

Working Paper 5

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## **Standardising data collection and management for Pacific Island coastal fisheries and aquaculture**

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## **STANDARDISING DATA COLLECTION AND MANAGEMENT FOR PACIFIC ISLAND COASTAL FISHERIES AND AQUACULTURE**

1. Coastal fisheries and aquaculture regroup a large diversity of fisheries and farms, with various operating scales, commercial circuits and social impacts. Data is required by fisheries departments to monitor and manage these activities, and also by various local, regional and international organisations involved in the development, technical and financial support of specific activities for their implementation, evaluation of outcomes, and reporting to donors.
2. Contrary to oceanic fisheries, there is little commitment from countries to have an intensive coastal data collection program, and therefore surveys are often limited in scope, space and time due to insufficient allocated staffing and funding. Moreover, data collected is not always used to its full potential or publicised, leading to the perception that there is little data available on coastal fisheries and aquaculture in the Pacific.
3. This is not new and not specific to the Pacific. To improve the collection, management and use of coastal fisheries and aquaculture data we can adopt the same process that is proposed by NRC (2000) and FAO (2003). It starts with an assessment of the information needs and associated minimum dataset required. Then it prioritises the data collection so that it does not overlap with the efforts of others and maximises the use of data through data sharing and normalisation.
4. The standardisation of surveys, sampling designs, reference data and supporting tools are the key factors to ensure that the necessary data is collected, stored, analysed and disseminated in a timely manner.

### **Standardisation of survey methodology and sampling design to maximise outputs and improve data quality**

5. The multiplication of projects and parties seeking data for different purposes leads to a multitude of different surveys, forms and sampling designs which are not maximising the information and knowledge that can be extracted. Sometimes desired pieces of information are missing or data is not structured and normalised to allow extraction of the all desired outputs.
6. In the absence of an overview of information and outputs required by the various entities and with no standard forms and survey designs that cover the core needs, surveys are multiplied, sometimes overlapping and not optimizing effort. It can lead to survey fatigue on the part of the participants — which further reduces the benefits you can extract from data collected.
7. In addition, of the majority of data typically are entered in spreadsheets or non-normalised databases because databases can only be developed, maintained and supported by skilled database managers for standard forms. Spreadsheets are not as versatile as relational databases and don't allow the same possibilities in term of quality control. Importing data from spreadsheets into a database for example often requires a lot of cleaning and effort because of misspellings, spreadsheet cells containing several pieces of information such as value and unit etc. Exporting data from a relational database into a spreadsheet for analysis or reporting on the other hand is quick and easy.
8. The other aspect which is crucial for comparison and cross results is standardisation of reference data such as species names, geographic and administrative regions, boat and gear types etc.

9. No coding system will satisfy everybody and there are many reference databases that users might want to tap into or cross information with. It is important that the chosen reference table provides level of details sought (ideally the most detailed level) and allows for exports to whatever coding system required (possibly less detailed). For example FAO codes are detailed for pelagic species, but a single code might encompass a whole family for coastal fisheries (SNA for *Lutjanus* sp.) and would not be sufficient to discriminate species in a size frequency analysis or be particularly relevant for management purpose. If data can be recorded at the species level, it is better and still allows exports of aggregated information if necessary while the reverse is not possible. Using reference data with bridges and translation tables between coding systems is the best option when data is stored in a relational database.

