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PACIOCEA



FINAL REPORT

European Commission BEST project number

07.032700/2012/635071/SUB/B2



This final report was jointly developed by the Agence des aires marines protégées (French marine protected areas agency) and the Secretariat of the Pacific Regional Environment Programme in November 2015.

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The Voluntary Scheme for Biodiversity and Ecosystem Services in Territories of the European Union's Outermost Regions and Overseas Countries and Territories (BEST) initiative seeks to promote the conservation of biodiversity and the sustainable use of ecosystem services including ecosystem-based approaches to climate change adaptation and mitigation.

The objectives of BEST are to provide further means to protect biodiversity and ecosystem services in the European Union's Outermost Regions and Overseas Countries and Territories.

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Authors: Jean-Charles Gordon, Ryan Wright, Paul Anderson, Pascale Salaun, Warren Lee Long & Lionel Gardes.

Contributors: Todd Bryan, Chad Burt, Alex Chailloux, Cécile Cot, Daniel David, Grace Goldberg, François Johany, Erwann Lagabrielle, Sylvie Lardon, Anne Littaye, Will McClintock & Andres Vega.

Available from: Agence des aires marines protégées
16 quai de la douane
CS 42932
29229 Brest Cedex 2
France
contact@aires-marines.fr

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1. Pacific Ocean Ecosystem Analysis - PACIOCEA

1.1. Introduction and regional context for the PACIOCEA project

As a pilot project, PACIOCEA (PACific OCEan Ecosystem Analysis) was a first attempt to consider marine ecosystem-based management across the Pacific region (over 33 million km²) at multiple scales ranging from national to regional extents in order to encompass the array of interactions between species, ecosystem components and humans.

The project promoted integrated management at different scales using multi-resolution data with multi-level decision-makers. The project provided a methodological framework for the integrated ecosystem-based management of coastal and marine biodiversity that match the appropriate levels of action in the Pacific as it is specified by the Convention on Biological Diversity (CBD COP5 V/6/B/ Principle 7). The project intended to contribute to the implementation of the Pacific Island Countries and Territories (PICTs) marine strategies, such as the French Polynesian Action Plan "*Ruahatu*" and the Pacific Oceanscape Framework. For more detail on the international and regional context, please refer to Annex 1.

The PACIOCEA project was implemented jointly by the Agence des aires marines protégées and the Secretariat of the Pacific Regional Environment Programme (SPREP) in close collaboration with Pacific island governments and the French Research Institute for Development (IRD).

The PACIOCEA was officially launched during the workshop: *Marine spatial planning to support sustainable ocean and coastal management of Pacific islands* held from the 26-28 November 2013 in Suva, Fiji. Please refer to Annexes 5a, b and c for more details.

1.2. General objective

The general objective of the PACIOCEA project was to strengthen marine spatial planning capacities, at local and regional scales to improve conservation and sustainable ocean management in the Pacific Island Countries and Territories (PICTs).

1.3. Specific objectives

1. Develop analysis and maps to support integrated ocean management, within EEZs and in areas beyond national jurisdiction, in the EU Overseas Countries and Territories and in the Pacific island countries
2. Work on management options and scenarios to help define recommendations for the region
3. Foster regional collaboration and strengthen regional capacity

PACIOCEA was implemented through 5 main steps:

1. Sharing and capitalizing experiences for co-defining an appropriate marine spatial planning methodology for the European Territories of the Pacific and the neighbouring countries
2. Data collation
3. Identification and synthesis of marine management issues
4. Scenario-based conservation planning to identify future priority areas for ecosystem-based management recommendations
5. Dissemination of the results

1.4. Expected results and impacts

The project's expected results and key deliverables are the following:

- i. Knowledge and data on marine ecosystems will be improved and conservation planning capacities at local and regional scales in the European Territories and the neighbour countries of the Pacific are strengthened.
- ii. An electronic library will be created gathering all the data collated in the areas of biodiversity, ecosystem functions and economic activities. This database will portray data through maps and will be accessible on line.
- iii. Factsheets of regional issues related to the management and sustainable development of the Pacific region will provide decision-makers and stakeholders with clear and crucial information.
- iv. A participative planning process will be put forward allowing decision-makers and stakeholders to co-build the appropriate methodology for marine spatial planning in the Pacific.
- v. Furthermore, a policy brief highlighting key outcomes and management options will be produced for the region.

The expected impacts of the PACIOCEA project are to contribute to:

- i. Implementing the Aichi Biodiversity Targets (UNEP/CBD/COP/DEC/X/2); the Coastal and Marine Biodiversity decision (UNEP/CBD/COP/DEC/X/29) adopted by the 10th Conference of the Parties; the Strategic Plan for Biodiversity 2011-2020 and the Reunion Island declaration (BEST Preparatory Action objective D).
- ii. Strengthening the capacities of Pacific Island Countries and Territories at a regional scale (BEST 2012 Preparatory Action objective C)
- iii. Strengthening the existing nature conservation programmes in the Pacific Island Countries and Territories (BEST 2012 Preparatory Action objectives C and D)
- iv. Establishing marine protected areas (BEST 2012 Preparatory Action objective A)
- v. Strengthening the sustainable use of biodiversity and ecosystem services (BEST 2012 Preparatory Action objective C)
- vi. Implementing living and non-living resource management measures outside protected areas and fostering ecosystem-based approaches (BEST 2012 Preparatory Action objective B)
- vii. Improving climate change adaptation (BEST 2012 Preparatory Action objective C)
- viii. Identifying data deficient areas that need further investigation (BEST 2012 Preparatory Action objective C)

Children in canoe, Solomon Islands © Stuart Chape



2. Key results

2.1. Factsheets providing a regional overview

Aim

Clear visualisation of geographic information is crucial in order for stakeholders to make sound decisions for management and planning. To understand and use the available ecological and socio-economic data in the Pacific region, maps and factsheets were produced to assess the current regional situation. This work was part of the deliverables of the first specific objective of the project.

