPAs that need to address communities in multiple languages, education and outreach activities can be especially challenging and costly. It is essential to use the language of the audience being addressed whenever possible. As these guidelines have underscored, for the early, ongoing, consistent and balanced engagement of diverse stakeholders – be they the general public, policy makers, scientific partners, or Indigenous peoples and local communities – it is key to use the most common and easily understood terminology for a wide range of audience.