Community Marine Monitoring Toolkit: A locally-developed toolkit to inform community-based management of marine resources in Vanuatu

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Community engagement, participation and empowerment are key to effective and sustainable environmental management and climate change adaptation at the local level. Furthermore, if the widespread decline of coastal resources throughout the Pacific is to have any chance of recovery, then communities need to be part of the solution with the use of appropriate and effective tools. A novel marine monitoring toolkit ('the Toolkit') has been developed in Vanuatu under the Restoration of Ecosystem Services and Adaptation to Climate Change (RESCCUE) project, implemented by the Pacific Community (SPC), with the participation of community resource monitors in North Efate and the Vanuatu Fisheries Department (VFD), in order to inform local to national actions and management. The Toolkit has been successfully field tested to allow communities to take ownership of monitoring their marine resources. The Toolkit includes simplified versions of established monitoring methods for marine habitats and resources to achieve a balance between robust science and methods that are appropriate for communities to use. The key to its success in North Efate is that it was developed in response to communities' needs by using a participatory approach and a series of community training workshops with local environmental leaders. Uniquely, the Toolkit includes a standardised process for communities to use that monitors results instantly, and has also been delivered in Bislama language. Results from field surveys are translated directly on to data reporting posters that are used to inform community decisions on management actions in order to target key areas of concern. Furthermore, the Toolkit has been developed to link and align with government initiatives and policy, especially those of the Vanuatu Fisheries Department. By using these methods, communities are able to adapt their traditional management to address immediate and medium-term issues in their local marine environment. The observed benefits of the Toolkit include increased local awareness through community-led environmental outreach, increased ownership of and motivation for local monitoring and management, expansion of traditional tabu *(no take) areas, and new local ecotourism initiatives to generate revenue to support environmental management and climate change adaptation.*

Why is community-based monitoring important?

Marine resources are under pressure in the Pacific Islands region due to coastal development, over-exploitation, increasing human populations and demand for resources, land-based pollution and sand and coral mining (UNEP 2018). Climate change is expected to exacerbate these pressures and modify marine ecosystems throughout the Pacific Islands region, with implications for the communities that depend on them for food and livelihoods (Bell et al. 2011; Johnson et al. 2017). However, there is limited capacity within government departments in Pacific Island countries and territories (PICTs) to conduct regular or extensive monitoring, meaning that communities are a key group for identifying changes in local marine ecosystems. With simple and robust monitoring tools that link directly to management, communities become empowered to make effective and informed decisions in order to manage their marine resources and adapt to future climate change.

Developing local stakeholders' capacity to monitor marine resources has been trialled throughout PICTs with varying levels of success. Despite the immense amount of resources allocated by conservation practitioners to monitoring, often the right things are not being monitored in the right way to robustly assess the impact of conservation and management (Gurney and Darling 2017). Some of the main challenges of successful and sustainable local monitoring are poor engagement, complex methods and reliance on costly equipment and external data analysis.

In a pilot site in North Efate, Vanuatu, a marine monitoring toolkit was developed in response to community needs that aimed to address the above issues. The Toolkit provides a novel approach to community monitoring that was co-developed with community designated Marine Champions from Nguna-Pele Marine and Land Protected Area, Tasi-Vanua environmental networks representing 27 communities, and the Vanuatu Fisheries Department.

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The Toolkit supports local monitoring of marine environments to detect changes caused by human activities and natural events. Community monitoring is important as it provides regular information from many locations that is collected by people who are familiar with their environment, has the ability to support national initiatives and can:

- provide an early warning of changes or impacts (e.g. coral bleaching, crown-of-thorns starfish outbreaks, or decline in fish);
- raise awareness within communities about the condition of their marine environment;
- raise awareness about the impacts of fishing methods and gear;
- raise awareness about the range of management actions appropriate for local issues;
- empower communities to take control of local marine resource management through an inclusive and informed process; and
- determine if local management actions are effective and facilitate adaptive management.

How does the Toolkit work?

The Toolkit includes six modules that are independent of each other and communities select one or more module(s) depending on their local issues and resources: (1) fish catch surveys; (2) intertidal invertebrates; (3) reef health; (4) mangroves; (5) seagrass; and (6) crown-of-thorns starfish.

By using both qualitative and quantitative methods to monitor key local indicators of coastal habitats and resources, each module collects standardised data that is readily plotted on to a scale from nogat (none/unhealthy) to fulap (full/healthy). For each of the modules, relevant published scientific information was used as the basis for determining what is considered as a healthy or unhealthy state. Chiefs and community members of all ages are involved in the monitoring, management and review process (Figure 1). Importantly, this process also serves as an effective engagement and awareness-raising tool for communities.