Method

The factsheets were designed around ecosystem services in order to better portray the issues directly affecting people within the Pacific region (Figure 1). With this anthropocentric approach we set out to gather the available data and organize it by ecosystem service. For more detail please see Annexes 2a, 2b, 2c and 2d.

Results

These factsheets are broken into 3 ecosystem services and 2 drivers for change categories, the details of which can be found in Annex 2a. Please note that these factsheets were a first version used for the PACIOCEA workshops and have not been peer-reviewed. They could possibly undergo subsequent modification to meet the needs of other regional marine spatial planning projects for the Pacific in the near future.

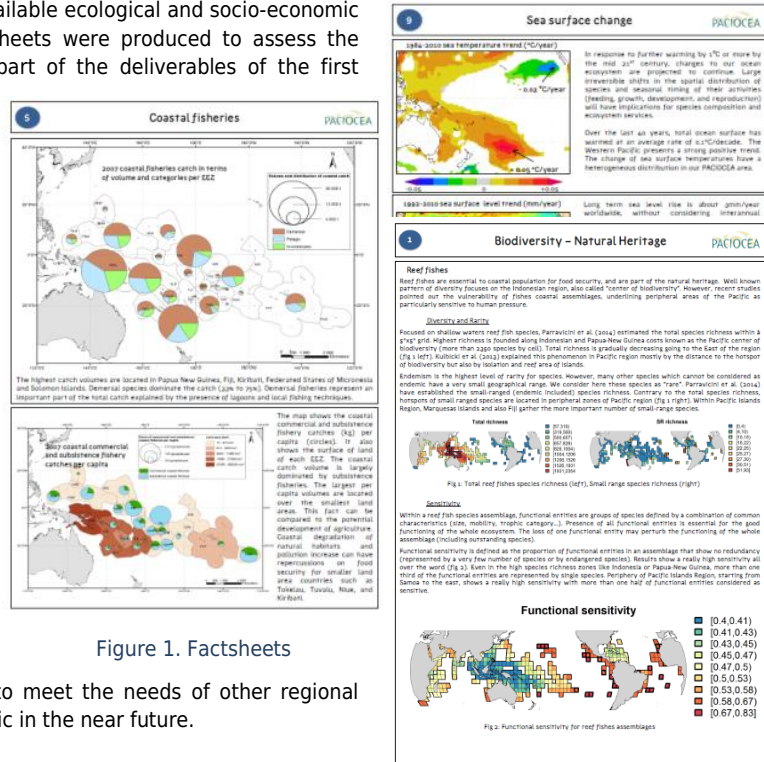


Figure 1. Factsheets

2.2. Spatial analysis: human and environmental interactions in the marine environment

Aim

With regional and national key decision makers acutely aware of issues affecting the marine environment at national and regional scales, the main objective of PACIOCEA was to use marine spatial planning (MSP) to provide new information to assist identifying key areas of management and assist national and regional planning processes.

Method

Using key priorities identified by countries through National Biodiversity Strategies and Action Plans (NBSAPs) and national participants in PACIOCEA's workshops, a number of human and environmental spatial datasets across the region were collected, overlaid and analysed. A number of spatial themes previously unanalysed or considered independent of other themes were analysed.

Results

A number of key interactions were analysed including the interface between shipping, pollution, deep sea mineral exploration, fishing and biodiversity.

With a number of shipping sectors sharing the same marine space across the region, an analysis was conducted to look at cargo, tanker, fishing and recreational vessels in these spaces. Using 187 million kilometres of vessel tracks from Automated Identification Systems (AIS) for the period April 2013 – March 2014 across 33 million square kilometres of Pacific Ocean, high activity spots were identifying, please see Annex 3. Key findings included the high fishing activity (similar to that of the Parties to the Nauru Agreement or PNA) across the equatorial currents and around exclusive economic zone (EEZ) boundaries, namely the Cook Islands, Kiribati, French Polynesia and Pitcairn.

The shipping vessel analyses were overlaid with other marine-based sectors including human activity layers (i.e. deep sea mining tenements and marine pollution events) and environmental layers including the CBD Ecologically and Biologically Significant Marine Areas (EBSAs), Birdlife's Important Bird Areas (IBAs), turtle nesting areas and humpback whale paths.

These analyses formed simple case studies to show the cumulative impacts and potential interactions the environmental and human activity in the Pacific.

Results of these analyses were presented at the Pacific Ocean Alliance meeting: *High Hopes for High Seas* in Suva, Fiji, May 2015 (see Annex 3) and at the sub-regional workshop on 'The Identification and Designation of Particularly Sensitive Sea Areas (PSSAs) in the Pacific Ocean' in Nadi, Fiji, July 2015 (See Annex 3 and figure 2).

