DEVELOPING A MARINE SPATIAL PLAN: A TOOLKIT FOR THE PACIFIC

TEN STEPS TO A HEALTHIER OCEAN AND STRONGER ECONOMY

MACBIO

Marine and Coastal Biodiversity Management in Pacific Island Countries

MARINE SPATIAL PLANNING

Marine Spatial Planning is an integrated and participatory planning process and tool that seeks to balance ecological, economic, and social objectives, aiming for sustainable marine resource use and prosperous blue economies.

The MACBIO project supports partner countries in collecting and analyzing spatial data on different forms of current and future marine resource use, establishing a baseline for national sustainable development planning.

Aiming for integrated ocean management, marine spatial planning facilitates the sustainable use and conservation of marine and coastal ecosystems and habitats.

This toolkit outlines the basic process of developing a national marine spatial plan. It has been tailored specifically for use by Pacific Island countries based upon lessons learned in Fiji, Solomon Islands, Tonga and Vanuatu.

For a copy of all reports and communication material please visit **www.macbio-pacific.info**

DEVELOPING A MARINE SPATIAL PLAN : A TOOLKIT FOR THE PACIFIC

2018

MACBIO
Marine and Coastal Biodiversity Management in Pacific Island Countries

SPREP
Secretariat of the Pacific Regional Environment Programme

IUCN

giz

On behalf of:
Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
of the Federal Republic of Germany

Photo credit: Yanuca Island, Fiji - Helen Pippard, IUCN

Recommended citation: Ceccarelli D, Davey K and L Fernandes 2018. Developing a Marine Spatial Plan: a toolkit for the Pacific. MACBIO (SPREP/IUCN/BMU): Suva.

MACBIO

Marine and Coastal Biodiversity Management in Pacific Island Countries

CONTENTS

1 ACKNOWLEDGEMENTS

The Marine Spatial Planning Toolkit is a culmination of the lessons learnt during the work undertaken by the MACBIO project (2013-2018), together with our country partners (Fiji, Tonga, Vanuatu, Kiribati and Solomon Islands). The authors, Daniela Ceccarelli, Leanne Fernandes and Kate Davey acknowledge the tireless dedication and commitment of the countries in their work to secure a sustainable future for their ocean. The authors wish to thank, in particular their in-country colleagues with who they have worked and who have taught them so much. Finally, we further thank the participants of the Regional Peer-to-Peer Learning Workshop on Marine Spatial Planning in the Pacific held in Nadi, Fiji (11-14, September, 2018), who provided much needed input and advice: (in no particular order) Jacqueline Evans (Director, Marae Moana, Cook Islands), Puna Rakanui (Clerk of the House of Ariki, Cook Islands); Margaret Tabunakawai Vakalalabure (FLMMA Coordinator, Fiji), Kiniviliame Ravonoloa (FLMMA, Fiji), Mere Lakeba (Principal Fisheries Officer, Ministry of Fisheries, Fiji), Tokabwebwe Katangateman (Assistant Fisheries Officer - Lami, Ministry of Fisheries, Fiji), Tarisi Toroca (Senior Fisheries Officer – Western, Ministry of Fisheries, Fiji), Joji Vuakaca (Principal Fisheries Officer – Northern, Ministry of Fisheries, Fiji), Richard Veeran (Principal Fisheries Officer – Inshore, Ministry of Fisheries, Fiji), William Sokimi (Assistant Fisheries Officer -Offshore, Ministry of Fisheries, Fiji), Sophie Buinimasi (iTAB Representative, Ministry of iTaukei Affairs, Fiji), Pita Naidike (Senior Technical Officer, iTaukei Land Fisheries Commission, Ministry of iTaukei Affairs, Fiji), Mason Smith (Regional Director, IUCN, Fiji), Liliana Rakance (Receptionist, IUCN, Fiji), Fipe Tuitubou (Programme Support Officer, IUCN, Fiji), Marian Gauna (Project Support Assistant, IUCN, Fiji), Kate Davey (MACBIO Project Officer, IUCN, Fiji), Leanne Fernandes (MACBIO Senior Project Officer, IUCN, Fiji), Hans Wendt (MACBIO Technical Officer, IUCN, Fiji), Savenaca Kalokalo (Protocol Driver, IUCN, Fiji), Epeli Nakautoga (Communications Officer, IUCN, Fiji), Nawaia Matia (IT Officer, IUCN, Fiji), Etika Qica Rupeni (Special Projects Officer, IUCN, Fiji), Ifereimi Dau (CCMRR Programme Officer, IUCN, Fiji), Stacy Jupiter (Melanesia Director, Wildlife Conservation Society, Fiji), Rusila Savou (Climate Change Officer, World Wildlife Fund, Fiji), Susana Waqainabete Tuisese (Fiji Program Director, Conservation International, Fiji), Kalesi Tuitui Nadalo (GIS Officer, Conservation International, Fiji), Jan Steffen (MACBIO Project Director, GIZ, Fiji), John Kaitu'u (Technical Project Assistant, GIZ, Fiji), Andra Whiteside (Technical Project Assistant, GIZ, Fiji), Mavileko Ramoica (Technical Project Assistant, GIZ, Fiji), Saiasi Buluta (Admin Officer – Conservation, iTAB-Conservation Unit, Fiji), Manoa Duwai (Nadroga Navosa Yaubula Rep, NNYMST, Fiji), Martin Jack Nabola (Senior Budget Analyst, Ministry of Economy, Fiji), Kelera Tokalau (Environment Officer, Department of Environment, Fiji), Alfred Lebehn (GIS Specialist, National Oceanic Resource Management Authority, FSM), Shirley Ann Pelep (Grants Officer, Micronesia Conservation Trust, FSM), Alistair Maruia (GIS Officer, Ministry of Fisheries and Marine Resources Development, Kiribati), Rateiti Vaimalie (Department of Fisheries, Ministry of Fisheries and Marine Resources Development, Kiribati), Jonas Star (Fisheries Director, Nauru Fisheries Marine Resources Authority, Nauru), Being Yeeting (Coastal Fisheries Science Advisor, Nauru Fisheries Marine Resources Authority, Nauru), Josie Tamate (Director-General, Ministry of Natural Resources, Niue), Coral Pasisi (President, Tofia Niue, Niue), Fabio Siksei (Fisheries Coordinator, Palau Conservation Society, Palau), Joyce K Beouch (Conservation Planner, Ministry of Natural Resources, Environment & Tourism - Protected Areas Network Office, Palau), Lolita Gibbons-Decherong (Program Manager - Conservation and Protected Areas, Palau Conservation Society, Palau), Darlynne Takawo (GIS Officer, Ministry of Natural Resources, Environment & Tourism - Protected Areas Network Office, Palau), Beatrix Oni (Senior Officer – Conservation, Bougainville Bureau for the Environment, Papua New Guinea), Maria Satoa Peni (Prinicipal Marine Conservation Officer, Ministry of Natural Resources & the Environment, Samoa), Telesia Sila (Senior Mapping Officer, Ministry of Natural Resources & the Environment, Samoa), Marolionel Polataivao (Marine Ecosystem Conservation Officer, Ministry of Natural Resources & the Environment, Samoa), Maria Sapatu (Programme Associate Officer, Conservation International, Samoa), Agnetha Vave Karamui (Chief Conservation Officer, Protected Areas, Ministry of Environment, Climate Change, Disaster Management & Meteorology, Solomon Islands), Anja Gross-Kemp (Development Advisor, Ministry of Environment, Climate Change, Disaster Management, Solomon Islands), Mathew Walekoro (Principle Planning Officer, Ministry of Development, Planning & Aid Coordination, Solomon Islands), Rachel Bare-Anita (Communications Officer & Principal Marine Officer / Manager, SIMSA/Ministry of Infrastructure and Development, Solomon Islands), Veira Pulekera (Project Liaison Officer, Solomon Islands, MACBIO Project, Solomon Islands), Trevor Ramoni (Assistant Secretary, Ministry of Foreign Affairs & External Trade, Solomon Islands), Ivory Akao (Assistant Director Fisheries, Ministry of Fisheries and Marine Resources, Solomon Islands), Tahirih Hokafonu (Principal Assistant Secretary (Principal Biodiversity Officer & Head of Biodiversity Division, Ministry of Environment & Climate Change, Tonga), Rosamond Bing (Chief Executive Officer, Ministry of Lands and Natural Resources, Government of Tonga), Karen Stone (Director, Vava'u Environmental Protection Association, Tonga),

Yumi Casualina Nafe (Assistant Geologist, Ministry of Lands and Natural Resources, Tonga), Lilieta Takau (Senior Project Manager, Department of Environment, Tonga), Latu Aisea (Coastal Community Development and Advisory Section, Ministry of Fisheries, Tonga), Auiluma Lotoala (Traditional Knowledge & Cultural Biodiversity Officer, Tuvalu Association of Non-Governmental Organisation, Tuvalu), Teleke Peleki Lauti (Funafuti Kaupule, Tuvalu), Vaiguna Penileta (Local Leader and Focal Point for Funafuti Conservation Area, Funafuti Town Council, Tuvalu), Donna Kalfatak (Senior Biodiversity Officer, Department Environmental Protection & Conservation, Vanuatu), Toney Tevi (Director Maritime Division, Department of Foreign Affairs, Vanuatu), Vatumaraga Molisa (Vanuatu MACBIO Project Liaison Officer, Department of Environmental Protection & Conservation, Vanuatu), Tony Kanas (Acting Surveyor General, Department of Lands, Vanuatu), Henderson Tagaro (Senior Finance Officer, Department of Finance, Vanuatu), Trevor Mele Trief (Senior Finance Officer, Department of Finance, Vanuatu), Rolenas Tavue Baereleo (Senior Conservation Officer, Department of Environmental Protection and Conservation, Vanuatu), Jayven Ham (Senior Marine Biologist, Department of Environmental Protection and Conservation, Vanuatu), George Amos (Fisheries FAD & Livelihood Development Officer, Department of Environmental Protection and Conservation, Vanuatu), Nate Peterson (GIS and Conservation Information Manager, Pacific Division, The Nature Conservancy, Australia), Malakai Vakatauwale (Maritime Boundaries Advisor, Secretariat of the Pacific Community, Fiji), Kathryn Mengerink (Executive Director, Waitt Foundation, USA), Jacob James (Managing Director, Waitt Foundation, USA), Jennie Dean (Consultant, Waitt Foundation/UCLA, USA).

The Marine and Coastal Biodiversity Management in Pacific Island Countries (MACBIO) project is funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety's (BMU) International Climate Initiative (IKI). It is being implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) with the countries of Fiji, Kiribati, Solomon Islands, Tonga and Vanuatu. It has technical support from the Oceania Office of the International Union for the Conservation of Nature (IUCN) and is working in close collaboration with the Secretariat of the Pacific Regional Environment Program (SPREP).

2 SUMMARY

Marine spatial planning (MSP) is a practical way of spatially organising the human use of marine areas to balance the demands of human activities with the need to maintain the health of the ecosystems on which those activities depend. This Toolkit is intended to support the development of nation-wide or large-scale marine spatial plans. It aims to complement, but not replace, community-based management and other existing management interventions such as sectoral plans, permits, licences and other controls and restrictions. The final output is typically a national (or large-scale) marine spatial plan that includes a network of marine protected areas. This Toolkit primarily concentrates on the development of a marine spatial plan. Links to information relating to the implementation of a marine spatial plan can be found in http://msp.ioc-unesco.org/msp-guides/msp-step-by-step-approach/.

The 10 Steps, and subordinate tasks are outlined below:

Step 1: Identify need, political will and financial support

Task 1.1: Determine whether MSP is necessary.

Task 1.2: Ensure there is recognition of the need for MSP at the appropriate political level.

Task 1.3: Organise an internal, government-led senior technical working group to develop the MSP

Task 1.4: Determine whether there is financial support for developing a MSP.

Task 1.5: Build a work plan with a timeframe.

Step 2: Prepare and implement a consultation plan

Task 2.1: What are the key phases of the consultation plan?

Task 2.2: Who should be involved at each phase of the MSP process?

Task 2.3: What is the desired level of input at each round of consultation?

Task 2.4. Identify the purpose/objective and key messages for each round of consultation

Task 2.5 Identify when each group should be involved in each phase of the MSP process

Task 2.6. Identify how people should be involved

Task 2.7. Identify the consultation team

Step 3: Define vision and objectives

Task 3.1: Set out a clear vision for your country's MSP

Task 3.2: Set out the broad objectives for MSP

Task 3.3: Set out the specific objectives for MSP

Step 4: Gather and map baseline data and future conditions

Task 4.1: Gather and map information about the environment, ecology and oceanography

Task 4.2: Understanding marine bioregions in marine protected area planning

Task 4.3: Gather and map information about human uses and values

Task 4.4: Identify areas of conflict or compatibility

Task 4.5: Consider future scenarios

Step 5: Identify special, unique marine areas

Task 5.1: Identify special, unique marine areas combining spatial data with in-country knowledge

Step 6: Define desired ocean[1] zones

Task 6.1: Determine what types of ocean zones are needed in your country

Step 7: Prepare guidelines to assist zoning decisions

Task 7.1: Define socio-economic, cultural and management feasibility guidelines

Task 7.2: Decide on guideline to design a network of Marine Protected Are

Step 8: Establish the legal and institutional basis for MSP

Task 8.1: Review the legislation, policies, strategies and plans relating to MSP

Task 8.2: Identify who has the authority for MSP

Task 8.3: Legislation to support a marine spatial plan.