The Toolkit provides information that can be used by government to inform national initiatives. For example, the catch surveys focus on subsistence catch, which fills a national (and regional) data gap, and complements national

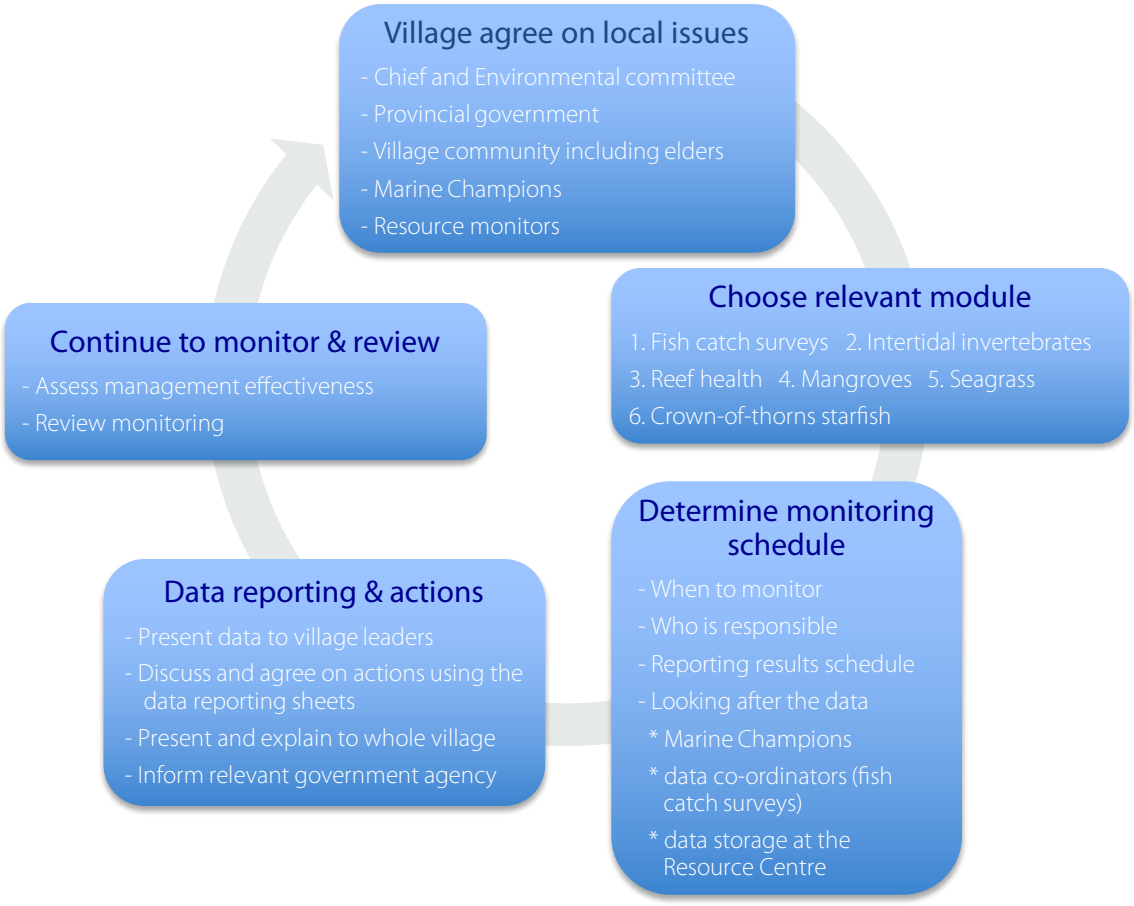

Figure 1. Diagram of the monitoring, review and management process.

Figure 2. Some of the Vanuatu Marine Champions who are all trained in the six Toolkit modules and lead community training and monitoring sessions.

data monitoring of commercial catches. The catch surveys also focus on size data to inform community decision-making while also collecting catch per unit effort (CPUE) data that provide a long-term data set that is compatible with VFD requirements. Also, the mangrove and seagrass surveys adopt nationally used methods, and the crown-of-thorn starfish (COTS) module links directly with a current national initiative.

Importantly, the scientific basis of the data reporting outputs means that community-based monitoring can complement more technical scientific and regional monitoring that is conducted less frequently (e.g. once every three years). This multi-level involvement means that management actions are streamlined towards common goals. The key to the success of the Toolkit is the involvement of community Marine Champions in the training and delivery of monitoring methods and activities (Figure 2). Marine Champions were nominated by communities based on their demonstrated interest in environmental stewardship and prior experience in the networks as leaders or resource monitors. Keeping the Toolkit adaptive to community needs gives the Marine Champions and their communities the capacity to monitor and manage their resources without the need for external input.