Another notable study undertaken was the analysis of ten years of pollution incidents data recorded by observers on purse seine fishing vessels and examining trends and distributions across the Pacific. Analysis showed 92% of the 8000 incidents recorded occur in the exclusive economic zones (EEZs) of PNA members (please see Annex 3). A SPREP paper on these results was accepted at the 11th Regular Session of the Scientific Committee, held in Pohnpei, Federated States of Micronesia, August 2015: "*Marine pollution originating from purse seine fishing vessel operations in the Western and Central Pacific region, 2004-2014*" (please see [link](#)).

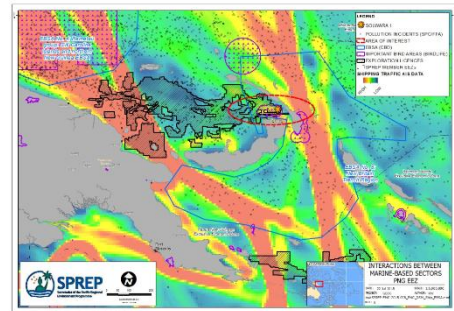


Figure 2: Interactions between marine-based sectors in PNG (see Annex 3)

A preliminary analysis of fishing vessel activity and interactions with the largest marine protected areas in the world, the Phoenix Islands Protected Area or PIPA, was completed. Please see Annex 3. The analysis showed fishing activity within the protected area boundaries from April 2013 to March 2014 prior to the protected area enforcement 1 January 2015. The analysis highlights the need to form baselines and collect data over time to effectively manage these areas. This will be discussed further in data gaps section later in the report.

2.3. Open access regional database repository - an open source solution to spatial data management

Aim

Access to relevant spatial information is critical for supporting decision makers within governments and across the region to help assist the strategic management of our oceans. The PACIOCEA project stipulated that an online GIS data library be developed creating a publically available, centralized, marine spatial planning (MSP) database for decision makers and GIS users across the region. To ensure long-term stability, the project directed that the system utilise open-source technologies consistent with regional architectures and standards.

Method

SPREP used open-source spatial data infrastructure solutions that had been implemented with success across national, regional and at international levels. This is consistent with platforms in use by technical partners and technical experts at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) through the Australian Aid program '*Enhancing Pacific Ocean Governance*' and the Secretariat of the Pacific Community (SPC).

After extensive consultations, GeoNode (a web-based platform to produce an Open-Source, Open Access Regional Database Repository) was selected. GeoNode is a geospatial content management system, a platform for the management and publication of geospatial data, bringing together mature and stable open-source software components. Please see Annex 4 for more details. The GeoNode architecture has shown the ability to work in the Pacific region in the form of SPC's PacGeo (<http://www.pacgeo.org>), in countries such as the Solomons and Kiribati, and at international levels at the UN (<http://GeoNode.wfp.org/>) and the Red Cross (<http://ebolaGeoNode.org/>).

Results

The resultant installation of GeoNode architecture established at SPREP was the region's first dedicated environmental spatial data server named the Environment Spatial Information System (<http://gis.sprep.org>). The installation of GeoNode at SPREP allowed the project to upload collected and analysed datasets, allowing users across the Pacific to view, interact with and download spatial datasets for MSP (figure 3).

This development provided Pacific island decision makers and GIS users a platform to interact and a better understanding of the many marine issues that they face at national and regional levels. The interface allows non-specialised GIS users to share data and create interactive maps on-line.

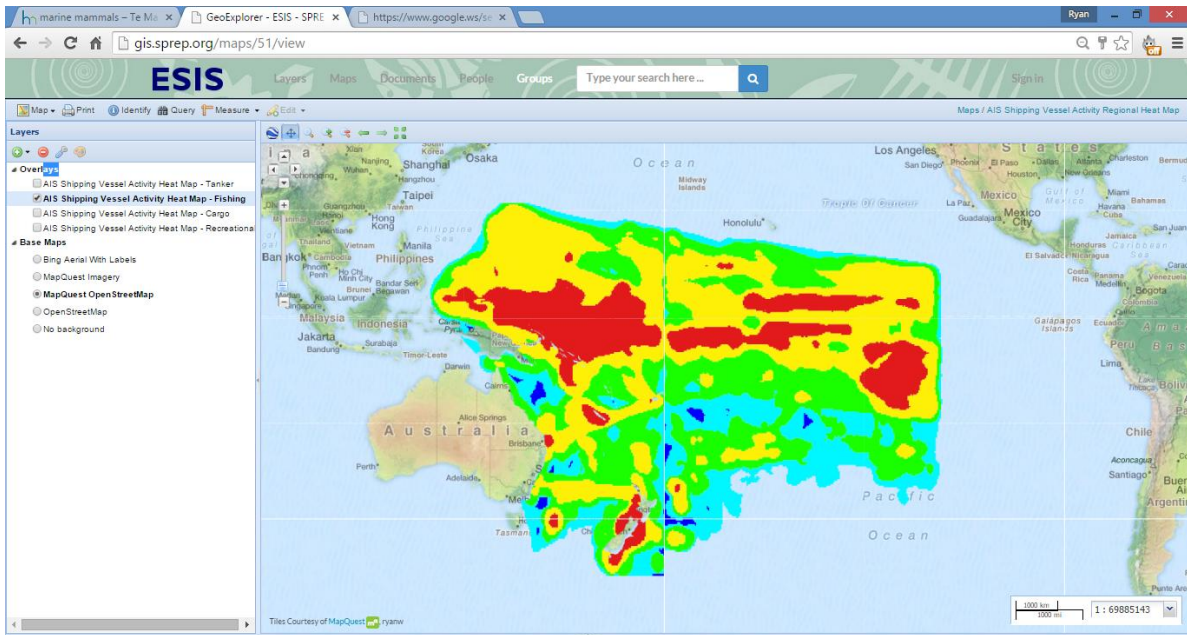


Figure 3: ESIS online platform

The Environment Spatial Information System (ESIS) strategically fitted into SPREP's Pacific Environment Information Network as its primary spatial data visualisation and sharing tool (Figure 4).