Step 9: Prepare a draft marine spatial plan

Task 9.1: Prepare a draft marine spatial plan for consultation

Step 10: Prepare and implement the final marine spatial plan

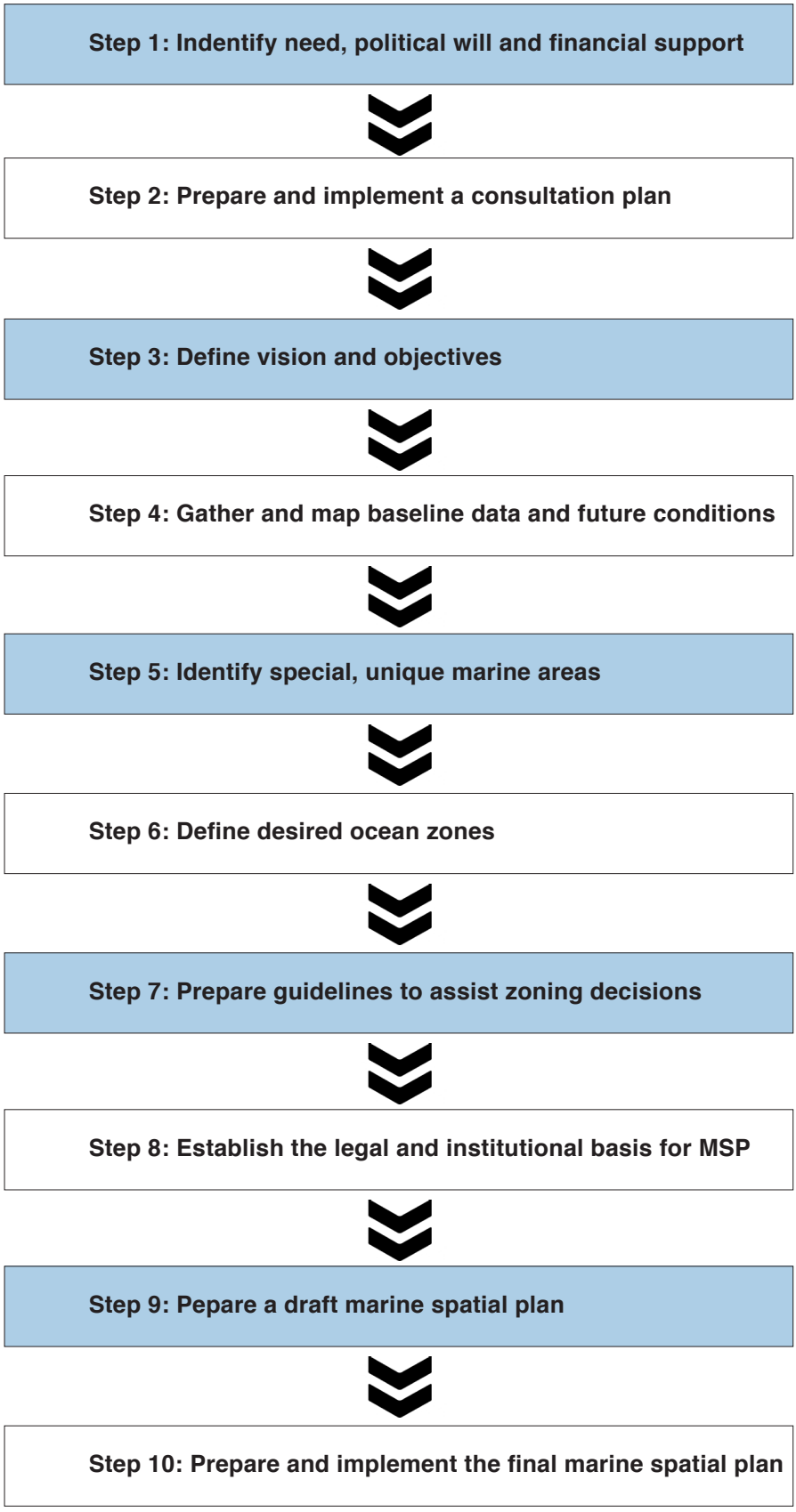
Task 10.1: Finalise the marine spatial plan after considering all submissions received during the consultation

Task 10.2: Guide the MSP through the usual government processes to enter it into formal law

The steps can be implemented either sequentially or individually.

[1] "Marine" and "ocean" can be used interchangeably

10 STEPS TO DEVELOPING A MARINE SPATIAL PLAN (MSP)



2 INTRODUCTION

Marine spatial planning (MSP) is a practical way of spatially organising the human use of marine areas to balance the demands of human activities with the need to maintain the health of the ecosystems on which those activities depend. This is especially important in Pacific Island countries where ~98% of their area is ocean[1], and where livelihoods, food security, cultural wellbeing and economic dependencies are intertwined with the sea.

There is recognition that marine ecosystems are in decline, mostly due to human activities[2], but there is also recognition that it is possible to manage human activities to minimise negative impacts on marine ecosystems[3]. MSP involves an inter-sector and participatory public process of identifying and achieving economic, social and ecological objectives in a transparent and organised way[4]. The intended result of MSP is to spatially organise human activities to ensure that they are ecologically, economically and socially sustainable.

Ideally, MSP results in a national marine spatial plan (including a national network of marine protected areas) that guides the management of human activities and is adaptable over time. As knowledge is gained about marine ecosystems and their responses to human activities, and the activities themselves change, the plan can be adapted to provide the best solution possible given the information available. Tailored to meet the needs and capabilities of Pacific Island nations, this MSP Toolkit provides a practical step-by-step approach to develop a marine spatial plan (which can also be referred to as MSP).

A number of MSP guides exist, either for specific regions or for a more general approach[4–7]. Some of these set out steps to guide the process, but many of the steps are either not possible or not relevant in the Pacific. In addition, many other MSP guides provide exhaustive details on aspects of marine resource management which are not central to MSP itself. This Toolkit is specifically adapted to the Pacific situation and focusses only upon the development of an MSP. Links to information relating to the implementation of a marine spatial plan can be found in http://msp.ioc-unesco.org/msp-guides/msp-step-by-step-approach/.

Although they may not call it “marine spatial planning”, most countries in the Pacific are already applying aspects of MSP, through area based management tools, such as designating shipping lanes, allocating fishing areas, and implementing locally managed marine areas (LMMAs) or marine protected areas (MPAs). However, these have often been declared opportunistically and sectorally, rather than as part of integrated, cross-sectoral planning. Applying a more integrated approach is more likely to result in the desired outcome, which is usually to secure the ecosystem services (see below) that people rely on and benefit from in the medium- and long-term[1], as well as providing clarity for users and investors as to what activities are allowed in which areas.

MSP has clear ecological, economic and social benefits (Table 1). Importantly, if designed and implemented effectively, it streamlines the otherwise potentially complicated process of managing multiple uses in the sea, including for business and investors, and assists in setting priorities for each area of ocean. It also results in clear outputs (a spatial management plan) designed to help achieve broad goals: for example, healthy fish populations, functioning marine ecosystems, robust coastal and marine economies, reduced conflicts among human activities, and the maintenance of critical marine ecosystem services[8]. This plan is translated into a zoning map and/or a permit system which guides and organises human activities throughout the ocean. The term marine and ocean are used interchangeably throughout this document.

Table 1. Key benefits of MSP.
From Ehler and Douvere 2009[4]

Economic Benefits	Provides greater certainty of access to desirable areas for new private sector investments, frequently over 20-30 years
	Identifies compatible uses within the same area
	Reduces conflicts between incompatible uses
	Improves capacity to plan for new and changing human activities, including emerging technologies and their associated effects
	Improves safety during operation of human activities
	Promotes the efficient use of resources and space
	Assists in streamlining and transparency of permit and licensing procedures

Social Benefits	Identifies and improves protection of cultural heritage
	Improves opportunities for community and citizen participation
	Identifies impacts of decisions on the allocation of ocean space (e.g., new industries, protected areas) for communities and economies onshore (e.g., employment, distribution of income)
	Identifies and preserves social and spiritual values related to ocean use (e.g., the ocean as an open space)
Ecological / Environmental Benefits	Identifies biological and ecological important areas
	Mainstreams biodiversity objectives into planned decision-making
	Identifies and reduces conflicts between human use and nature
	Allocates space for biodiversity and nature conservation
	Establishes context for planning a network of marine protected areas
	Identifies and reduces the cumulative effects of human activities on marine ecosystems

3.1 MARINE SPATIAL PLANNING - AN OVERARCHING MANAGEMENT TOOL

Before we introduce the steps of this Toolkit, we firstly acknowledge that marine spatial planning does not replace sectoral management. For example, sectoral management of fishing, tourism, deep sea mining, shipping and so on - remains an essential part of marine resource management. MSP does not remove the need for sectoral management; however holistic and integrated spatial planning complements and augments the aims of these sectoral management efforts. Examples of sectoral management measures include:

- Input controls/measures (the human inputs)
    - Limitations on fishing activity and capacity
    - Limitations on shipping vessel size or horsepower
    - Limitations on the amounts of fertilisers and pesticides applied to agricultural lands
- Output measures/controls (outputs of human activities)
    - Limitations on the amount of pollutants discharged into the marine environment
    - Limitations on allowable catch and by-catch
    - Tonnage limitations on sand and gravel extraction
- Process measures (the nature of the process of human activities)
    - Specification of fishing gear type, mesh size
    - Specification of “best available technology” or “best environmental practice”
    - Specification of level of waste treatment technology
- Sectoral spatial and temporal measures (where and when human activities can occur)
    - Specification of areas closed to fishing or energy development
    - Designation of areas for specific uses, e.g. wind farms, military operations, sand and gravel extraction waste disposal
    - Designation of marine protected areas

In addition, in the Pacific, national-scale marine spatial planning will complement and augment community-based management. Again, it will not replace the need for community-based management.

Integrated MSP requires participation and cooperation across government agencies and with all the resource owners and users. Sectoral planning and management will continue, but within a comprehensive, integrated framework (i.e. the marine spatial plan) and with a united vision of the future which informs sectoral decision-making [8].

3.2 CROSS CUTTING ISSUES IN MARINE SPATIAL PLANNING

There are many cross-cutting issues that are relevant to the application of any marine resource management tool, including MSP.

Cross cutting issue include:

- the valuing of marine ecosystem services[9]
- how to work in a culturally appropriate manner[10]
- how to incorporate gender and other minority groups equitably[11]
- how to account for climate change[12,13]
- how to deal with alternative sustainable livelihoods, socially and environmentally[14]
- principles of good planning practice (e.g. transparency, precautionary principle)[15]

- sustainable financing[16]
- compliance (from education to enforcement)[17]
- performance monitoring[18],
- adaptive management[19], and
- traditional practices, knowledge, management and cultural values [20,21].

These issues are relevant across many of the steps outlined below and should be integrated into the suggested processes and procedures outlined in the MSP steps. However, these aspects are not addressed specifically. Many other resources provide advice as to how to address these important issues including those cited above (see also [4,22]).

3.3 THE MARINE SPATIAL PLANNING TOOLKIT

This MSP Toolkit offers 10 steps to developing a marine spatial plan. It does not address the implementation aspects of marine spatial planning including the compliance program, performance monitoring and evaluation, or the process of reviewing the marine spatial plan. Information about how to implement the MSP can be found at http://msp.ioc-unesco.org/msp-guides/msp-step-by-step-approach/ [4].

This Toolkit is designed to ensure that it is globally relevant, but each step is tailored to the specific needs, opportunities and challenges experienced by Pacific Island nations. To this end, for many of the steps outlined below, includes a practical example from a Pacific Island Country.

Each step is presented as a separate and stand-alone stage of the MSP process; however, in reality, the steps will often be iterative. The Toolkit is designed to be useful even if the order of the steps is not followed exactly as outlined below.

Marine Spatial Planning (MSP) in a nutshell (5 minute video)

The film, to which the a link is provided here, explains marine spatial planning simply and dynamically. It is suitable for everyone: from local communities to planners and policy-makers. The German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety has been financed this film through its International Climate Initiative. Available at vimeo: https://vimeo.com/219515087

4 STEP 1: IDENTIFY NEED, POLITICAL WILL AND FINANCIAL SUPPORT

TASK 1.1: DETERMINE WHETHER MSP IS NECESSARY

The first step in MSP is to ask the question: do we need MSP? Are the marine resources of our country valuable? Are these values threatened because there are current or predicted human uses that are unsustainable, incompatible with each other or incompatible with maintaining the marine environment and the benefits it brings? Are marine resource management decisions being made sectorally and in isolation of each other? If the answer is "yes" to any of these questions, marine spatial planning may help address these issues.

Many of the threats experienced in the world's oceans are experienced by all Pacific Island nations, for example: climate change, illegal extractive activities, land-based pollution and sedimentation, overfishing, habitat destruction and weak governance and management capacities. These threats can diminish the values that people derive from their ocean resources and can be mitigated with holistic management, like MSP.

Once there is an agreement to proceed with marine spatial planning, then ensuring that politicians and other leaders recognise this and the potential benefits of MSP is essential.

TASK 1.2: ENSURE THERE IS RECOGNITION OF THE NEED FOR MSP AT THE APPROPRIATE POLITICAL LEVEL

Politicians, community leaders and other high-level decision-makers are often forced to think in short-term political time-spans, and need to communicate with their constituents in terms of clear and tangible goals and plans. Setting out a list of problems, conflicts and threats to be addressed by MSP and the objectives of MSP as they relate to government priorities can translate a relatively abstract and long-term concept into language that politicians and leaders can use. Support for MSP from politicians can be gained by specifying the human values derived from the marine environment, the problems that threaten those values and detailing how MSP can help solve them.

This group or individual(s) can then facilitate and champion the correct political processes to ensure the MSP is embedded thoroughly into government administration, for example Cabinet papers, high-level (i.e. Ministerial, Prime Ministerial) briefings, etc. They will need to be supported by a more hands-on technical working group.

TASK 1.3: ORGANISE AN INTERNAL, GOVERNMENT-LED SENIOR TECHNICAL WORKING GROUP TO DEVELOP THE MSP

To guide the development of a MSP, it is useful to establish an internal, government-led senior technical working group. The MSP technical working group needs to have appropriate skills, and be given adequate authority, to guide the process. This means that the team must have the highest level of government support and approval. It must be a multi-disciplinary, cross-Ministerial team comprised of biologists, ecologists, social scientists, geographers, economists, lawyers, and planners, with a diverse range of roles and skill types.. It may be necessary to engage consultants to fill gaps in the team. It is advantageous for there to be a clear leader(s) who maintains an overview over all the different parts of the process (see "work plan" section below).

PACIFIC PROFILE: TONGA

Tonga has Cabinet-level support for their high-level technical MSP Steering Committee. It comprises seven Ministries and three Authorities (Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication; Ministry of Lands and Natural Resources - including the Planning and Urban Management Authority; Ministry of Agriculture, Food, Forests and Fisheries; Ministry for Finance; Ministry for Internal Affairs; Ministry of Tourism; Ministry of Infrastructure and Tourism (Marine Division); and the Tonga Ports Authority and National Planning Authority. This steering committee is called the Ocean 7 and reports to both the National Environment and Climate Change Committee and to Cabinet. It is co-chaired by the three Ministries in charge of Environment, Fisheries and Lands (the first three Ministries listed above). It is supported by a small secretariat within the Department of Environment. The individual members of the Ocean 7 have the functional roles, knowledge, programmatic and administrative skills required to progress their national marine spatial planning processes.