What makes the Toolkit different from other monitoring?

The Toolkit is designed to be easy yet robust and to inform local to national actions, allowing communities to take ownership of all the stages of monitoring and managing their marine resources. The Toolkit has drawn on established survey methods and known species and ecosystem thresholds in order to apply standardised interpretation of monitoring results instantly, and to translate information from community surveys directly into management actions that target key local issues. This is achieved by plotting the survey results from the *nogat* to *fulap* scale on to the data reporting sheet, which is maintained as a poster in communities with pre-agreed management actions, so that results are readily available and the process is transparent (Figure 3). The data reporting sheets use the same colours as the cyclone warning colours; blue indicates no concern, yellow indicates there is a possible issue and red indicates there is an immediate issue. This means communities do not need to rely on outside experts to interpret the results, which empowers them to use the monitoring results to inform local management actions.

How does the Toolkit inform local management?

The Toolkit includes an important community meeting at the start, where everyone comes together to agree on what key local issues are to be monitored and what management actions are suitable and acceptable for their local environment if an issue is observed. If monitoring detects an issue, the community can meet again to confirm the management actions that will be implemented to address the issue. Communities can work together with provincial and national governments to ensure by-laws in the management plans are recognised and enforced. Some examples of this are shown in Figures 3 and 4. Using these methods, communities can adapt their traditional management to address growing pressures on their marine local environment, including the effects of climate change.

The Toolkit has been applied by many communities in North Efate, including as part of community conservation monitoring days and school awareness days (Figure 5). Additional benefits of this work include increased local awareness of climate change and marine issues, expansion of locally managed tabu (no take) areas, long-term recognition and importance of conservation areas and new local ecotourism initiatives for income generation to support climate change adaptation.

While the survey techniques are based on established protocols that have been used throughout the Pacific Islands region for years, the Toolkit provides easy to understand and robust methods with the ability to use monitoring results in order to directly and instantly inform local management decisions. The Toolkit methods can also complement other more technical approaches that are used in the Pacific Islands region, and are able to accommodate available existing data. The Toolkit therefore has the potential for broad application and provides relevant and appropriate methods for empowering communities in the Pacific Islands region to take affirmative and immediate action to ensure future food security and livelihoods from coastal resources.

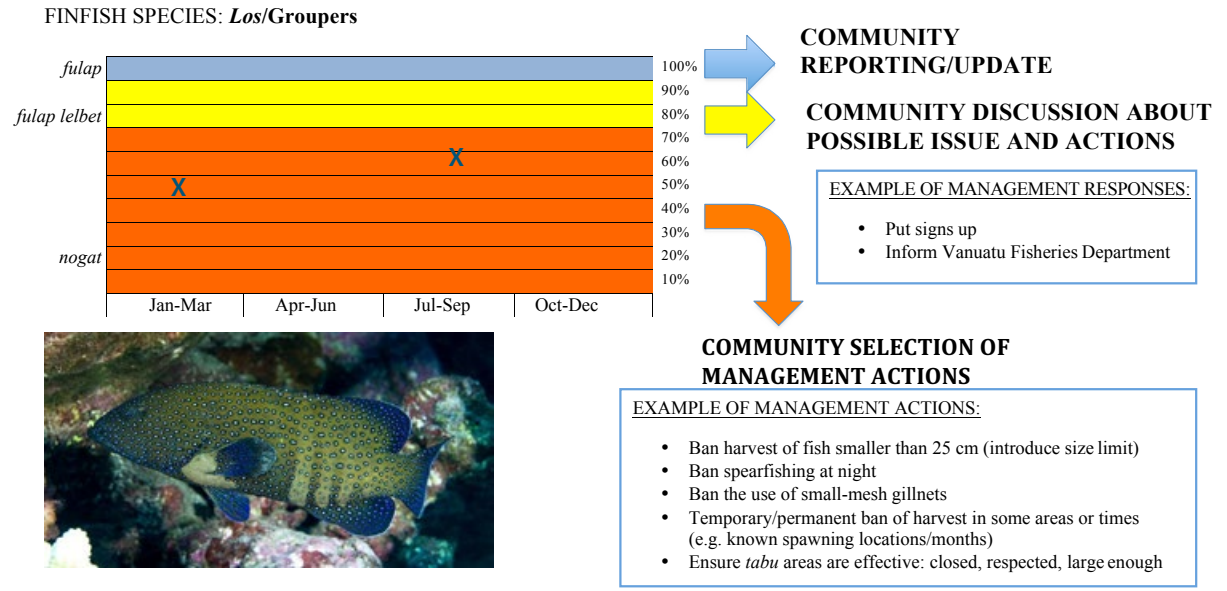

Figure 3. Data reporting posters showing the translation of *Fish Catch Survey* results (Module 1) on to a graph that includes appropriate management actions that are pre-agreed by the communities depending on the results.