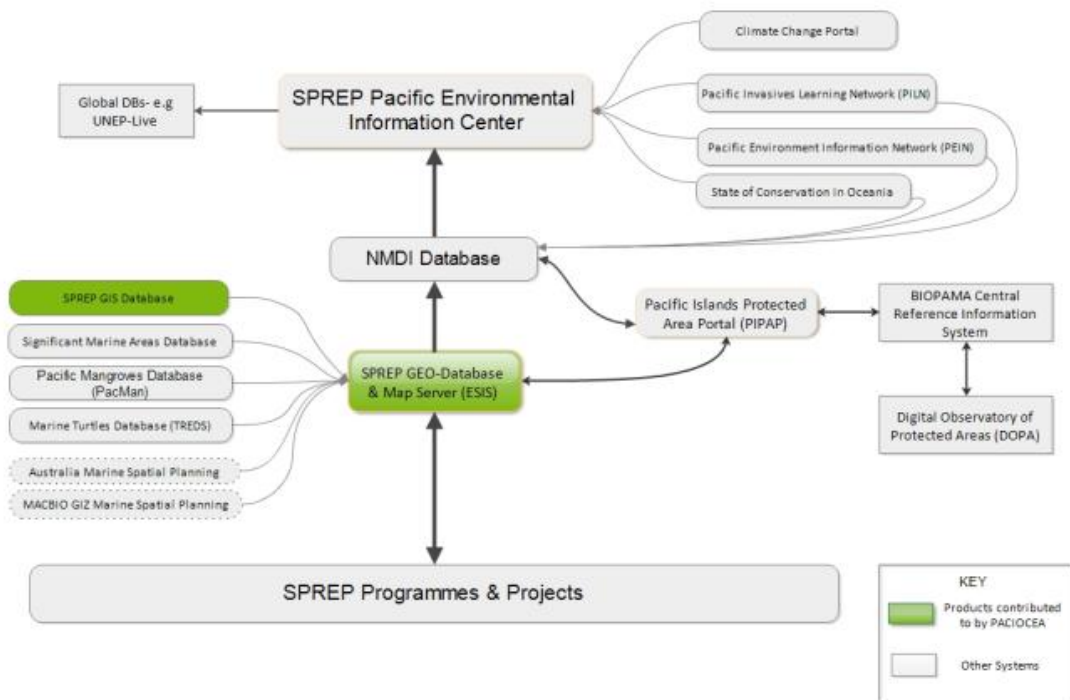


Figure 4: SPREP's Pacific Environment Information Network

2.4. Participative planning process

2.4.1. 'Territory game'

Aim

The 'territory game' is a participative and prospective approach for stakeholders to co-construct a shared vision of the Pacific region and its evolution through potential scenarios. In the case of the PACIOCEA project the 'territory game', methodology developed by AgroparisTech, was used with the intent to overcome the limited and heterogeneous scientific data by identifying and representing key issues and areas of interest for the region. The three dimensional characteristic of the ocean and the spatial extent of the region is a challenge in itself and difficult to grasp, but by overlapping different datasets and debating in a participative approach, participants were challenged to synthesize issues and further comprehend the complexity of the region.

Method

The 'territory game' followed a three step plan (Table 1):

- 1) Design a collective representation of the region with the information provided. This first step corresponds to the spatial diagnosis of the current situation in the region that participants then illustrate on a map.
- 2) Identify cross-cutting issues between topics and spatial dimensions.
- 3) Suggest future scenarios for the region (and actions to support these scenarios) from the knowledge gained from the previous steps and from the ideas that may emerge from the debate between participants.

Two workshops were organized to put into practice the 'territory game'. The thematic factsheets produced were used to facilitate discussions with stakeholders to identify current issues as a basis for designing potential future scenarios.

This methodology has been used as part of terrestrial planning projects in continental Europe but this was the first attempt for a marine spatial planning project on a regional scale.

Table 1 the three step plan of the territory game

Steps for the participants	Objectives that participants need to address	Input from the PACIOCEA team	Output from participants
1: Analyse the dynamics and the processes of the region and identify issues 1a: Illustrate and characterise the current situation 1b: Synthesize the dynamics and processes of the current situation 1c: Identify issues	Define the current situation of the region	<ul style="list-style-type: none"> • 18 factsheets of the Pacific region • Blank base map • Symbol examples to help with representation 	<ul style="list-style-type: none"> • Map of the current situation • Classification of the representations in a table • List of issues
2: Represent the identified issues 2a: Map issues 2b: Identify cross-cutting issues	Define the issues that need or can be managed	<ul style="list-style-type: none"> • Examples to help with identifying the issues • Blank base map 	<ul style="list-style-type: none"> • Map of issues
3: Design a future for future generations 3a: Imagine what future scenarios could look like 3b: Directions and actions to achieve the desired future 3c: Map the actions	Define a sustainable future	<ul style="list-style-type: none"> • Blank base map • Blank action table 	<ul style="list-style-type: none"> • Map of scenario • List of suggested actions • Map of actions

Results

The French Research Institute for Development (IRD) presented the challenges of multi-scale marine spatial planning in archipelagic regions during the territory game, providing methods and tools useful for stakeholders and decision makers involved in the participative process. For further details regarding the multi-scale challenges, please refer to Annexes 5d and 5e.