TASK 1.4: DETERMINE WHETHER THERE IS FINANCIAL SUPPORT FOR DEVELOPING AN MSP

Identifying and securing funding sources will go hand-in-hand with setting out the goals and objectives of MSP (Step 3). Government funding may or may not be available, and alternative financing may be required for MSP development. A range of options is usually available for consideration (Table 2), but not all will be equally feasible. A financial plan should consider the security of funding and plan for contingencies when needed.

The biggest new costs will be temporary and associated with the development of the marine spatial plan. These costs will include the required consultations (Step 2) and building the new technical foundations that may be needed for the marine spatial plan (see Steps 3-9).

Table 2. Some potential mechanisms of financing for MSP Development [4,16].

Financing mechanism	Source of revenue
Government revenue allocations	
Direct allocations from government budgets	Government budget revenues; taxpayers
Government bonds and taxes earmarked for MSP	Tax payers; investors who purchase bonds
Grants and donations	
Bilateral and multilateral donors	Donor agencies
Foundations	Individuals, corporations
Non-Governmental Organizations (NGOs)	NGO members and supporters
Private sector	Investors
Conservation trust funds	Multi-source

TASK 1.5: BUILD A WORK PLAN WITH A TIMEFRAME

Building a realistic work plan with an associated timeline is essential when developing a marine spatial plan.

The work plan should clarify how the various parts of the process relate to each other. In this context, it is also necessary that one individual maintains an overview of all parts of the work plan throughout the entire period. The following actions should be the key components of the work plan[4]:

1. List the main activities required to develop the MSP
2. Choose appropriate time periods for specifying when activities will take place (by week, month, quarter, year)
3. Estimate the start time and duration of each task. This may be represented as a line or bar on a chart
4. Identify key events (milestones) to help monitor progress. These are often dates by which a task will be completed
5. Assign responsibilities for tasks with the various members of the MSP team.

Step 1 Summary
Task 1.1: Determine whether MSP is necessary.
Task 1.2: Ensure there is recognition of the need for MSP at the appropriate political level.
Task 1.3: Organise an internal, government-led senior technical working group to develop the MSP
Task 1.4: Determine whether there is financial support for developing a MSP.
Task 1.5: Build a work plan with a timeframe.

5 STEP 2: PREPARE AND IMPLEMENT A CONSULTATION PLAN

Preparing a consultation plan that will help guide community engagement throughout the development of a MSP is essential. A consultation plan can help secure input, support and ultimately improve the outcome of the MSP. A good consultation plan answers the questions as to who, why, when (at what stages), what and how to engage communities and stakeholders in the MSP process.

Consultation should occur in multiple ways throughout the MSP process; in this sense, it is not really a separate "step" but instead must occur throughout the process. However, to be most effective the consultation plan should be developed early in the process. The objective is to optimise the MSP through use of the best information available, including information collated in the consultations, and to secure participation and stewardship of the MSP. This support will enhance the likelihood of compliance with, and therefore success of, the MSP.

The suggested phases of a standard consultation include:

I. one round of consultation before the development of a draft MSP;
II. a second round of consultation once the draft MSP has been prepared; and
III. a third round of consultation after the new MSP becomes law.

A consultation plan will streamline the consultation process. The consultation plan should include, for each round of MSP consultation, the groups of people and organisations to consult with, the purpose of the consultations, key messages/ questions to ask to achieve that purpose and the best modes of communication for each interested group including communities and other groups. The plan should also identify existing structures and mechanisms that can be used to share information, including government agencies, religious organisations, schools, community-based organisations, international and national non-government organizations (NGOs) or other non-government avenues of outreach such as the private sector.

MSP often aims to achieve multiple objectives (social, economic and ecological) and communication about the MSP process should therefore reflect all the corresponding affected groups in the MSP area. Communities and relevant stakeholders need to be made aware about the MSP process. Knowing which people and groups to involve at which stage of the process will avoid the time-consuming and distracting effects of involving the wrong people at the wrong time. The work plan (see above) needs to detail to what degree, and at what points in time, people are to be involved in the process. Affected groups could include government, non-government, private sector, scientists and communities. A list or database should be prepared which identifies people who wish to be informed and involved in the project.

The consultation plan will identify which communication tools might be helpful at each stage of the consultations. However, in general, it's likely that two main types of consultation products will be needed: 1) maps of information, including colour hardcopy maps showing information about the relevant marine area and, when appropriate, the preferred plan at a scale to allow effective input; and 2) fact sheets and information about the MSP process itself (e.g. newsletters).

In preparing a consultation plan, one needs to identify:

1. The key phases of the consultation plan including the number of rounds of national public/community consultation;
2. Who should be involved (the target audiences) for each round of the national MSP consultations;
3. To what degree different groups should they be involved in each round of national consultations (are we inviting co-decision-making or input or just sharing information with each identified target audience);
4. The purpose/objective for each round of consultations and key messages/questions that will help to achieve that purpose/objective;
5. How best to share the messages/ask the questions (i.e. communication tools/products/methods); and
6. The consultation team to go out and conduct the consultations.

TASK 2.1: WHAT ARE THE KEY PHASES OF THE CONSULTATION PLAN?

As mentioned above generally, it is recommended to have three rounds of formal, national consultations:

- one round of consultation before the development of a draft MSP;
- a second round of consultation once the draft MSP has been prepared; and
- a third round of consultation after the new MSP becomes law.

TASK 2.2: WHO SHOULD BE INVOLVED AT EACH PHASE OF THE MSP PROCESS?

The following guidelines will help determine who should be involved in MSP[4]. It should include those:

- directly dependent on the resources of the area where MSP decisions will be taken (e.g. community groups, women's groups)
- responsible for making decisions about resources (e.g. village chiefs and elders, lawyers)
- who have or make legal claims or obligations over areas or resources within the management area (e.g. local and national governing bodies)
- that conduct activities that impact on areas or resources of the management area (e.g. industry agencies)
- that have special seasonal or geographic interests in the management area (e.g. scientific research teams)
- that have technical knowledge about the area (e.g. scientists, internal or external)
- that have a special interest in the management of the area (such as environmental NGOs and cultural advocacy groups)

The answers to these questions will provide the MSP team with a network of interested parties with whom it will consult.

TASK 2.3: WHAT IS THE DESIRED LEVEL OF INPUT AT EACH ROUND OF CONSULATION?

There are different levels of consultation (the "ladder" of consultation):

Informing:	Where one lets people know about something
Consulting:	Inviting input to decision-making which will be considered; however, this level of consultation does not promise that the input will influence decisions
Influencing:	The input will influence the decisions although not everyone's wishes will be fulfilled
Partnership:	Both those consulted and the government will have a significant and relatively equal say in the final decisions
Delegation:	The central authority hands over most of the decision-making to communities or citizens
Citizen control:	The local communities and citizens are in control of the policy or planning.

Community-based marine resource management usually operates at the "citizen control" or "delegation" level of consultation. National policies, including marine spatial planning, can operation at any scale but usually engage in "informing", "consulting", "influencing" or "partnership". And the level of consultation may vary at different parts of the process. It will be influenced by the government's processes and corporate culture. However, decisions will need to be made about the desired level of consultation at each stage of the MSP process. Usually, once the final decision about a policy or plan is made, one must let people know about that and, at that stage, the consultations take the form of "informing". However, at earlier stages, communities can be given more opportunity for input.

Those in charge of the MSP need to be aware that different groups will have different levels of influence. We recommend allowing as much influence over the decisions as possible whilst still ensuring achievement of the desired objectives.

Regardless, there must be absolute clarity, and no false promises, about the level of influence that affected groups will have over the MSP process. The commitments made to stakeholders must be followed through in a way that is consistent with the communication plan (see below).

TASK 2.4: IDENTIFY THE PURPOSE/OBJECTIVE AND KEY MESSAGES FOR EACH ROUND OF CONSULTATION

The purpose/objectives of each of the three communication rounds are broadly as follows:

a) Round One - Inform people that the government intends to develop a national MSP and invite input (it is also worthwhile to state why i.e the expected benefits of MSP)
b) Round two - Use information from (a) to develop a draft MSP and invite input on this draft; and
c) Round three - Use information from (b) to finalise the MSP and inform everyone that the MSP is finalised and what the new rules are.

Within each round of the consultations, and for each purpose, it must be decided what the key messages are and what information is being sought from each engaged group of people.

It is important to align the communication/consultation objectives and purpose with what is acceptable to the government processes and organisational culture within which the MSP is embedded (refer to Task 2.2, above).

TASK 2.5: IDENTIFY WHEN EACH GROUP SHOULD BE INVOLVED IN EACH PHASE OF THE MSP PROCESS

Involvement will need to vary throughout the process. During the early stages, it is ideal to involve as many affected groups as possible. This will also facilitate the collection of information on the wide range of expectations and conflicts at play in the management area. During the development of the MSP plan a core group of people should be engaged (e.g. a technical advisory group). However, the draft MSP must be subject to as wide a consultation as possible, because the ocean of any nation belongs to all her people. The job of taking everyone's comments on board then belongs to the senior technical group. However, once the MSP is finalised in law, everyone needs to know that it is in place to ensure compliance.

TASK 2.6: IDENTIFY HOW PEOPLE SHOULD BE INVOLVED

In this part of the consultation plan, decisions must be made as to the communication tools, methods and approaches to take. It will likely be a mixture of options. Consideration might be given to the following examples:

- Community consultation meetings
- Information sheets
- Newsletters
- TV advertisements and media releases
- Radio advertisements and media releases
- Social media
- Church events
- Women's groups
- Youth groups
- Etc.

TASK 2.7: IDENTIFY THE CONSULTATION TEAM

The consultation team will conduct the detailed, community-level consultations on the ground. This team should be cross-ministerial, include women and men, and at least one "youth" representative (e.g. mid-twenties or younger). This diversity is to ensure that the team has knowledgeable and culturally appropriate experts who can discuss the range of issues likely to arise during consultations, and encourage input from all groups. Each consultation team must work with a locally respected "facilitator".

The consultation team must nominate a rapporteur to record feedback at each location in a way that it can (a) be included in a consultation report and (b) be considered in decisions about where to locate which types of ocean zones.

INTERNAL VERSUS EXTERNAL CONSULTATION

External communication should be aligned to the intended workplan, milestones and expected outcomes of the MSP process. The results of the plan should be monitored via consultation reports that detail the findings, and the consultation plan should be updated accordingly. Potential ways to communicate nationally include[4]:

- Engaging a national champion and/or local champions e.g. chiefs that already have the trust of the people
- Distributing information to raise awareness of the possibility of participating in MSP efforts via mass and social media
- Holding workshops/meetings with local communities and other resource users to support understanding about MSP and the effects (positive and negative) it may have on certain groups
- Sharing of information via existing communication channels (e.g. traditional leaders, communities, churches, schools, provincial government offices and officers, fishing industry groups).

Internal communication is aimed at ensuring all of government agencies and key decision makers understand and have opportunities to engage and influence the marine spatial planning process. This includes to generate and/or maintain the require political will.

Step 2 Summary

Task 2.1: What are the key phases of the consultation plan?
Task 2.2: Who should be involved at each phase of the MSP process?
Task 2.3: What is the desired level of input at each round of consultation?
Task 2.4: Identify the purpose/objective and key messages for each round of consultation.
Task 2.5: Identify when each group should be involved in each phase of the MSP process.
Task 2.6: Identify how people should be involved.
Task 2.7: Identify the consultation team.

PACIFIC PROFILE: TONGA

In late 2018, Tonga began the first phase of its consultation plan. The overall consultation plan included the following key areas:

1. Introduction
2. Audience
- **Government**
- **Communities**
- **Private Sector**
- **Non-government organizations (NGOs)**
- **Scientists**
- **Traditional knowledge custodians**

3. Phase A: National Consultations – to introduce the concept of MSP
- **Objectives**
- **Key messages**
- **Communication tools and activities**
- **Timeline**

4. Phase B: National Consultations – Seeking input to draft MSP
- **Objectives**
- **Key messages**
- **Communication tools and activities**
- **Timeline**

5. Phase C: Education and Information about the final MSP National Consultations – Seeking input to draft MSP
- **Objectives**
- **Key messages**
- **Communication tools and activities**
- **Timeline**

6. Internal Communications
7. Resourcing the Consultation Plan
8. Appendix A: Possible technical information sheets
9. Appendix B: Potential issues that may need to be addressed.

6 STEP 3: DEFINE VISION AND OBJECTIVES

MSP is a management tool. It is not an end in itself. The tool should be used to help a government achieve desired outcomes. Having a clear vision and objectives, will help achieve this.

TASK 3.1: SET OUT A CLEAR VISION FOR YOUR COUNTRY'S MSP

MSP needs to be driven by a clearly articulated vision. Defining the vision guides managers in making decisions during all parts of the MSP process. The vision should be a clear and positive statement which sets out, in very broad terms, what MSP intends to achieve. A vision may already exist or can arise out of, and after, the articulation of well-defined MSP objectives (see below).

TASK 3.2: SET OUT THE BROAD OBJECTIVES FOR MSP

For MSP to be successful, there needs to be a list of broad objectives, which tend to be general statements of the outcomes the MSP is aiming towards (e.g. protect marine resources, improve food security, increase resilience to climate change, etc.). These broad objectives can give rise to much narrower and more specific objectives that can help achieve the desired outcome (e.g. set minimum size limits for fisheries catch). Ideally, these broad objectives are best developed by both the identification of existing problems, conflicts and threats (Step 1), and an analysis of government objectives as articulated in existing plans, policies and legislation.

To better embed the MSP effort within existing government processes, it is very useful to analyse government documents and extract relevant broad objectives that a MSP can contribute towards, rather than developing new objectives that are not already government commitments. Most governments have already identified, in various strategies, plans and policies, a suite of objectives that they want to achieve; MSP can contribute to some of these.

In many instances, these objectives may seem to be in incompatible or even in conflict with each other; this is normal and can reflect differences in priorities, especially in different locations. The MSP process should help balance these differences.