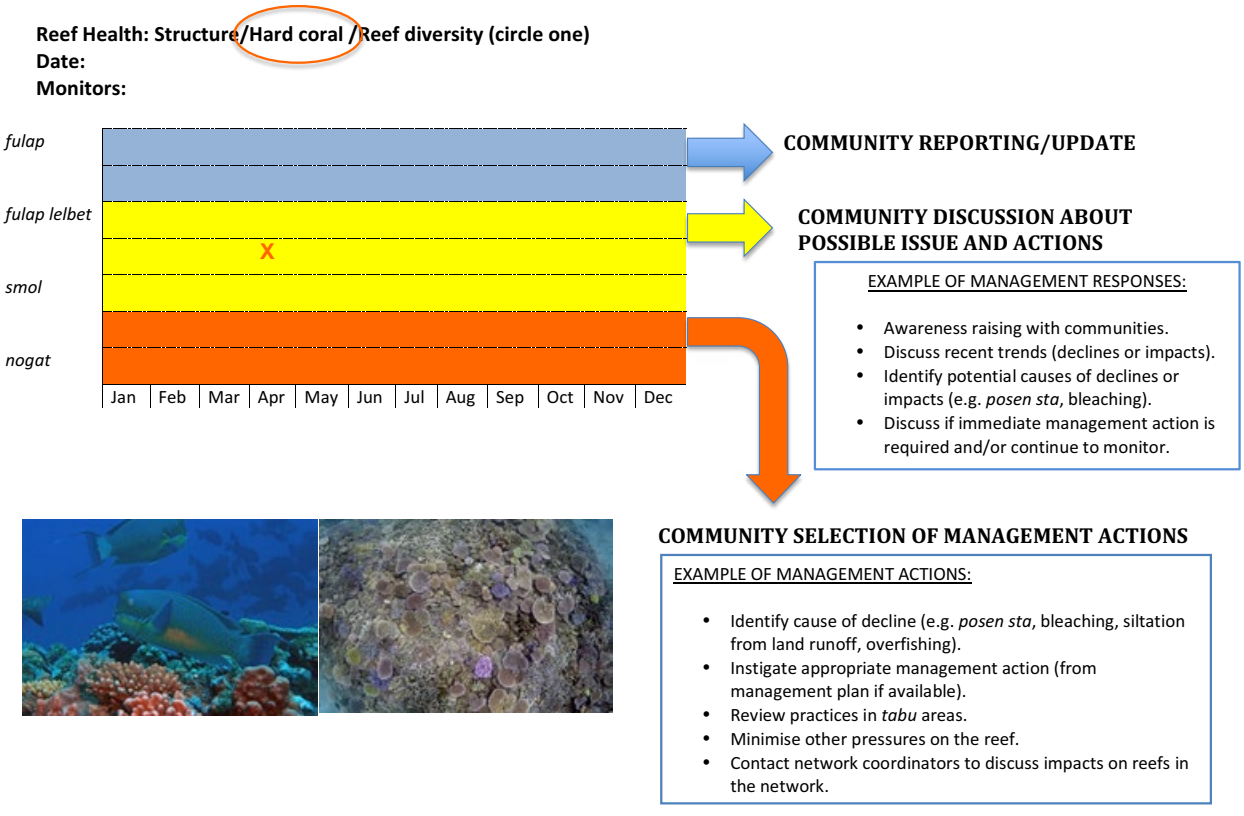

Figure 4. Data reporting posters showing the monitoring results of reef health indicators in the *Reef Health Survey* (Module 3) and how results are used instantly to identify appropriate and agreed management actions.

Figure 5. Community monitoring days demonstrating the utility of the Toolkit methods and the awareness raising benefits.

Acknowledgements

The authors would like to acknowledge funding support from the French Development Agency (AFD) and the French Global Environment Facility (FFEM) under the RESCCUE project, implemented by the Pacific Community (SPC). We want to also acknowledge the members of the Nguna-Pele Marine and Land Protected Area and Tasi-Vanua environmental networks in North Efate, Vanuatu for their passion and dedication to recognise and seek to address growing marine resource issues. Integral to the Toolkit development was the commitment of the Network Marine Champions who dedicated their time to provide critical input and deliver training. The Vanuatu Fisheries Department, in particular Jeremie Kaltavara, also provided valuable support and input to the Toolkit.

Note

Videos about the Marine Monitoring Toolkit and testimonies from Marine Champions are available on the RESCCUE project Youtube playlist at the following link:

https://www.youtube.com/user/spcnc1

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