The participants' spatial and graphic representations demonstrate the complexity of marine spatial planning in the Pacific (Figure 5). It consolidated an extensive list of issues and provided a floor for discussion on the interactions between the environment and human uses. The subjective and exploratory nature of the territory game approach was a challenge for participants to understand and engage in. Please see Annexes 5f, g, h, i, j, k, l, m and n for more details.

Issues identified were developed through fact sheets and participants' local knowledge. The transition from spatially accurate data to coarse spatial representation led to both relevant and irrelevant overlapping of information. This confusion was felt in the following steps leading to intangible sets of future scenarios and associated potential actions.



Figure 5: Photo taken during the workshop in Fiji.

2.4.2. SeaSketch

Aim

Visualising geographical data is key to make sound decisions for management and planning as mentioned above. Having a tool that can not only show stakeholders the data but that can also integrate information in the design of prospective plans is an added benefit in the planning process. SeaSketch is a web-based tool developed by the University of California Santa Barbara and used around the world for collaborative marine spatial planning. In the case of the PACIOCEA project, SeaSketch was used with the intent to design areas of interest and produce statistical reports of the latter. With the possibility of sharing the users' designs on a web-based platform, this eliminated the need for licence-based software for each end user.

Method

The design process is simple allowing users to digitally sketch an area of interest and enabling them to extract scientific data from that area. Additionally, each user-generated sketch can be analyzed using built-in reports to understand the potential interactions of the design, such as whether the design meets certain science or policy guidelines. In addition, the sketch can be shared and editable online by users for further improvement.

The PACIOCEA project may be found at paciocea.seasketch.org.

For further details regarding SeaSketch, please refer to Annexes 6a and 6b.

Results

This fast, easy to use tool encouraged iterative design to meet planning objectives. Users generated proposals representing a range of perspectives and interests in an accessible map interface. They sketched their ideas, and edit based on the report's immediate feedback to compare alternatives. These reports are available at paciocea.seasketch.org.

SeaSketch gave the users the opportunity to share their sketches with associated reports, discuss their ideas, share views of maps, and post file uploads to discussion forums (Figure 6). In conclusion, SeaSketch has potential for a study area as large as PACIOCEA's. The majority of the use for SeaSketch occurred during the 2nd workshop and there has been little subsequent use by countries. A sustainable source of funding hasn't yet been identified for the continued development of the platform.

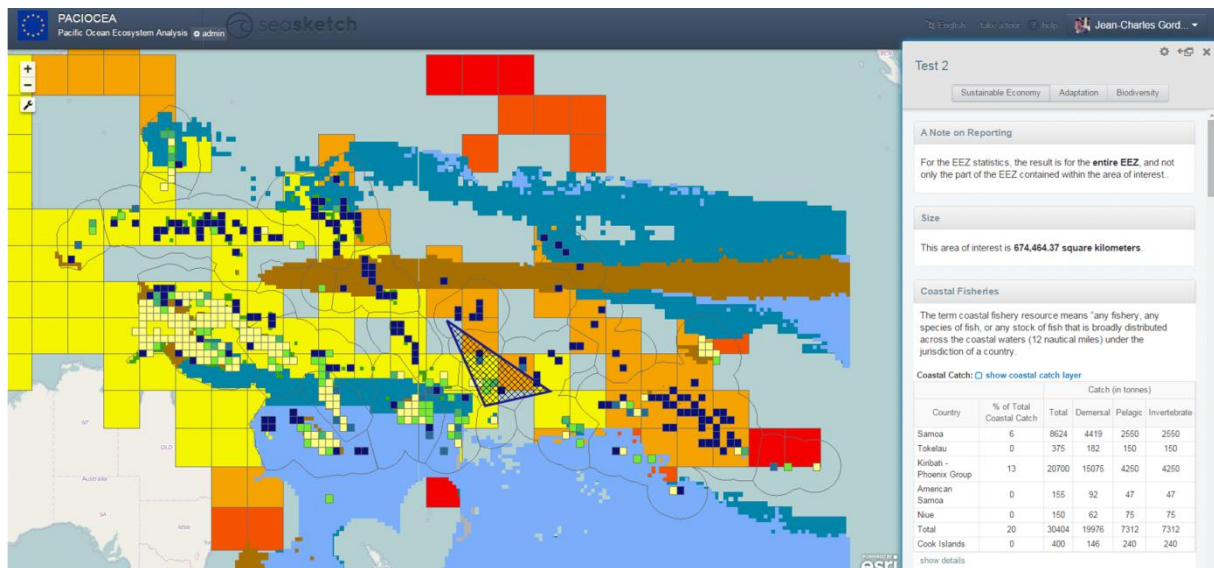


Figure 6: SeaSketch online platform

2.4.3. Youth survey

Aim

The Pacific Island Countries and Territories present a fast growing population, expected to double by 2050. The labour market is unable to absorb the new working-age youth, resulting in strong unemployment and encouraging emigration. Could tools promote and conserve the maritime heritage and offer job opportunities to Pacific Island youth? This youth survey set out to collect the students' vision on the natural environment and tourism in their home country and the links between both and also the activity sectors they planned to work in.