PACIFIC PROFILE: FIJI

The vision and objectives for Fiji's proposed national network of marine protected areas were defined by reviewing 27 government policies, plans, strategies and other documents and identifying those existing government-articulated objectives that a national MPA network could help towards.

The vision was defined as:
A comprehensive, ecologically representative networks of MPAs that restores and sustains the health, productivity, resilience, biological diversity and ecosystem services of coastal and marine systems, and promotes the quality of life for our communities who depend on them.

The six broad objectives that Fiji's MPA Network will aim to achieve are to help:

1. **Ensure food security**
2. **Sustain livelihoods**
3. **Restore and sustain the health and productivity of marine resources**
4. **Minimise conflicts between uses**
5. **Build resilience to climate change and disasters and**
6. **Restore and conserve biological diversity and ecosystem services**

TASK 3.3: SET OUT THE SPECIFIC OBJECTIVES FOR MSP

Useful lower-level objectives are ideally specific, measurable, achievable, relevant, and time-bound (SMART)[4]. If they are SMART, then the objectives can more easily give rise to indicators, which are measurable variables that can be used for performance monitoring.

SMART objectives for protecting ecosystem values could include, for example[7]:

- All areas determined to allow for aquaculture are defined and mapped by 2020;
- a 1km shipping buffer is created around all coral reefs by 2025;
- the area available to artisanal fishers only is expanded by 10% by 2020;
- at least 30% of the ocean is included in no-take marine protected areas by 2020;
- by 2021, all deep-sea mining exploration tenements are located in the general use ocean zones of the marine spatial plan.

NOTE: These are examples only and each country must determine their own SMART objectives.

Step 3 Summary
Task 3.1: Set out a clear vision for your country's MSP
Task 3.2: Set out the broad objectives for MSP
Task 3.3: Set out the specific objectives for MSP

7 STEP 4: GATHER AND MAP BASELINE DATA AND FUTURE CONDITIONS

Gathering and presenting knowledge and information about the marine environment, its condition, uses and special areas is a central part of the planning process. Maps are the best way to present this knowledge and can support all spatial planning exercises.

TASK 4.1: GATHER AND MAP INFORMATION ABOUT THE ENVIRONMENT, ECOLOGY AND OCEANOGRAPHY

A crucial step in the MSP process is gathering existing knowledge about the current conditions of the marine environment and human interactions with the environment. It is important to also keep in mind the spatial scale and extent of the MSP when you start the process of data gathering and consolidation. The type of data to be collated and mapped will need to be, as far as possible up-to-date, objective, reliable, relevant and comparable. The inventory of existing knowledge should also take account of any obvious trends and developments (e.g. by finding datasets collected over time) in order to be able to assess what future spatial pressures may arise at a later stage of the planning process[4]. You will need to consider the ecological characteristics of the area, as well as physical environmental variables such as ocean currents, seabed geomorphology, and prevailing weather patterns.

Data and information can be collected from scientific literature, expert scientific opinion or advice, government sources, websites, local and traditional knowledge and direct field measurements. Accessing information may require certain online processes, protocols and agreements. It is useful, during this step, to focus upon gathering spatial data. There will be instances where data may not be available in a spatial data format. However, if the data collected have a spatial component attached as information, then a Geographic Information System (GIS) can be used to map out or turn the information into spatial data.

Although spatial data are available in many forms and from a variety of sources, determining how to appropriately use the data can still be a challenge because of limited metadata. It is very important that all spatial data have associated metadata information. The metadata should describe how the data was created and when, the process involved, geographic description, custodianship, a clear understanding about the copyright and the access and use conditions of the data. There are many metadata formats and standards that are now available for spatial data (e.g. ANZLIC metadata).

AVAILABLE BIOPHYSICAL DATASETS

Physical data

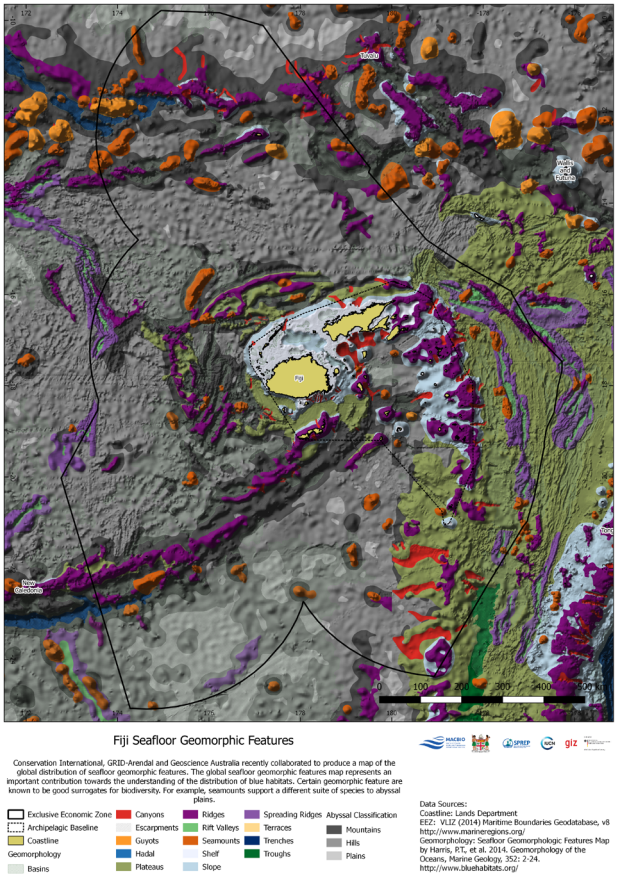
- Geomorphology: http://www.bluehabitats.org/
- Hydrothermal Vents: http://vents-data.interridge.org/ventfields_list_all
- Seamounts – classified: http://www.bluehabitats.org/
- Seamount productivity http://data.unep-wcmc.org/datasets/41
- Temperature: http://www.bio-oracle.org/
- Currents: http://www.oscar.noaa.gov/datadisplay/oscar_datadownload.php?pagetype=nonjava
- Silica concentration: http://www.marine.csiro.au/~dunn/cars2009/
- Nitrate concentration: http://www.marine.csiro.au/~dunn/cars2009/
- Phosphate: http://www.marine.csiro.au/~dunn/cars2009//
- Oxygen concentration: http://www.marine.csiro.au/~dunn/cars2009/
- Salinity: http://www.marine.csiro.au/~dunn/cars2009/
- Mixed layer depth: http://www.marine.csiro.au/~dunn/cars2009/
- Wave height: http://www.marine.csiro.au/~dunn/cars2009/
- Bathymetry: http://www.gebco.net/data_and_products/gridded_bathymetry_data/
- pH: http://www.marine.csiro.au/~dunn/cars2009/
- Particulate organic carbon: POC Flux: CSIRO: Lutz et al 2009

Biological data

- Chlorophyll A: http://www.bio-oracle.org/
- Vertically Generated Production (modelled): http://www.science.oregonstate.edu/ocean.productivity/
- Mangroves: http://data.unep-wcmc.org/datasets/41
- Coral reefs: http://data.unep-wcmc.org/datasets/1
- Seagrass: http://data.unep-wcmc.org/datasets/7
- Ecologically and Biologically Significant Areas: https://www.cbd.int/ebsa/ebsas
- Important Bird and Biodiversity Areas: http://datazone.birdlife.org/site/search
- Benthic species richness: https://www.aquamaps.org/
- Pelagic species richness: https://www.aquamaps.org/
- Coldwater coral probability: Davies , Guinotte (2011) Global Habitat Suitability for Framework-Forming Cold-Water Corals. PLoS ONE 6(4)
- Number of coral species: http://www.esapubs.org/archive/ecol/E094/150/
- Special, unique marine areas (for some Pacific countries only): http://macbio-pacific.info/macbio-resources/
- Marine bioregions: http://macbio-pacific.info/Resources/draft-marine-bioregions-southwest-pacific/

PACIFIC PROFILE: FIJI

Figure 1: Showcases the geomorphology map available for Fiji.

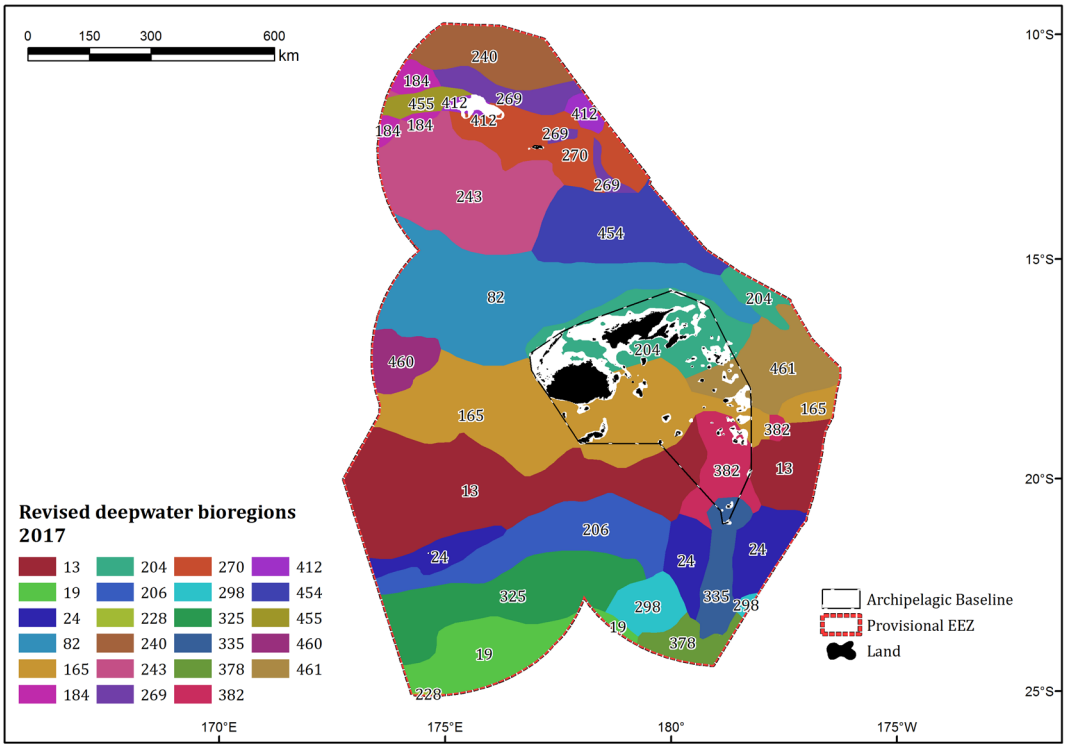


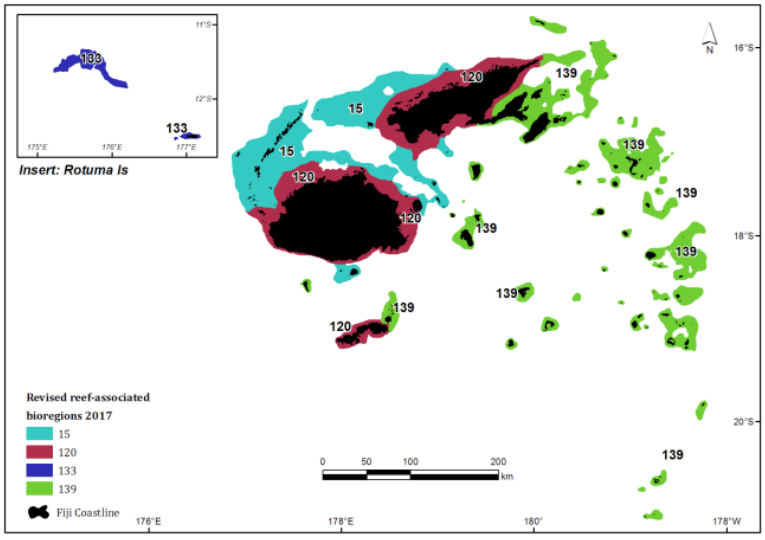
TASK 4.2 UNDERSTANDING MARINE BIOREGIONS IN MARINE PROTECTED AREA PLANNING

Most countries in the Pacific are party to the international Convention on Biological Diversity (CBD) which requires, amongst other things, at least 10% of the marine environment to be protected in ecologically representative marine protected areas. But marine environmental data are imperfect everywhere, including in the Pacific, so it is difficult to identify what is "ecologically representative". Using only available data of selected sites can result in the risk of protecting only known places. Using a combination of spatial datasets, a system of draft marine bioregions has now been described for the entire southwestern Pacific at a scale useful for national planning (see http://macbio-pacific.info/Resources/draft-marine-bioregions-southwest-pacific/: a report, map and spatial data of the marine bioregions is available here). By protecting examples of each marine bioregion, nations will be able to ensure that their network of marine protected areas is ecologically representative, and captures the broadest range possible of biodiversity. These marine bioregions provide one important data layer in the planning process (see Step 7 to see how Bioregions are used to select networks of protected areas).

PACIFIC PROFILE: FIJI

Figure 2 shows a map of the Bioregions for Fiji, after undergoing expert review. Each colour represents a different marine bioregion. Where habitats (e.g. seamounts or coral reefs) and populations found within one bioregion are more likely to be similar to each other than to those same habitats or populations located in another bioregion. Wendt et al (2018)[23].





TASK 4.3: GATHER AND MAP INFORMATION ABOUT HUMAN USES AND VALUES

As well as the spatial distribution of species, ecosystems, and the physical environment, it is extremely important to understand the location and extent of existing human activities and values. Some examples of important human uses for which spatial data would be useful include:

- Large and small-scale commercial fishing;
- Subsistence fishing;
- Marine transportation;
- Marine tourism;
- Underwater cabling;
- Cruise shipping;
- Renewable and non-renewable energy production including oil/gas mining;
- Deep Sea mining or exploration for minerals; and
- Existing protected or managed areas.

The following types of data can be used for this part of the MSP process.