## Data collection for coastal fisheries monitoring and management

10. So what data should be collected to support and improve coastal fisheries monitoring and management?
11. Fisheries management generally requires an assessment of the targeted stock in relation to its habitat and ecological context, the development and implementation of management measures and the monitoring of their impact on the resource and the livelihoods of dependent communities.
12. Assessing the status of marine resources is not an easy task and will always be subject to some level of uncertainty. Fishery-independent methods such as underwater assessments are often preferred by scientists as they are more replicable than fishery-dependent surveys (logbooks, creel surveys) for which changes in fishing habits (improvement of gears, new fishing locations), survey coverage or sampling strategy can make it harder to detect actual changes in the resource. However underwater assessments are logistically difficult, often expensive, typically not expansive enough and provide little information on the fishery itself. Moreover, such approaches can be significantly biased by differences in observer skill levels or species avoidance behaviours. In contrast, fishery-dependent surveys often require less logistics and allow for a larger coverage. They also provide information on catch levels and importance of the fishery, either directly (full coverage) or indirectly (carefully crafted extrapolation based on sampling design).
13. Socioeconomic household and fisher surveys assess the importance of specific fisheries for communities' livelihood, help determine food and income alternatives and evaluate the impact of management measures. Because of the diversity of possible questions, socioeconomic surveys are the most difficult to standardise. Yet there are core questions that are common to all surveys, and it is possible to add blocks of questions for specific fisheries. A tailored survey would comprise a core part and an optional choice of additional Standardised questions for specific fisheries.
14. Standardised survey methodologies and sampling designs for both fishery-independent and fishery-dependent methods have been developed and promoted for a long time by SPC fisheries scientists for key fisheries in the region and are supported by databases such as RFID, Creel and Market Surveys, TUFART. In addition, a minimum socioeconomic dataset has been proposed and is supported by the SEMCoS database.
15. A new system is currently in development for the monitoring of domestic and international trade in commercial species where demand is mostly externally driven (aquarium trade, sea cucumber, trochus etc.). The system aims, for sea cucumbers for example, among other

objectives, to ease the enforcement of total allowable catch through traceability of origin (managed fishing area).

16. This suite of tools seeks to cover the various types of information generally sought by fishery managers and provides standard survey methods that are supported by databases and a large range of outputs. Nevertheless, we would welcome suggestions if you have identified gaps that still need to be addressed and/or areas that would benefit from further development at the regional level.

## **Data collection for aquaculture**

17. Similarly to fisheries management, socioeconomic data is often required to assess the contribution of aquaculture to livelihoods, food security, employment and income. But a large part of data collection consists in gathering information about infrastructures (inventory of farms) and production by species in quantity and value of farms and hatcheries for FAO reporting. In addition, environmental and biological data is sometimes collected to better understand the factors that influence growth and survival rates of cultured organisms to improve production.
18. While fisheries management aims to ensure the sustainability of wild and shared resources, aquaculture facilities are often privately operated and farmers can be more reluctant to provide information if they don't understand what the information will be used for and how they will benefit, directly or indirectly, from providing good data. On the other hand, they are interested by information and tools that would ease the marketing and trade of the goods produced.
19. Ideally an aquaculture system would cover both the needs of the authorities and agencies that are seeking information to monitor and develop the sector, and the needs of the industry (this apply also to specific fisheries sectors such as aquarium trade).
20. At the moment SPC hasn't developed any standard database for aquaculture activities, but this a gap that we plan to fill in 2015–2016. The first step will consist in conducting an inventory of existing data collection, as well as monitoring and reporting needs of authorities, agencies and industry so that we can propose specifications for a regional standard. Once approved, we will develop forms and associated database, software and services.

## **Technologies are not a magic wand**

21. Surveys should not be driven by available technology (or absence of it); the best technology alone won't solve fisheries management in the Pacific. Fisheries management comes down to how information is collected, analysed and used and was implemented successfully at a number of locations prior to the advent of computers.
22. The new trendy technology is mobile apps (for phones and tablets) coupled with online databases. While enticing and perfectly viable for some applications that don't require much input from users and benefit from instant updates and mobile extra capabilities (GPS, camera), a phone or a tablet won't replace a desktop with a keyboard and a mouse when it comes to lengthy data entry. Such systems also require more data validation and data can be possibly more biased if the information providers are not trained enough or are not representative of the population.
23. New developments at SPC will use some of the newly available technologies but only when deemed a good fit. The core mandate remains: what data is needed and for which purpose;

and survey design and survey methodology will be chosen to best address the questions at hand.

## Conclusion

24. Improvement of coastal fisheries and aquaculture data collection for management in the Pacific requires an in-depth reflection of what information is needed and for what purpose(s) and how it can be obtained in the most cost-effective way. Standardised surveys and associated tools have been designed to help this process along and ensure that data collected will produce the maximum outputs possible. Some gaps have been identified and will be filled during the next two years with the involvement of member countries so that we ensure that tools developed and choices of technologies fit the core needs of fisheries and aquaculture managers.

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