Method

We set out to contact 11 universities across the Pacific, of which 3 answered (University of New Caledonia, university of French Polynesia and the University of the South Pacific). The sample is representative of the Pacific Island students, not the whole youth.

Results

A total of 375 students answered. 75% of those were male and 25% were female. 54% of the surveyed students grew up in urban areas whereas 46% of them grew up in rural areas. The results of the survey showed that according to the students the main landscape elements to be put forward for tourism were maritime landscapes (lagoons, coral reefs and beaches) and that the main cultural elements to be put forward were the artistic productions, customary practices and local food. When asked what kind of tools the students would use to promote and protect natural and cultural heritage, they mostly associated tools to tourism.

20% of the surveyed students still plan to work abroad due to the lack of local opportunities. This figure highlights the urgent need to create local job opportunities, questioning the potential of natural and cultural heritage promotion. For further details regarding the survey, please refer to Annex 7f.

2.5. Dissemination of results

PACIOCEA's main results were disseminated and promoted during the following events:

1. The 3rd *Oceania 21 summit on sustainable development*, Nouméa, New Caledonia, 30 June – 2 July 2014 – Annexes 7a and 7b.
2. The 3rd *International Conference on Marine Mammal Protected Areas (ICMMPA)*, Adelaide, Australia, 9-11 November 2014 – Annexes 7c and 7d.
3. The *IUCN World Parks Congress* in Sydney, Australia (12-19 November 2014) saw 3 presentations showcasing on-going PACIOCEA activities. These took place in the following events:
 - Pacific: challenge for a giant (Ocean+ Pavilion launch event).
 - Marine Spatial Planning in the Pacific: Linking multiple scales of integrated marine management to support sustainable development (ePoster) – Annex 7e.
 - Promotion and conservation of the Ocean's natural and cultural heritage: what's the job potential for Oceania's Youth? (ePoster) – Annex 7f.
 - Marine spatial planning brochures – Annex 7g.
4. '*Better ocean management through open-source GIS and data sharing*' Suva, Fiji, (24 –28 November 2014) presented current marine Challenges in the Pacific and the on-going marine spatial planning programs (and technologies being developed) to help assist Pacific Island Countries and Territories manage the marine environment. – Annex 7h.
5. The results of the analyses undertaken for the PACIOCEA project were presented at the Pacific Ocean Alliance meeting: *High Hopes for High Seas* in Suva, Fiji, May 2015 (Clarion-Clipperton Fracture Zone analysis). – Annex 7i.
6. *MARE academic conference: People and the Sea VIII*, Amsterdam, 24-26 June 2015. – Annex 7j.
7. PACIOCEA results were used to facilitate and inform the sub-regional workshop on '*The Identification and Designation of Particularly Sensitive Sea Areas (PSSAs) in the Pacific Ocean*' in Nadi, Fiji, July 2015 (Papua New Guinea, Jomard Passage). – Annex 7k.
8. The 26th *SPREP meeting* (21-24 September 2015) saw a number of presentations that credited the outcomes of the PACIOCEA project primarily the joint AAMP-SPREP side events "Sustainable Ocean Initiative and signing of the MOU" and "Integrated Ocean Management" that focused on the following topics:
 - Pacific experiences on Marine Spatial Planning.
 - Proposing the *Pacific Biodiversity Blue Belt* project.
 - Discovering the European Commission's BEST 2.0 programme.
 - Preparing the IUCN World Conservation Congress 2016 in Hawaii.
9. Merlgéo meeting: '*From the coast to the open ocean, geographic information in motion*', Brest, France, 24 – 26 November 2015. Presenting the results of SeaSketch and the participative planning process. – Annexes 7l and 7m.

A project of web based tool has also been prepared for the dissemination of the results of the project. This communication tool presents an animation of synthesis maps presenting the main current issues that have been identified. The animation finishes by the presentation of a scenario + 50 years.

Animation can be seen at: <http://www.aires-marines.fr/paciocea/dev/index.html>.



Traditional canoes, New Caledonia © Stuart Chape

3. Conclusions

3.1. Lessons learnt

3.1.1. Factsheets

Gathering, compiling and summarising ecological and socio-economic data for the Pacific region was a challenging task. Our main priority was to have the data presentable in a clear and concise format for both workshops. During both workshops, participants shared their thoughts and knowledge on multiple topics which we gathered and will use to improve these regional factsheets for future projects. For a pilot project, these factsheets give a first overview of the data present for the region and an opportunity for further review. The further refinement of the factsheets could be adapted to follow the criteria used in the selection of EBSA sites and subsequent initiatives such as the Sustainable Ocean Initiative from the Convention of Biological Diversity to enhance their long term value.

3.1.2. Territory game

The complexity of the territory game methodology and the breadth of marine issues resulted in unintelligible results. Due to the methodology and non-consultative processes during and after the workshops, Pacific island members left without a strong ownership of the results. However the participatory approach should be continued in marine spatial planning processes in a more specific and realistic way for the Pacific, for example the EBSA method. In future participatory planning processes, ownership can be maintained by utilising national and regional mandated bodies or organisations to carry out and facilitate the steps of an MSP process. Following the lessons learnt from the 2 participatory workshops here are the steps recommended for improvement:

Pre-workshop procedure

The multi-sector regional perspective of MSP necessitates that the thematic areas be analysed where interactions are likely to occur, which will then present a new set of threats, opportunities and challenges that will inform participants of the priority areas needed to be addressed by MSP.