USE DATASETS

- Tuna catch: http://SeaAroundUs.org
- Deepwater snapper catch: Catch: http://SeaAroundUs.org; Deep Water Fish Species: Anon. 2006. Some marine coastal food fish of the Solomon Islands [Poster]. Noumea, New Caledonia: SPC, Secretariat of the Pacific Community: http://www.spc.int/DigitalLibrary/Doc/FAME/Posters/Solomon.html
- Shipping tracks: http://www.aishub.net/
- Underwater cables: http://www.cablemap.info/
- Deep sea mining exploration tenements: Data Source – country specific
- Marine managed areas: https://www.protectedplanet.net/
- Villages: Data source – country specific
- Exclusive Economic Zones and Proclamation Boundaries: http://www.marineregions.org/
- Industrial fishing (Global Fish Watch) https://www.globalfishingwatch.org/map-and-data/

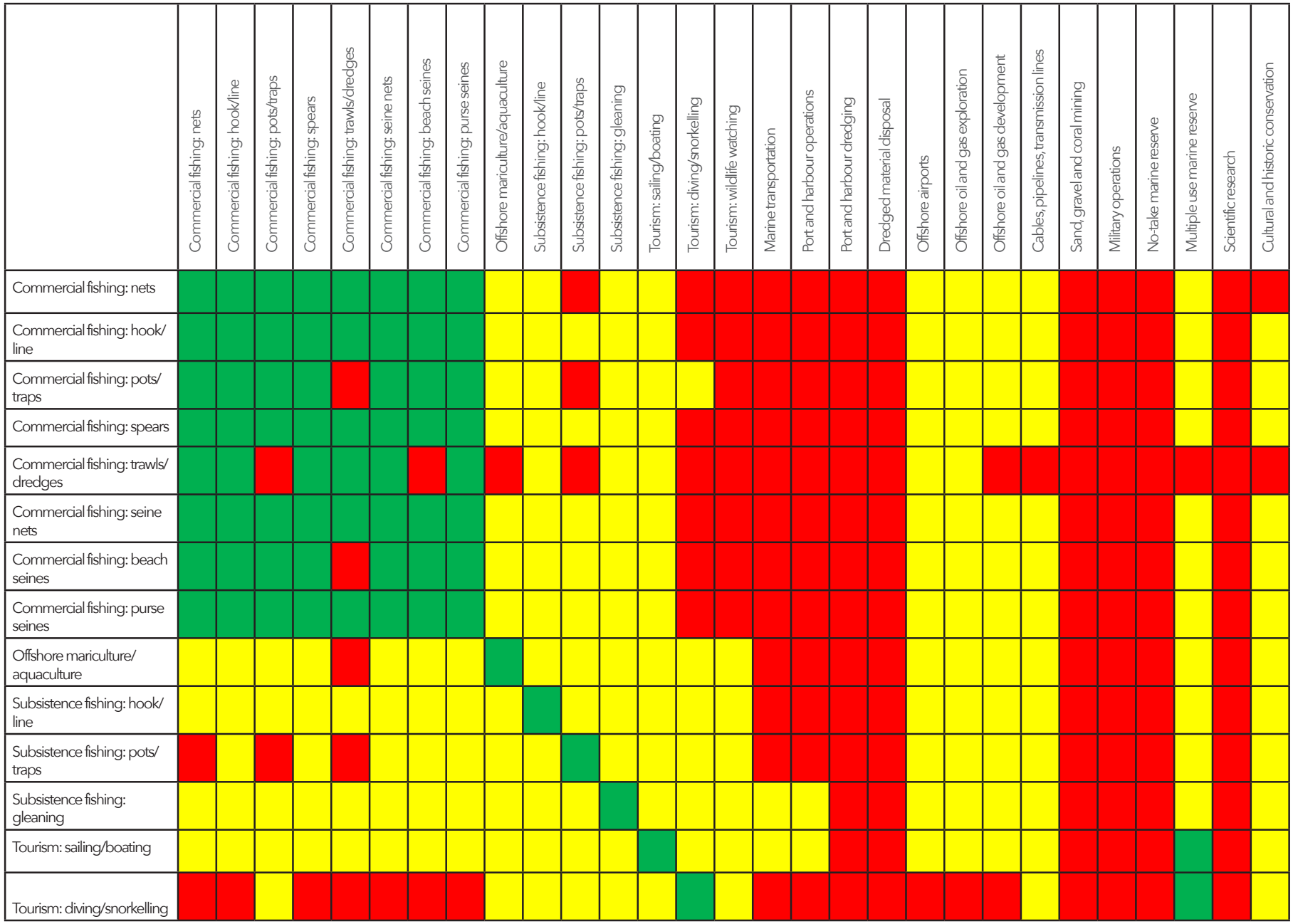
RISK DATASETS

- Cyclones: https://coast.noaa.gov/hurricanes/
- Reefs at risk: https://www.wri.org/our-work/project/reefs-risk
- Pollution incidents: Direct request to the Secretariat of the Pacific Regional Environment Programme (SPREP).
- Human impact map: e.g. http://www.oceanhealthindex.org/region-scores/maps

TASK 4.4: IDENTIFY AREAS OF CONFLICT OR COMPATIBILITY

Biophysical and human use maps can be visualised using GIS or hardcopy maps to understand where uses or spatial data overlaps occur. Once all the known areas have been mapped out, areas of conflict or overlap of different needs and uses will become clear[7]. Matrices exist that list all possible biophysical characteristics and human uses, and indicate which are compatible or incompatible (Table 4)[4].

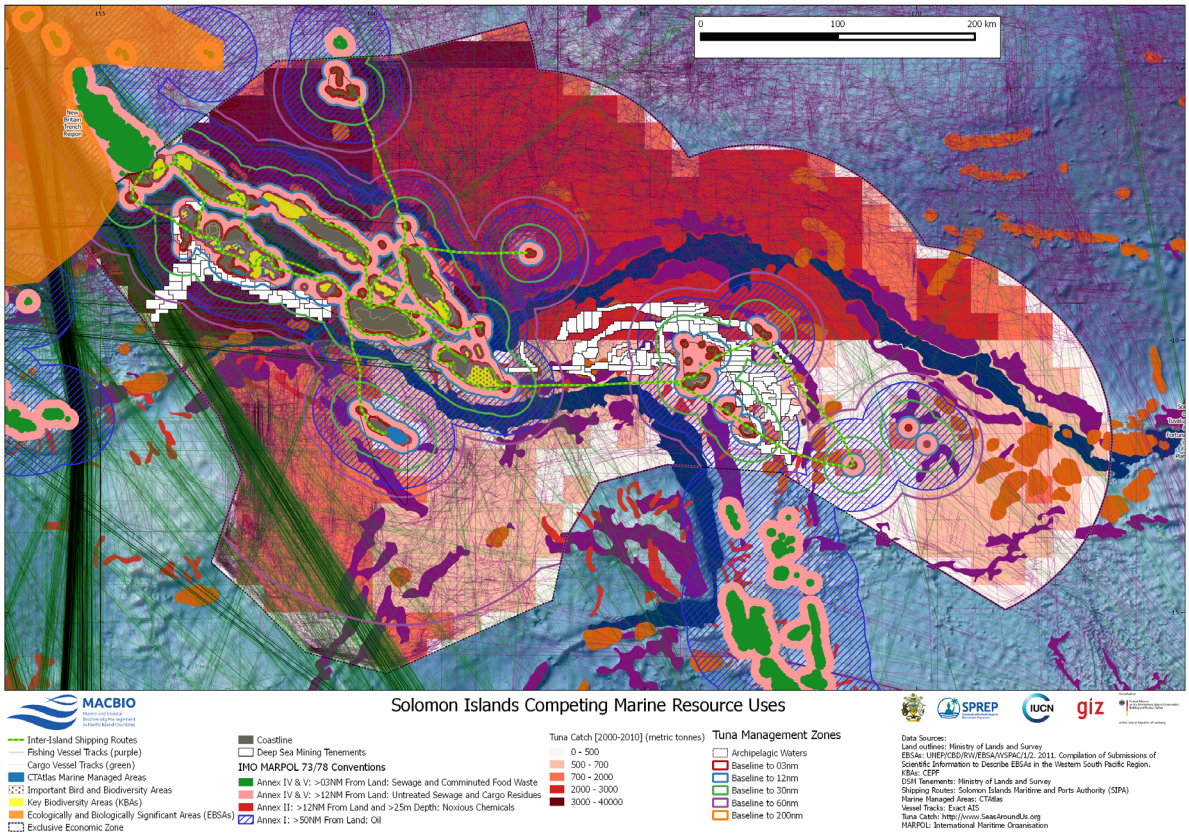
Table 3: Matrix of compatible and incompatible uses. Green is for compatible uses, yellow for probably compatible, and red for incompatible. Adapted for relevance to Pacific island nations[4].



	Commercial fishing: nets	Commercial fishing: hook/line	Commercial fishing: pots/traps	Commercial fishing: spears	Commercial fishing: trawls/dredges	Commercial fishing: seine nets	Commercial fishing: beach seines	Commercial fishing: purse seines	Offshore mariculture/aquaculture	Subsistence fishing: hook/line	Subsistence fishing: pots/traps	Subsistence fishing: gleaning	Tourism: sailing/boating	Tourism: diving/snorkelling	Tourism: wildlife watching	Marine transportation	Port and harbour operations	Port and harbour dredging	Dredged material disposal	Offshore airports	Offshore oil and gas exploration	Offshore oil and gas development	Cables, pipelines, transmission lines	Sand, gravel and coral mining	Military operations	No-take marine reserve	Multiple use marine reserve	Scientific research	Cultural and historic conservation
Tourism: wildlife watching	Red	Red	Red	Red	Red	Red	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Red	Yellow	Red	Red	Red	Red	Red	Yellow	Red	Red	Red	Green	Red	Green
Marine transportation	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Yellow	Yellow	Red	Red	Red	Green	Green	Red	Red	Red	Yellow	Red	Yellow	Red	Red	Red	Yellow	Yellow	Yellow
Port and harbour operations	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Yellow	Yellow	Red	Red	Yellow	Green	Green	Yellow	Yellow	Red	Red	Red	Yellow	Red	Red	Red	Red	Red	Yellow
Port and harbour dredging	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Red	Red	Red	Red
Dredged material disposal	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Yellow	Yellow	Yellow	Green	Green	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red
Offshore airports	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Red	Red	Red	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Red	Red	Red	Red	Red
Offshore oil and gas exploration	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Red	Yellow	Red	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Red	Red	Red	Red	Red	Red
Offshore oil and gas development	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Red	Red	Red	Yellow	Yellow	Yellow	Green	Green	Yellow	Yellow	Red	Red	Red	Yellow	Red
Cables, pipelines, transmission lines	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Green	Red	Red	Red	Red	Red	Red
Sand, gravel and coral mining	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Yellow	Red	Red	Red	Red	Yellow	Green	Red	Red	Red	Red	Red
Military operations	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Green	Red	Red	Yellow	Red
No-take marine reserve	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Green	Yellow	Green	Green
Multiple use marine reserve	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Green	Green	Yellow	Red	Red	Red	Red	Red	Red	Red	Red	Yellow	Red	Green	Green	Yellow
Scientific research	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Yellow	Red	Red	Red	Red	Red	Yellow	Red	Red	Yellow	Green	Green	Green	Green
Cultural and historic conservation	Red	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red	Red	Green	Yellow	Green	Green

PACIFIC PROFILE: SOLOMON ISLANDS

Figure 3 provides an overview of the range of ocean uses for the Solomon Islands. Maps like this, together with the matrix (Table 3), can help managers and decision makers identify potential areas of conflict and compatibility



UNCERTAINITY AND ADAPTIVE MANAGEMENT

MSP needs to incorporate uncertainty and adaptive management into all stages of the planning process (and, later, the implementation process). In this way, knowledge limitations do not prevent action and the precautionary principle[2] can therefore be applied with confidence. Many areas are still data-poor, and observed patterns (whether of human use or ecological) are often governed by multiple interacting factors at various spatial and temporal scales, many of which are poorly understood and poorly documented. Modelling and surrogates can be used to infer patterns. For example, physical environmental information can be used to infer patterns in biodiversity, particularly if used in MSP (e.g. use of marine bioregions). Additionally, guidelines or principles that use available knowledge and address uncertainty explicitly can be developed to guide MSP in the face of imperfect knowledge.

An adaptive management approach is also useful (see Step 10). This means that the marine spatial plan is reviewed as new information or new uses come to light. It is important that review is conducted at appropriate intervals; ecosystems tend to respond slowly to new management. Review intervals could be organised for set timeframes (7-10 years) or in alignment with national planning processes and timelines. The review may not always lead to changes; new information may confirm that existing management regimes are appropriate.

TASK 4.5: CONSIDER FUTURE SCENARIOS

Once existing conditions are as well defined as possible, it may be possible to predict some future scenarios. Projecting future conditions may involve:

- Projecting current trends in the spatial and temporal needs of existing human uses; and
- Estimating spatial and temporal requirements for new demands of ocean space (see Step 6).

These scenarios may be considered using sophisticated modelling, but simple brainstorming and application of in-country knowledge in a systematic manner can also work. For example, the process could involve listing all the current uses, and, where possible, mapping current uses and predicting where those uses are most likely to occur in the future. Similarly, in-

[2]The Precautionary Principle is defined as follows:
When human activities may lead to morally unacceptable harm that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm. Morally unacceptable harm refers to harm to humans or the environment that is:

- threatening to human life or health, or
- serious and effectively irreversible, or
- inequitable to present or future generations, or
- imposed without adequate consideration of the human rights of those affected. http://www.precautionaryprinciple.eu/

country experts can list potential new uses that they know of and map where they think these might occur. This is already being done in fisheries management, for example, as the predicted impacts of climate change are better understood. Countries may also have signed up to the MARPOL London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter – which then means there are existing restrictions on waste disposal from shipping.

Step 4 Summary
Task 4.1: Gather and map information about the environment, ecology and oceanography.
Task 4.2: Understand marine bioregions in marine protected area planning.
Task 4.3: Gather and map information about human uses and values
Task 4.4: Identify areas of conflict or compatibility
Task 4.5: Consider future scenarios.

8 STEP 5: IDENTIFY SPECIAL, UNIQUE MARINE AREAS

Some habitats are more important than others for particular species, ecosystems, or processes. Documenting and mapping these special, unique marine areas is separate from, and additional to, identifying representative marine protected areas or marine bioregions (see Section 4). The art of MSP relies in knowing which places are most important for conservation and which places are compatible with human use. Many of these areas may have already been identified through previous efforts, such as Ecologically or Biologically Significant Areas (EBSAs)[24], Important Bird and Biodiversity Areas (IBAs)[25] and Key Biodiversity Areas (KBAs)[26]. In fact, there are globally accepted biophysical criteria that can be used to identify these areas and their boundaries (Table 5). However, some of these global criteria may not be applicable at a smaller (sub-national) scale, and there may not be enough data to support their identification. Special, unique marine areas are relevant within countries and can be defined based on existing data and information.