Examples of this analysis could be:

- Purse seine fleet efforts and the location of sensitive seamounts.
- Fishing pressure within MPAs.
- Deep sea mining potential overlapping shipping traffic and whale migration paths.

A key step is to highlight the policy and framework environment of each country and the region prior to the workshop drawing attention to how MSP can assist countries in meeting their national and regional commitments. These commitments include:

- CBD Aichi Targets.
- Sustainable development goals.
- Pacific Ocean Framework.
- Strategic plans including National Biodiversity Strategic Action Plans, National Environmental Management Strategies and Sustainable Development Plans.

Workshop facilitation

Regional spatial planning is a Pacific driven process. It is important that facilitators recognise that ownership and buy-ins are achieved through a national led process. This process draws participants from multiple sectors and multiple levels of government and civil society and this requires clear concise objectives and a proven Pacific approach.

The process requires clear and simple steps. This allows participants to stay engaged, encouraging their participation and input during the length of the process.

Post-workshop procedure

Post workshop efforts should focus on reporting back to countries the findings and results of the workshop, identifying a clear way forward and ideally, funding sources to continue the MSP process nationally. The results for specific areas or actions need to be clearly tied to national policies or priorities.

3.1.3. SeaSketch

The on-line platform was tested during the last workshop. Participants found that the statistical reporting and discussion forums were beneficial to the spatial planning process as it gave them the feedback and the possibility to edit and share their modifications. The PACIOCEA team engaged the participants at a later stage after the workshop in a 4 part series where we looked at possible scenario building in order to discuss, modify and complete regional analyses. Participation was nonexistent as time schedules and limited availability rendered collaboration difficult. For projects involving a large number of actors such as PACIOCEA, we recommend setting aside a specific amount of time during a dedicated workshop for maximum efficiency in the spatial planning process.

In conclusion, SeaSketch is a convenient platform with its user-friendly interface, a cross-sector approach of the data and facilitation of idea exchanges via forums that gives the users the possibility to further understand the region and its intricate nature.

CROP agencies and countries have nominated to move toward open source software as have regional partners including CSIRO. The initial cost associated with the tailored set up and the low but consistent operating cost to maintain the platform functional will prove to be problematic for sustainability in the region.

3.2. Information gaps

3.2.1. Bycatch

One data gap is the disparity in information from different fishery sectors. High seas and industrial fisheries have been the focus on data collection including the catch of non-target species. By catch from FFA observer program would be valuable for MSP by providing the specific location and abundance of key species including sharks, bill-fish and cetaceans.

3.2.2. Plastic debris

Analyses of plastic debris in the environment derived from beach-cleaning surveys typically only provide data on coarse trends and larger items. In order to gain an accurate and meaningful assessment of plastics and their influence, large-scale and long-term monitoring is needed across countries and environments, including the sea floor, and across a range of debris sizes.

3.2.3. Coral reefs

The following information collected over the past five decades hasn't been adequately described, cleaned and analysed to highlight trends and patterns with a high level of confidence. Meta-analysis on coral reef surveys in the Pacific developing region would provide significant insight to the following points:

- Reef health and resilience: this requires long-term data from several locations over decadal time spans on disturbance and recovery cycles, and reef processes such as coral recruitment, changes in species composition, grazing by herbivores, calcification rates etc. This information is used to understand reef responses to pressures, to provide early warning before catastrophic changes, and to assess management effectiveness, and also for adaptive management;
- Reef resource use: trend analyses require long-term data on catch and fishing effort at the species level. Risk assessments, preferably collected over long periods for subsistence and commercial fisheries are especially useful in adaptive management;
- Factors affecting reef health: there are anecdotal reports describing damage to coral reefs with indications of worsening trends (e.g. climate change, increases in pollution and erosion), but detailed monitoring programs are rarely available to understand how coral reefs respond to management initiatives.
- Governance and management: There is little information on the effectiveness of management arrangements, plans, policies, laws and regulations, and little information on implementation. Socioeconomic monitoring of reef users to determine compliance and acceptance of these rules is used to support 'on-ground' monitoring of the reefs.

3.2.4. Migratory species

For many migratory species knowledge of their migration routes, migration timing and consequently threats during their migration is inadequate and the existing data is scattered across a number of organisations and universities. Furthermore there is a high number of endangered species, especially smaller ones, where it is unknown if they exhibit migratory behaviour. New technologies and new methodologies will make tracking of smaller animals feasible. Increasing application of existing animal tracking methodology and adoption of new technology and methods holds great promise to improve knowledge on the migratory behaviour of many species. Keeping up to date on new technologies and promoting their use among CMS (The Convention on the Conservation of Migratory Species of Wild Animals) Parties is an issue that can help bring forward the CMS agenda in the coming years.

4. Future directions for marine spatial planning in the Pacific region and sustainability of PACIOCEA's outcomes

4.1. Ongoing MSP projects in the region

4.1.1. Enhancing Pacific Ocean Governance (EPOG)

In response, the Pacific Island Forum leaders in 2010 endorsed the Framework for a Pacific Oceanscape, which identifies strategic priorities and actions throughout the region to achieve sustainable development, management and conservation of the Pacific Ocean—including actions designed to support sustainable economic development and food security in the region.