TASK 5.1: IDENTIFY SPEACIAL, UNIQUE MARINE AREAS COMBINING SPATIAL DATA WITH IN-COUNTRY KNOWLEDGE

Special, unique marine areas within countries are best identified by combining spatial data with in-country traditional and scientific marine expertise in a workshop setting, where the experts use their own knowledge and the data available to locate and describe each special or unique marine area. These areas can then be validated, further described and mapped more accurately using existing knowledge, including local expert information, formal reports and peer-reviewed scientific information. The geographical scope of this work should be national, from high water mark out to the outer boundary of the nation's ocean.

Table 4. Biophysical criteria for identifying areas of special biological or ecological significance, from Ehler and Douvere (2009)[4].

Criteria	Definition	Rationale
Uniqueness or rarity	Areas containing either (i) unique (the only one of its kind), rare (occurs only in few locations) or endemic (unique to a particular geographic location) species, populations or communities, and/or (ii) unique, rare or distinct habitats or ecosystems; and/or (iii) unique or unusual geomorphologic or oceanographic features.	These areas or species/populations are irreplaceable, and their loss would mean the probable permanent disappearance of diversity/a feature or reduction of the diversity.
Special importance for life history stages of species	Areas required for a population to survive and thrive.	Various biotic (living) and abiotic (nonliving) conditions coupled with species-specific physiological constraints and preferences tend to make some parts of marine regions more suitable to particular life stages and functions than other parts.
Importance for threatened, endangered or declining species and/or habitats	Areas (i) containing habitat(s) for the survival and recovery of endangered, threatened, declining species; or (ii) with significant assemblages of such species.	To ensure the restoration and recovery of such species and habitats.

Criteria	Definition	Rationale
Vulnerability, fragility, sensitivity or slow recovery	Areas containing a relatively high proportion of sensitive habitats, biotopes (small, uniform environments occupied by a community of organisms) or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.	The criteria indicate the degree of risk that will be incurred if human activities or natural events in the area or component cannot be managed effectively or are pursued at an unsustainable rate.
Biological productivity	Areas containing species, populations or communities with comparatively higher natural biological productivity.	Important role in increasing the growth rates of organisms and their capacity for reproduction, and providing surplus production to adjacent areas.
Biological diversity	Areas: (i) containing comparatively higher diversity of ecosystems, habitats, communities, or species, or (ii) with higher genetic diversity.	Important for evolution and maintaining the resilience of marine species and ecosystems.
Naturalness	Areas with a comparatively higher degree of naturalness as a result of the lack of, or low level of, human-induced disturbance or degradation.	Natural areas can be used as reference sites and will likely safeguard and enhance ecosystem resilience.

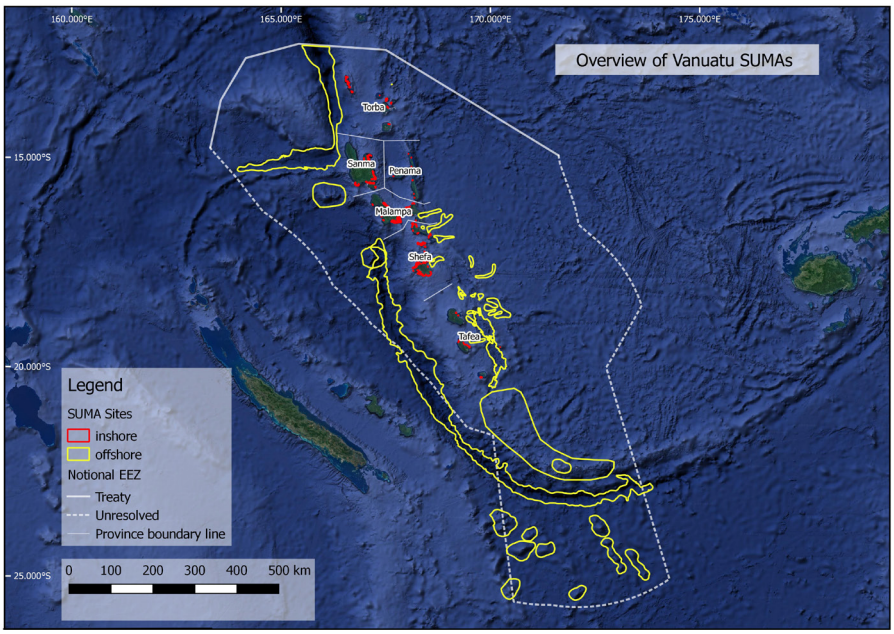
Other criteria to identify special, unique areas can refer to:

- how well the site is geographically defined,
- how many and what types of information sources exist for the site and,
- for national planning purposes, what national or international obligations might be associated with the site.

For special, unique marine areas defined using these multiple criteria in Fiji, Solomon Islands, Tonga and Vanuatu go to: http://macbio-pacific.info/categories/managing/.

Step 5 Summary
Task 5.1: Identify special, unique marine areas combining spatial data with in-country knowledge

PACIFIC PROFILE: VANUATU
In 2017, Vanuatu identified and described 89 inshore and 11 offshore Special, Unique Marine Areas (Figure 4)



9 STEP 6: DEFINE DESIRED OCEAN ZONES

An ocean zone (or marine/ocean management area) is an area of ocean, inshore or offshore, where specific human uses are allowed or prohibited. Ocean zoning is one of the key tools with which MSP seeks to manage and where appropriate separate human activities, and is based on knowledge of the distribution of ocean characteristics and the spatial distribution of all human activities (Step 4).

TASK 6.1: DETERMINE WHAT TYPES OF OCEAN ZONES ARE NEEDED IN YOUR COUNTRY

Types of ocean zones can include marine protected areas, various types of fishing (subsistence, industrial), mining, shipping and tourism. The process of MSP results in ocean zones that are legally enforceable. In inshore areas, they will usually complement, but not replace, traditional management. Traditional marine resource management systems should be supported as much as possible during the marine spatial planning process, in a way that is consistent and supports local culture and protocols.

For zoning to work well at a country level, there needs to be a few different, but standardised (within the country), ocean zones. As such, each ocean zone will need its own clearly defined objectives and rules governing which human activities are allowed and not allowed. Each zone should also support, in some way, the vision and objectives of the MSP.

Standardised ocean zones are necessary so that the final MSP or zoning plan can be understood and complied with by all users and members of the community, and also help achieve the MSP vision and objectives.

As outlined above, it is important, within each country, to have a standardised nomenclature when classifying zones for planners, communities and managers. One option is to use a classification system that is already established. For those zones aiming to achieve a level of biodiversity protection, the IUCN protected area management categories could be used. The IUCN categories classify protected areas according to their biodiversity management objectives. The categories are recognised by international bodies, such as the CBD and the United Nations, and by many national governments, as the global standard for defining and recording protected areas, and are increasingly being incorporated into government legislation (Step 8). However, these may need to be modified to fit within each Pacific Island country's requirements.

In addition to ocean zones with mainly conservation-focused objectives, in a comprehensive MSP some of the ocean zones must have more use-focused objectives.

Abundant examples of ocean zone typologies exist. Table 5 and Table 6 provide an example of ocean zones developed for Vanuatu's entire EEZ. Note that the "Community Conservation Area" is intended for use by communities and allows communities to determine, in their area, what kind of uses should be allowed and where. The "Community Conservation Area" is therefore one zone that is not standardised across the nation. Similarly, in Vanuatu, the government intends to allow for special provisions if there are particular species or habitats they want to protect in a particular place (e.g. dugong or turtle). The "Special Zone" will therefore also not be standardised across the nation. All the other zones, however, will be exactly the same no matter where they are located within the country's marine estate.

Table 5. Draft ocean zone typology for Vanuatu.

	General Use Zone (GUZ)/ Akses Solwota Eria (ASE)	Community Conservation Area (CCA)/ Kastom Manejmen Eria (KME)	Sustainable Use Zone(SUZ)/ Garen Solwota Eria (GSE)	Limited Use Zone (LUZ)/ Neseri Solwota Eria (NeSE)	No-take[6] Zone (NTZ)/ Notek Eria (NE)	Special Zone (SZ)/ Spesel Solwota Eria (SSE)
Activities						
Commercial mining including exploration, prospecting (incl sand, gravel, aggregate, deep sea, oil, gas)*	Yes	No	No	No	No	No
Non-commercial sand, gravel and aggregate mining	Yes	tbd per site[4]	No	No		No
Industrial fishing*[1]	Yes	No	Yes	No	No	No
Other non-artisanal fishing* includes take of sea cucumber, trochus, aquarium fish, coral, live rock, reef fish and charter fishing [2]	Yes	tbd per site[4]	Yes	No	No	No
Benthic disturbance (trawling/ dredging, weighted lines)*	Yes	tbd per site[4]	Yes	No	BI	No
Fish Aggregating Devices (FADs)*	Yes	tbd per site[4]	Yes	No	No	tbd per site[4]
Anchoring (including for cruise ships)	Yes	tbd per site[4]	Yes	No	No	tbd per site[4]
Walking/standing	Yes	tbd per site[4]	Yes	No	No	tbd per site[dz]
Use of traps	Yes	tbd per site[4]	Yes	No	No	tbd per site[4]
Gleaning	Yes	tbd per site[4]	Yes	No	No	tbd per site[4]
Hand spearing	Yes	tbd per site[4]	Yes	No	No	tbd per site[4]
Netting (3 finger mesh, gill, cast, etc)	Yes	tbd per site[4]	Yes	No	No	tbd per site[4]
Hand-line fishing	Yes	tbd per site[4]	Yes	Yes	No	tbd per site[4]
Trolling	Yes	tbd per site[4]	Yes	Yes	No	tbd per site[4]

Non-extractive uses (diving, swimming, snorkelling, kayaking/canoeing, sailing, boating etc) except research	Yes	tbd per site[4]	Yes	Yes	Yes	tbd per site[4]
Ecosystem restoration e.g. coral re-introduction, stock enhancement[8], clams, removal of crown-of-thorns	Yes	tbd per site[4]	Yes	Yes	Yes	Yes
Research*	Yes	tbd per site[4]	Yes	Yes	Yes	Yes
Mariculture[3]	Yes	tbd per site[4]	Yes	No	No	No
Hull maintenance/cleaning	Yes	tbd per site[5]	No	No	No	No
Artificial modification* e.g. beach nourishment, restocking[5], artificial reefs	By licence only	tbd per site[4]	By licence only			
Works* (dredging, reclamation, building, laying of cables)	By licence only	tbd per site[5]	By licence only	No	No	No
Dumping of solid and liquid waste including sewage and ballast water from marine vessels beyond 12nm from shore[7]	Yes	No	Noo	No	No	No

Table 6. Definition of objectives for each zone described above.

Ocean Zone/Solwota Eria Name	Objective	Most aligned to IUCN Protected Area Category #	Applied
General Use Zone (GUZ)/ Akses Solwota Eria (ASE)	To allow for and manage multiple uses of Vanuatu's marine environment.	nil	Offshore or within community areas
Community Conservation Area (CCA)/ Kastom Manejmen Eria (KME)	To benefit local communities by sustainable marine resource use and biodiversity protection as determined by communities. (NOTE: this "zone" already exists)	VI	Community-based only
Sustainable Use Zone(SUZ)/Garen Solwota Eria (GSE)	To allow for sustainable use of Vanuatu's renewable marine resources including non-artisanal commercial fishing for export.	nil	Offshore or within community areas
Limited Use Zone (LUZ)/ Neseri Solwota Eria (NeSE)	To protect local food security, livelihoods and biodiversity by allowing limited fishing, including artisanal fishing, and promoting non-extractive activities.	V	Offshore or within community areas

No-take[6] Zone (NTZ)/ Notek Eria (NE)	To protect natural biodiversity along with its underlying ecological structure and supporting environmental processes, and to promote education and recreation by restricting all extractive and damaging uses and activities.	II	Offshore or within community areas
Special Zone (SZ)/ Spesel Solwota Eria (SSE)	To protect, conserve and restore specific species, habitats or cultural values of concern by eliminating the key threats.	IV	Offshore or within community areas

* Means the activity needs a licence, permit, permission or other type of formal authorisation to occur within a zone where it is allowed; even with the required formal authorisation, however, the activity cannot occur in a zone where it says "no".

1. Industrial fishing is one type of non-artisanal fishing and is defined by FAO as capital-intensive fisheries using relatively large vessels with a high degree of mechanization and that normally have advanced fish finding and navigational equipment.

2. Other non-artisanal fishing refers to when the fishery is not a traditional fishery involving fishing households but involves commercial companies, uses a relatively large amount of capital and energy (compared to artisanal fisheries), often uses relatively large fishing vessels, makes relatively longer fishing trips, further from shore and NOT mainly for local consumption (e.g. sea cucumber, trochus, aquarium fish, coral, live rock, live reef fish are largely harvested for export). Artisanal fisheries are small-scale fisheries for subsistence or local, small markets, generally using traditional fishing techniques and small boats.

3 . Includes both intensive mariculture which requires the addition of feed and extensive mariculture which does not require feed or the addition of fertilisers. Extensive mariculture also excludes the use of ponds.

4. To be determined per site

5. For the purpose of future extraction

6. No-take/extraction of/interference with all natural resources including plants, animals and mineral such as mangroves, fish, coral, rocks etc.

7. As per IMO requirements

8. NOT for future extraction (but to enhance spillover effects etc.)

NB: For further definitions of industrial/artisanal fishing see FAO http://www.fao.org/fishery/glossary/en

Step 6 Summary

Task 6.1: Determine what types of ocean zones are needed in your country.

10 STEP 7: PREPARE GUIDELINES TO ASSIST ZONING DECISIONS

Ocean zone placement guidelines help guide decisions on where to best place different zones within the ocean. This is particularly important when developing a nation-wide marine spatial plan that must meet a variety of ecological, socio-cultural and economic objectives.

The placement of the different types of ocean zones is a key step in developing a marine spatial plan. A key challenge of ocean zoning is balancing environmental, economic, security, social, and cultural interests in the placement of zone boundaries. Well designed and placed ocean zones reduce conflict between users, safeguard ecologically important areas and enable commercial activity to develop with certainty.

Ocean zone placement guidelines are made up of two different types of design principles:

1. Socio-economic, cultural and management feasibility design principles; and
2. Biophysical design principles.

The socioeconomic, cultural and management feasibility design principles aim to achieve a variety of socio-cultural, economic and management feasibility objectives. The biophysical design principles aim to support the integrity of the marine environment upon which all human benefits rely. Together, these principles make up the 'Ocean zone placement guidelines'.

TASK 7.1: DEFINE SOCIO-ECONOMIC, CULTURAL AND MANAGEMENT FEASIBILITY GUIDELINES

Socio-economic, cultural and management feasibility guidelines provide a series of requirements to help ensure all types of ocean zones are placed in accordance with the needs of affected people (Table 7). Each of these requirements can be met with a number of guidelines, but four key principles tend to be universally important for all zoning decisions.

Table 7. Socio-economic (SEC) ocean zone placement principles[27–38]

Principles	Ocean Zone design considerations
SEC Principle 1: Maximise complementarity of ocean zones with human values, activities and opportunities	• Ocean zones have been identified through a comprehensive consultative process that is participatory, balanced, open and transparent; • Ocean zones are designed to minimise conflict with communities and other stakeholder's aspirations for their ocean; • Local communities or other stakeholders have identified areas that would benefit from the range of ocean zones; • Protect areas that the community identifies as special or unique e.g. places of biological, cultural, aesthetic, historic, physical, social or scientific value; • Ocean zones are chosen to minimise conflict with non-commercial extractive users such as subsistence fishers; • Ocean zones are chosen to minimise conflict with commercial extractive users; and • Ocean zones are chosen to minimise conflict with all non-extractive users.
SEC Principle 2: Ensure that final site selection of ocean zones recognizes social, cultural and economic costs and benefits	• Consider relative social costs and benefits, including community resilience; • Include protection, if desired by communities, of social, cultural, historical or other values as identified by communities; • Spatial equity of opportunity within and between communities who may use resources beyond their coastal environment; • Consider planned and approved future activities; and • Consider requirements for monitoring the effectiveness of the ocean zones.

SEC Principle 3: Maximise placement of ocean zones in locations which complement and consider present and future management and tenure arrangements	• Existing or proposed management plans or other related management arrangement for marine areas by national, provincial or local government authorities and local communities; and • Existing or proposed tenure and management strategies for adjacent coastal areas (mainland and islands).
SEC Principle 4: Maximise community and public understanding and acceptance of new ocean zones, and facilitate compliance	• Zones that are simple shapes and mainly straight edges; • Zones with boundaries that are easily identified; • A minimum width of "buffer" added to the edge of each zone to mitigate against non-compliance; and • Fewer, larger zones rather than more, smaller zones facilitate/promote cooperation between communities to reach this goal.

TASK 7.2: DECIDE ON GUIDELINES TO DESIGN A NATIONAL NETWORK OF MARINE PROTECTED AREAS

Biophysical guidelines are primarily principles that guide the design of no-take Marine Protected Area (MPA) networks. No-take MPAs are usually one of the types of ocean zones. It is possible to develop biophysical guidelines for no-take MPAs, in part, because almost all the science has concentrated on no-take areas. Regardless, these biophysical guidelines can be tailored to guide decisions for other types of ocean zones. Biophysical guidelines are needed to enable the maintenance or restoration of native species diversity and abundance, habitat diversity, keystone species and biological connectivity – all of which generate the human benefits (ecosystem services) that come from ocean resource use. As mentioned, Pacific Island countries have made commitments under the Convention of Biological Diversity for "ecologically representative and well-connected networks of MPAs". Among other things, the biophysical guidelines can help to determine the basis for "ecologically representative" and "well-connected". Below is an example of recent guidelines that were prepared for offshore no-take MPA networks in the Pacific [39]:

1. Represent at least 20–30% of offshore bioregions and offshore bioregional transition boundaries in no-take MPAs, within and outside the EEZs of maritime nations.
2. Represent at least 10–30% of each known habitat[3] in no-take MPAs, with higher levels of protection where bioregions are unknown[40].
3. Represent whole features / habitats, wherever possible.
4. Have at least three replicate no-take MPAs within bioregions, and include at least one example of each habitat or feature (e.g. hydrodynamic front, seamount, hydrothermal vent, migration bottleneck, resting areas, nesting, breeding or spawning area, other aggregation area, etc.).
5. Ensure that no-take MPAs include critical habitats and biologically or physically special or unique sites.
6. Make no-take MPAs larger rather than smaller.
   - Make inshore (coast to edge of shallowest habitats surrounding the coast, e.g. coral reefs) no-take MPAs 400m–2km in diameter.
   - Make nearshore (edge of slope or reef to 80m depth contour) no-take MPAs 2–10 km in diameter.
   - Make offshore (beyond 80m depth contour) no-take MPAs 50–200 km in diameter.
7. Use simple MPA shapes that maximize area to edge ratios (e.g. square rather than rectangle).
8. Maximise connectivity between no-take MPAs in an MPA network.
   - Inshore (coast to edge of shallowest habitats, e.g. coral reefs) no-take MPAs should be between 500m and 5km apart.
   - Nearshore (edge of slope or reef to 80m depth contour) no-take MPAs should be between 5 and 20km apart
   - Offshore (beyond 80m depth contour) no-take MPAs should be between 20 and 200 km apart.
9. Where possible, place offshore no-take MPAs adjacent to existing coastal MPAs.
10. Choose permanent over temporary protection.
11. Reduce or eliminate threats across the area that the entire no-take MPA network lies within by applying other categories of MPAs or spatial management areas throughout it.

[3] Guidelines for individual habitats

Inshore and nearshore

- Halimeda beds – ensure no-take areas represent 10% of known Halimeda beds;
- Shallow water seagrass – ensure no-take areas represent 10% of shallow water seagrass habitat;
- Deepwater seagrass – ensure no-take areas represent 10% of known deepwater seagrass habitat;
- Algae – ensure no-take areas represent 10% of known algal habitat;
- Epibenthos – ensure no-take areas represent different faunal classes (5% each of echinodermata, sponges, bryozoans, solitary corals, soft corals, foraminifera, brachyura);
- Dugong – ensure no-take areas represent identified dugong habitat areas summing to about 50% of all high priority dugong habitat;
- Cays – where cays exist within a bioregion, try to include at least two examples of them in potential no-take areas;
- Reef size - capture 5% of reef area in each of five reef-size classes;
- Inter-reef channels - capture at least one inter-reef channel in bioregions where they exist;

The science underpinning these principles can be found at: http://macbio-pacific.info/Resources/biophysical-design-principles-for-offshore-networks-of-no-take-marine-protected-areas/[39].

After these principles have been applied to no-take areas, many of these principles equally apply to ocean zone with lesser levels of protection.

In their implementation, decision-makers will have to balance the socio-economic, cultural and management feasibility guidelines against the biophysical guidelines.

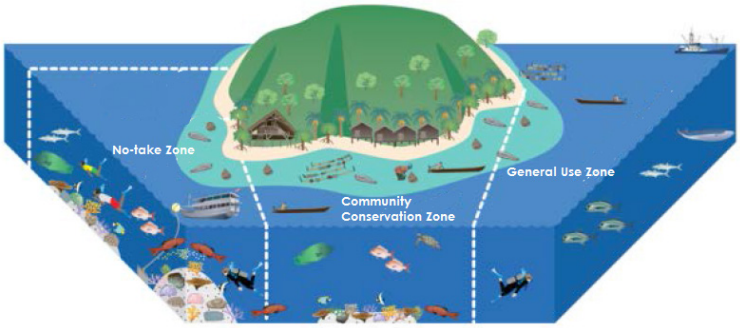


Figure 5: An example of how oceans can be applied around an island in the Pacific[4].

Step 7 Summary
Task 7.1: Define socio-economic, cultural and managent feasibility guidelines
Task 7.2: Decide on guidelines to design a national network of Marine Protected Areas

- Exposure - ensure the entire network captures 5% of reef and non-reef area in each of five wave exposure classes;
- Islands – where islands exist within a bioregion try to include one example of them in no-take areas;
- Oceanographic diversity in water quality – ensure representation of reefs within the "natural" diversity of water quality (5% of reef and non-reef area in each of nine oceanographic "bioregions"; 5% of reef and non-reef area in each of four flood frequency classes;
- Adjacent coastal and estuarine habitats (including islands) – locate no-take areas adjacent to mangroves, wetlands and protected areas rather than adjacent to towns and villages; and
- Major turtle sites – ensure no-take areas include known major turtle nesting and foraging sites (100% of about 30 sites of the 115 identified – these include both nesting sites and foraging sites).

Offshore

- Shelf valleys – ensure no-take areas represent 10% of known shelf valleys;
- Coral reefs (emerging from > 80m) – ensure no-take areas represent 25% of oceanic coral reefs;
- Oceanic islands (emerging from > 80m)– ensure no-take areas represent 25% of oceanic islands;
- Basins (of various sizes, of seas and oceans, perched on the continental shelf, plateau or slope) – ensure no-take areas represent 10% of basin habitat;
- Shelf, slope, abyssal and hadal sills – ensure no-take areas represent 20% of known sills;
- Slope terraces – ensure no-take areas represent 10% of known shelf terraces;
- Slope, abyssal and hadal escarpments – ensure 10% of known escarpments are included in no-take areas;
- Seamounts - capture 20% of each seamount type within no-take reserves;
- Canyons of all types - ensure no-take areas represent 10% of known canyons;
- Troughs - ensure no-take areas represent 10% of known troughs;
- Trenches – ensure no-take areas represent 15% of known trenches;
- Bridges – ensure no-take areas represent 10% of known bridges;
- Fans – ensure no-take areas represent 10% of known fans;
- Plateaus – ensure no-take areas represent 15% of known plateaus;
- Epipelagic habitats – ensure no-take areas represent 20-30% of the epipelagic zone;
- Mesopelagic habitats – ensure no-take areas represent 20-30% of the mesopelagic zone;
- Bathypelagic habitats – ensure no-take areas represent 20-30% of the bathypelagic zone;
- Abyssopelagic habitats – ensure no-take areas represent 20-30% of the abyssopelagic zone;
- Hadopelagic habitats – ensure no-take areas represent 20-30% of the hadopelagic zone.

[4]Picture adapted from www.conservation.org

11 STEP 8: ESTABLISH THE LEGAL AND INSTITUTIONAL BASIS FOR MSP

It is important to ensure that the final output (the MSP) is either enforceable under existing legislation, or that legislation can be developed or revised to this effect. It can be highly beneficial to employ an experienced, independent and unbiased external expert to review existing legislation for MSP in partnership with a local legal expert. It is likely that, many different legal and other governance arrangements and policies are relevant to MSP in each Pacific Island country.

TASK 8.1: REVIEW THE LEGISLATION, POLICIES, STRATEGIES AND PLANS RELATING TO MSP

In this step, all the legislation, policies, strategies and plans that may relate to MSP in your country should be reviewed. Compile a list of all documents to be reviewed. The review of each document or instrument should identify:

- The document title and type (legislation, policy, strategy, plan or other)
- The source (regional, national, provincial or local government)
- The main objectives of the document
- The main activities that are promoted, controlled and/or managed
- The main management tools (including incentives) used
- The geographic extent of the jurisdiction (whether formal or informal)
- Administration of instrument (who is responsible, see below)
- Bodies established under the instrument
- Regulatory, penalty and planning provisions established by the instrument
- Conflict or potential conflict
- Synergy or potential synergy
- Gaps of any kind
- Relevance of instrument to MSP
- Comments including recommendations and relevance

PACIFIC PROFILE: VANUATU
In 2015, Vanuatu undertook a review of legislation, policies, strategies and plans relating to the use and management of Vanuatu's oceans. See http://macbio-pacific.info/Resources/legal-review-for-marine-management-in-the-vanuatu/

TASK 8.2: IDENTIFY WHO HAS THE AUTHORITY FOR MSP

Developing MSP requires two types of equally important forms of authority: 1) authority to plan for MSP and 2) authority to implement MSP. Very often, new (formal or informal) authority is established for the planning stage of MSP (see Step 1), while implementation is carried out through existing authorities and institutions[4]. It is important to consider that MSP does not replace single-sector management. The MSP provides guidance to all single-sector decision-makers to easily coordinate decisions for integrated, ecosystem-based marine management.

An important part of this step is to determine the most effective institutional and decision-making system to implement the MSP. Ideally, the government Ministry who will finally implement the MSP, and have authority to do so legally, will not have, and will not be seen to have, a vested interest or bias in any particular direction or towards any user or stakeholder group. They should be seen as topically "neutral" as far as this is possible.

The Ministry responsible for the MSP will be in charge of integrated management of up to 98% of the nation and so should be a sufficiently powerful Ministry to exercise their management powers effectively to the benefit of the nation.

Likely Ministries for this role may include those in charge of national planning, foreign affairs, national economic development, Prime Minister's or President's Office. Of course, the optimal authority will differ in each country.