The 3 year, 5.4 million AUD, Enhancing Pacific Ocean Governance (EPOG) project aims to assist in the implementation of these actions under the Framework. The project's overarching goal is to empower Pacific Island countries and territories to effectively manage marine and coastal resources for sustainable economic development and food security, while maintaining productive ecosystems and biodiversity. The project will also support regional organisations and countries move towards a more holistic, cross-sector approach to ocean governance.

CSIRO, the Department of the Environment and partner agencies are working at a regional, national and sub-national level to support marine planning processes. At a regional level this includes working with CROP agencies to produce a regional integrated ocean assessment and support the use of that assessment to guide regional policy, programs and research.

At a national level the project is exploring and expanding marine spatial planning processes in two pilot countries to achieve economic development and environmental objectives. This will include the development of national integrated ocean assessments to inform the review, and the update of national policies and plans.

CSIRO, Department of the Environment and consultant advisors will work with national and provincial level governments in pilot locations to develop strategies for strengthening the implementation of community-based marine and coastal resource management.

The project is working with country agencies to identify and tailor approaches to marine planning, and identify capacity development needs associated with their use.

4.1.2. Marine and Coastal Biodiversity Management in Pacific Island Countries (MACBIO)

This 5 year, 8.1 million Euros, MACBIO project is jointly implemented by the German Agency for International Cooperation (GIZ) and IUCN Oceania, supported by the Secretariat of the Pacific Regional Environment Programme (SPREP).

The project will undertake economic assessments of marine and coastal ecosystems in the five project countries on a national and regional level compatible to the global TEEB (The Economics of Ecosystems and Biodiversity) programme in order to contribute to national development plans.

The project will assist governments to use seascape-level planning to re-design MPA networks, and will demonstrate effective approaches to site management, including payment for ecosystem services.

Objectives:

1. The economic value of marine and coastal ecosystem services is considered in national development planning.
2. Exclusive economic zone-wide spatial planning frameworks are used to align national marine and coastal protected area systems with the requirements of ecosystem conservation.
3. Best practices for the management of marine protected areas, including payments for environmental services, are demonstrated at selected sites.
4. Concepts and instruments that have proven successful for the sustainable management of marine and coastal biodiversity are disseminated regionally and internationally.

4.1.3. Sustainable Ocean Initiative (SOI)

SOI's mission is to provide a global platform to build partnerships and enhance capacity to achieve the Aichi Biodiversity Targets related to marine and coastal biodiversity in a holistic manner by:

- facilitating the sharing and exchange of knowledge, information, experiences and practices;
- creating partnerships that can provide targeted capacity-building and technical assistance in support of on-the-ground implementation priorities;
- enhancing interactive communication among global policy, science and local stakeholders;
- monitoring progress on Aichi Biodiversity Targets related to marine and coastal biodiversity;
- developing partnerships among different sectors and stakeholders at local, regional and global scales; and

- Working together to achieve a balance between the conservation and sustainable use of marine biodiversity, and promoting flexible and diverse approaches towards this end.

4.1.4. Biodiversity and Protected Areas Management (BIOPAMA)

This 4 year, 11 million Euros, Biodiversity and Protected Areas Management Programme (BIOPAMA) project aims to address threats to biodiversity in African, Caribbean and Pacific (ACP) countries, while reducing poverty in communities in and around protected areas. Specifically, the programme will enhance existing institutions and networks by making the best available science and knowledge available for building capacity to improve policies and better decision-making on biodiversity conservation, protected areas management and access and benefit sharing.

BIOPAMA consists of two main parts:

1. A protected areas component, jointly implemented by IUCN and the EC-JRC, that includes:
 - Capacity building for regional and national institutions, technical personnel, and protected areas managers;
 - Improved access and availability of biodiversity data through the establishment of regional observatories and information systems to improve decision making.
2. An Access and Benefit Sharing (ABS) component implemented by the Multi-donor ABS Capacity Development Initiative managed by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

4.2. Future projects and analysis

To ensure the methods, results and products developed during PACIOCEA are utilised, key partners including SPREP and AAMP will build upon the project outputs. Pacific marine spatial planning activities will be able to utilise these outputs to inform relevant frameworks, strategies and countries in the region.

Through tools like MSP, MPA networks and practical management action, future projects should aim to help PICTs to meet the Strategic Priorities of the Pacific Oceanscape Framework and the key objectives of the CBD's Aichi targets 6, 10, and 11.

Their objectives should aim to achieve practical on-ground outcomes that will improve:

- Our knowledge of marine biodiversity;
- Coral reef management and monitoring;
- Effective networks of sanctuaries for migratory and threatened species;
- Use of EBSAs for area based management;
- MPA management effectiveness and a more coherent MPA network; and
- Surveillance within MPAs and sanctuaries, including through increased use of satellite technology.

The core of these futures projects is to build capacity amongst SPREP members; to implement tangible national and territorial actions supporting local initiatives and to promote trans-boundary cooperation. Communication of results and tools will be an important and strategic component in achieving a wider influence. The results could be showcased during regional and global events such as Oceania21, the 2016 IUCN World Conservation Congress in Hawaii and the 2017 IMPAC4 in Chile.

As a first step, future projects should intend to build upon the growing body of marine biodiversity knowledge and conservation exchanges between European Territories and neighbouring countries in the Pacific. The immediate next step is to conduct regional MSP training with the best available data, including national analysis and support, ensuring that multiple MSP related projects, initiatives and activities are integrated and complimentary, both at the community, national and regional scales.



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