TASK 8.3: LEGISLATION TO SUPPORT A MARINE SPATIAL PLAN[5]

Either existing legislation or new legislation must be available to provide legal underpinnings for any marine spatial plan. The law should contain the following sections:

1. The objective/purpose
2. Preliminary
    a) Short title for the law and detail on when it comes into force
    b) List of definitions (the "interpretation" section)
3. Administration
    a) Powers and duties of the lead Ministry and/or other coordinating Ministry or Ministries pursuant to the legislation
    b) Clarity about how decisions will be made and the power of those decisions under this Act
    c) Formally establish any technical or other advisory committee(s), incorporating terms of reference, with description of membership and operation, as well as its role in developing, adopting, monitoring, and amending the marine spatial plan
    d) Provide for how the Minister and advisory committees are to interact and consult
    e) The level of power of this Act over other legislation must be made explicit here – is it subordinate to all other Acts or just some or is it to be overarching legislation?
4. Marine Spatial Planning
    a) Establish the process for developing and adopting a marine spatial plan. It would provide for the adoption of the initial marine spatial plan
    b) Establish the minimum requirements for a plan. For example:
        i. clearly set forth the vision and objectives for the MSP;
        ii. identify types of ocean zones to be used (although details should be in regulations);
        iii. placement guidelines, and other standards (although details should be in regulations);
        iv. how the boundaries of the ocean zones are to be defined (e.g. by coordinates);
        v. adherance to sound management practices, taking into account the existing natural, social, cultural, historic, and economic attributes;
    c) Clarify that a marine spatial plan must conform to existing laws
    d) Articulate the extent to which a properly adopted marine spatial plan is binding
    e) Provide for performance monitoring of the plan and periodic review
5. Public participation and access to information
    a) Provide for meaningful public participation in ocean management.
    b) Define requirements for public notices, comment/input period(s) prior to adoption or amendment of a marine spatial plan.
    c) Provide authority to develop and implement a program of public (and stakeholder) outreach and information about the marine spatial planning process.
6. Sustainable funding for the marine spatial plan
   Provide for the operation of any funding mechanism(s)
7. Offenses and enforcement
   Identify any new offenses and prescribe enforcement processes and authorities as well as penalties for violation of this law, ideally defined in units so that the size of the penalties can be updated, over time, in regulations or schedules
8. Miscellaneous and general
    a) Establish the authority of the Government to make regulations under the law
    b) Further clarify, as needed, how this legislation intersects with existing legislation on environmental management
9. Schedules
    a) Adopt initial marine spatial plan by way of a schedule, including all relevant zone demarcation.
    b) This part should refer to any authority that this Act may have over the use/application of enforcement assets existing under other legislation which might be provided with the ability to enforce this Act.

Further advice on developing legislation can be found in existing documents or by reviewing other existing legislation e.g. [41], Great Barrier Reef Marine Park Act, Marae Moana Act, or accessing existing reviews (e.g. http://macbio-pacific.info/categories/managing/ {scroll down} or https://www.iucn.org/content/marine-protected-areas-legislative-and-policy-gap-analysis-fiji-islands, https://www.fela.org.fj/publications.html,). Even though some of these documents refer to protected area legislation, their guidance and format applies equally well to all types of ocean zoning.

Step 8 Summary
Task 8.1: Review the legislation, policies, strategies and plans relating to MSP
Task 8.2: Identify who has the authority for MSP
Task 8.3: Legislation to support a marine spatial plan

[5]Personal Communication: Rosamond Bing and Kathryn Mengerink

12 STEP 9: PREPARE A DRAFT MARINE PLAN

A MSP is a comprehensive document that sets out the framework and direction for marine spatial management decisions. It will identify when, where, and how goals and objectives will be met.

TASK 9.1: PREPARE A DRAFT MARINE SPATIAL PLAN FOR CONSULTATION

Using all the information above, including inputs from the initial round of consultations (Step 2), a preferred draft MSP is prepared. Then draft maps and supporting information for the draft plan will be produced, including zoning and other management propositions.

In general, the draft MSP needs to include[4]:

- The MSP vision and objectives
- A description of the MSP area including boundaries
- A description of the draft ocean zones
- A map of where the ocean zones are located in the ocean
- The intended governance arrangements;
- Management measure needs to achieve the vision and objectives (see Figure 2)
- Arrangements for monitoring and evaluations
- A timetable for the formal actions needed to implement the plan (who does what, when)
- A timetable for the formal actions needed to implement the plan (who does what, when)

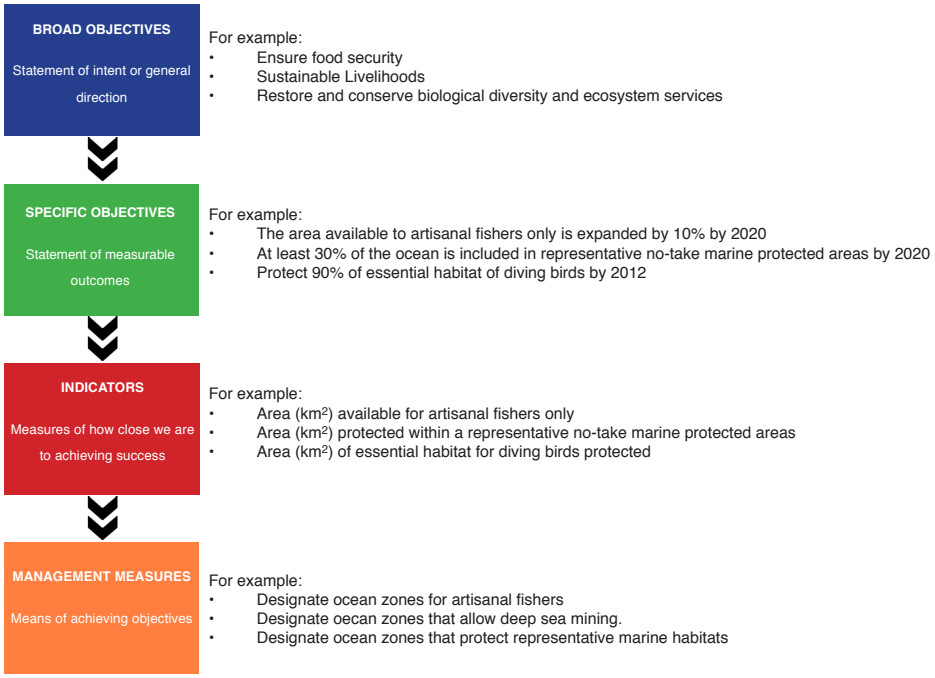


Figure: 6 Shows the clear linkage between objectives, indicators and management measures that will form part of the marine spatial plan.

Step 9 Summary
Task 9.1: Prepare a draft marine plan for consultation

13 STEP 10: PREPARE AND IMPLEMENT THE FINAL MARINE SPATIAL PLAN

Comments from interested parties (e.g. communities, government, non-government, users, private sector) will be used to finalise the MSP, which must then be implemented through each country's specific government processes. The MSP should include a statement of who the responsible management authority or authorities are and their specific responsibilities. After the MSP becomes law, it will be important to let people know this and what it means to their use and management of the ocean.

TASK 10.1: FINALISE THE MARINE SPATIAL PLAN AFTER CONSIDERING ALL SUBMISSIONS RECEIVED DURING THE CONSULTATION

The MSP is not an end in itself, but a beginning of the implementation of the vision and objectives defined in Step 2. Implementation of the MSP includes ensuring compliance with the plan, monitoring the outcomes and adapting the MSP if necessary.

The plan must be subject to periodic review by the relevant authority with affected people and groups, and it should be adapted when new information comes to light, especially through performance monitoring. If MSP has explicitly stated and achievable objectives, these can be broken down into appropriate indicators and, targets that can inform the planning stages from design through to ongoing management and performance monitoring. As ecological, cultural and socio-economic conditions change, an adaptive approach involves an iterative cycle of planning, management, monitoring, reporting, and the provision for any change deemed necessary to continue to achieve the goals [42]. This is becoming especially important, as climate change is leading to changes in species' distributions and changes to the regime of threats with which organisms are living [43].

THE FINAL MARINE SPATIAL PLAN WILL INCLUDE:

In general, the final marine spatial plan will include[4]:

- The MSP vision and objectives
- A description of the MSP area including boundaries
- A description of the final ocean zones
- A final map of where the ocean zones are located in the ocean
- Final governance arrangements
- Management measure needs to achieve the objectives (see Figure 2)
- Arrangements for monitoring and evaluations
- A timetable for the formal actions needed to implement the plan (who does what, when)
- Review date (e.g. 7 year – 10 years)
- Funding requirement and financial plan
- Appendix with the coordinates of the ocean zone boundaries.

Management can be changed by[4]:

- Modifying the specific objectives (for example, if monitoring and evaluation results show that the costs of achieving them outweigh the benefits to people or the environment);
- Modifying desired MSP indicators and targets to better achieve the vision, objectives (for example, the level of protection over a large marine protected area could be changed if the desired outcome is not being achieved); and
- Modifying MSP management measures (for example, alternative combinations of management measures, incentives and institutional arrangements could be suggested if initial strategies are considered ineffective, too expensive, or inequitable).

TASK 10.2: GUIDE THE MSP THROUGH THE USUAL GOVERNMENT PROCESSES TO ENTER IT INTO FORMAL LAW

Each country will have its own informal and formal government process which will need to be compiled with in order for the new Marine Spatial Plan to come into effect. The team that developed the MSP should continue to support its passage through the required government approval process to ensure entry into law.

Step 10 Summary
Task 10.1: Finalise the marine spatial plan after considering all submissions received during the consultation
Task 10.2: Guide the MSP through the usual government processes to enter it into formal law

14 REFERENCES

1 MACBIO (2018) *Fact Sheet: What is marine spatial planning?*, MACBIO (GIZ/IUCN/SPREP).
2 Halpern, B. *et al.* (2008) A global map of human impact on marine ecosystems. *Science* 319, 948–952
3 Conservation International (2011) , Science to Action. .
4 Ehler, C. and Douvere, F. (2009) *Marine Spatial Planning: a step-by-step approach toward ecosystem-based management*, Intergovernmental Oceanographic Commission and Man and the Biosphere Programme. IOC Manual and Guides No. 53, ICAM Dossier No. 6. UNESCO.
5 CBD, S. of the (2012) *Marine Spatial Planning in the context of the Convention on Biological Diversity*, Secretariat of the Convention on Biological Diversity.
6 CSIRO (2015) , EPOG MSP Tools Information delivery to support marine spatial planning (MSP). . [Online]. Available: http://msp.csiro.au/projects. [Accessed: 02-Sep-2015]
7 Smyth, C. *et al.* (2003) *Oceans eleven*, Australian Conservation Foundation.
8 Ehler, C.N. (2012) , Perspective: 13 myths of marine spatial planning. . [Online]. Available: https://meam.openchannels.org/news/meam/perspective-13-myths-marine-spatial-planning. [Accessed: 23-Aug-2018]
9 Salcone, J. *et al.* (2016) *Guidance manual on economic valuation of marine and coastal ecosystem services in the Pacific. Report to the MACBIO Project*, MACBIO (GIZ/IUCN/SPREP).
10 DeakinCo (2017) , Seven practices you can implement to increase cultural awareness in the workplace. . [Online]. Available: https://www.deakinco.com/media-centre/news/seven-practices-you-can-implement-to-increase-cultural-awareness-in-the-workplace. [Accessed: 16-Nov-2018]
11 IGC (2018) *Gender-responsive assemblies - an agenda for concrete action*, International Gender Champions.
12 McLeod, E. *et al.* (2008) Designing marine protected area networks to address the impacts of climate change. *Frontiers in Ecology and the Environment* 7, 362–370
13 Bell, J.D. *et al.* (2011) *Vulnerability of Tropical Pacific Fisheries and Aquaculture to Climate Change: Summary for Pacific Island Countries and Territories*, Secretariat of the Pacific Community.
14 Soekirman, T. *et al.* (2009) *Community development and alternative livelihoods initiatives at TNC-Coral Triangle related sites: recommendations for the future*, The Nature Conservancy.
15 Lockwood, M. *et al.* (2010) Governance principles for natural resource management. *Society and Natural Resources* 23, 986–1001
16 Spergle, B. and Moye, M. (2004) *Financing marine conservation*, Center for Conservation Finance, World Wildlife Fund.
17 Greenfield, R. (2009) *Facilitating compliance with natural resource management regulations. Findings from Research Cycle 2: expert perceptions of compliance and non-compliance*, Department of Environment and Resource Management.
18 Kusek, J.Z. and Rist, R.C. (2004) *Ten steps to a results-based monitoring and evaluation system*, The World Bank.
19 Aswani, S. *et al.* (2007) Customary management as precautionary and adaptive principles for protecting coral reefs in Oceania. *Coral Reefs* 26, 1009–1021
20 Veitayaki, J. (1997) Traditional Marine Resource management practices used in the Pacific Islands: an agenda for change*. *Ocean & Coastal Management* 37, 123–136
21 Vierros, M. *et al.* (2010) *Traditional Marine Management Areas of the Pacific in the context of national and international law and policy*, United Nations University – Traditional Knowledge Initiative.
22 Worboys, G.L. *et al.* (2015) *Protected area governance and management*, ANU Press.
23 Wendt, H. *et al.* (2018) *Marine bioregions of Fiji*, MACBIO (GIZ, IUCN, SPREP).
24 Secretariat of the Convention on Biological Diversity Ecologically or Biologically Significant Marine Areas (EBSAs). . (2014)
25 BirdLife International (2018) , Important Bird and Biodiversity Areas (IBAs). . [Online]. Available: https://www.birdlife.org/worldwide/programme-additional-info/important-bird-and-biodiversity-areas-ibas. [Accessed: 03-Sep-2018]
35 The Ecology Centre, The University of Queensland (2009) , Scientific principles for design of Marine Protected Areas in Australia: A guidance statement. 29pp. . [Online]. Available: Available at http://www.uq.edu.au/ecology/index.html?page=102441&pid=108450. [Accessed: 05-Dec-2017]
36 Green, A. *et al.*, eds. (2013) *Designing marine protected area networks to achieve fisheries, biodiversity, and climate change objectives in tropical ecosystems: A practitioner guide*, The Nature Conservancy, and the USAID Coral Triangle Support Partnership.
37 Mangubhai, S. *et al.* (2015) Explicitly incorporating socioeconomic criteria and data into MPA zoning. *Coastal Management* 116, 10.1016/j.ocecoaman.2015.08.018
38 Geange, S.W. *et al.* (2017) Integrating conservation and economic objectives in MPA network planning. *Biological Conservation* 210, 10.1016/ j.biocon.2017.04.011
39 Ceccarelli, D.M. *et al.* (2018) *Biophysical design principles for offshore networks of notake Marine Protected Areas*, MACBIO (GIZ/IUCN/SPREP).
40 Great Barrier Reef Marine Park Authority (2002) , Technical Information Sheet No 6: Biophysical Operational Principles as recommended by the Scientific Steering Committee for the Representative Areas Program.
41 Lausche, B. (2011) *Guidelines for Protected Areas Legislation*, IUCN.
42 Dunn, D.C. *et al.* (in press) A strategy for the conservation of biodiversity on mid-ocean ridges from deep-sea mining. *Science Advances*
43 Wassmann, P. *et al.* (2011) Footprints of climate change in the Arctic marine ecosystem. Global Change Biology 17, 1235-1249. *Global Change Biology* 17, 1235–1249

MACBIO

Marine and Coastal Biodiversity Management
in Pacific Island Countries