Fisheries statistics

Students fishing for information

Small-scale fisheries and fishing communities in developing countries could benefit from involving students in the collection of fisheries data

In many developing countries endowed with plentiful living marine resources, fisheries of several types are found competing for attention from the managing authorities, while stocks are stagnant or dwindling under increasing fishing pressure. As a general rule, commercial offshore fisheries, generating hard currency cash revenues for developing coastal States (mostly in the form of foreign fleet access fees) are given priority over inshore small-scale fisheries. Fisheries administrations facing shortages in human and financial resources generally prioritize the management of offshore resources, to the detriment of inshore resources. This almost invariably leads to a situation where authorities, central or decentralized, do not manage to effectively monitor small-scale fisheries. The grasp on data and information from these fisheries being weak, transparent or efficient management of the resources remains elusive, if not impossible.

Yet, it can only be reiterated that small-scale fisheries play central and vital roles in the lives of coastal communities on a global scale, both in terms of food security and socioeconomics. It is hence critically important for these communities that ways be found, through which management of these fisheries becomes a reality—ways that recognize that basic data or information embodies the starting point for coherent management attempts, and ways that address the inherent and omnipresent constraints linked to data collection within resource-deficient institutional frameworks.

There are vast numbers of youngsters in fishing communities worldwide, eager to learn about the aquatic resources their households are gaining sustenance from. It has also been recognized that there is a pressing need in many communities, that the young generation be sensitised towards, and taught about, the issues that threaten the sustained welfare of these resources, for example, overfishing and destructive fishing methods, to name but a couple.

The idea of raising awareness while collecting information unveils itself as a potentially valuable tool to start addressing small-scale fisheries monitoring, while involving the community, and transferring the sense of ownership and responsibility of the resources to the latter. To achieve this, it was conceived, in a Pacific Island case study, that a module of basic coastal and fisheries ecology be introduced into the science curriculum of schools in coastal communities, and that the students be taught about the various important aspects of coastal resource dynamics and the impacts of human interactions.

As an extension of the theoretical matter, students would collect household information on fishing gear assets, fishing activity and catches, record it in a logbook over a short period of time, and return it to the teacher. The collected information would be evaluated, pooled, fed into a database, and eventually yield a range of indicators describing the fishery in a given geographical area. The indicators obtained in this way are useful to underpin the teaching in class by visualizing the local situation, and, over time, the same indicators yield trends which are central to found the management of the fisheries resources upon.

Study done

In 1999, the FAO Sub-Regional Office in Samoa, in conjunction with the AusAID Village Fisheries Project and the Samoan Fisheries Department, carried out a study

to explore and document the potential of involving secondary school students in the collection of subsistence fishery data. The study was carried out with the view to detect problems with, and strengths of, the method, and to recommend lines of operation, should the method prove to be useful and practicable.

A coastal community spread across a dozen villages along the East Coast of Samoa's main island, Upolu, was chosen as the study area. There is only one secondary school in this district, with students attending from the villages around. Materials were prepared for the science teachers and the students alike. Teaching support materials included background reading on reef ecology and associated subsistence fisheries, and the solutions to the exercise book handed to the students. The students were provided with a booklet explaining South Pacific fisheries, an exercise book aiming at understanding the logbook, and a logbook (covering a seven-day week) into which to report household information and fishing specifics. Lecturing was left entirely to the discretion of the school.

In order to assess the quality of the information collected by the students, a household survey and a creel census were run in parallel in the same area over the same week. The Extension Division of the Fisheries Department carried out these two validating surveys. Both questionnaires mirrored the information to be recorded in the student logbook. All collected data were fed into a purpose-built Microsoft Access database, and were statistically evaluated using Microsoft Excel software. Eighty-three Samoan students, mostly between 15 and 17 years of age, participated in the study.

The overall outcome of the study, concerning the usefulness of the method and the quality of the student-collected data, was very positive. For certain types of indicators, very similar or even overlapping values were obtained between the validating household and creel surveys, and the student census. Data collected fall into two broad categories; the socioeconomic data and the capture data. Socioeconomic data included information on household size, main income, seafood consumption and fishing gear assets, while the capture data recorded information on catches with species names, mean lengths and detailed fishing trip information.

Poor match

Although most questions on socioeconomics were well answered (77 per cent rated satisfactory) and could be used for analysis, the data returned by the students matched poorly with the data recorded by the household survey. Students were consistent in reporting more fishing gear, higher per capita

consumption of canned seafood, more income earners per household, almost twice as many fishing households, etc.

The likeliest of reasons for these discrepancies is that the students did not embody a representative cross-section of their community, but arose from an economically advantaged stratum that can afford to keep its children in school at an advanced age, when they would otherwise be fit to take up duties in the running of family business (plantation work / fishing). Statistics to verify this assumption do not exist for rural Samoa, but existing statistics for neighbouring nations, Fiji and Tonga, support this idea. For this reason, it is suggested that age-related schooling statistics be consulted before designing a student census, and picking participating age groups.

A lot of returned questionnaires on daily catches and fishing trips were of poor quality (only 29 per cent rated satisfactory), and many could not be used for evaluation. This was mainly attributed to the relative complexity of the logbook sections recording catches and trips. In contrast to the socioeconomic data, though, the pool of questionnaires that were answered adequately returned results very much in line with the validating surveys. To name but a few indicators for illustration; the student census data established a CPUE of 2.35 kg per trip (n=23; s.e.=0.41), compared to 2.32 kg per trip (n=38; s.e.=0.2) obtained from the creel census data. The student census established an average trip duration of 2.77 hours (n=73; s.e.=0.16), compared to 2.88 hours (n=61; s.e.=0.16) obtained from the creel census. The student census estimated an average of 4.29 trips per household per week (n=17; s.e.=0.59), compared to 4.39 trips per household per week (n=342; s.e.=0.19) estimated from the household survey data. Furthermore, targeting of fishing areas, ranking of fishing gear used, diversity and relative distribution of species in the catch, etc. were all in close agreement between student census and validating surveys.

It has been found that the layout and complexity of the logbook are of central importance in this exercise. The logbook should come in a form that is visual and easy to understand. The questionnaires must use simple language, and the questions must be straightforward. The amount of returned, useable questionnaires, containing properly answered questions, is inversely proportional to the complexity of the logbook. If the logbook is too involved, asks for too much detail, or is too lengthy, chances are that no coherent use can be made of the returns.

The database to input the collected information into should be constructed in such a way that a validating data quality marker is attached to every single entry (for example, did your household fish today?) or set of related entries (for example, the catch record for a given day), as opposed to having only one quality marker attached to the entire logbook (that is, 'good job' - 'bad job').

The person encoding the data validates or discards the entries by inserting or omitting the related quality marker during data input into the database. It enables maximization of the use of good quality data for given entries or sets of entries, when data are regrouped and filtered during analysis. This is particularly important in situations where overall good quality returns are low, and where the same logbooks have been answered well in some parts, and poorly in others.

A well-designed student census can generate valuable fisheries data for local contexts on a regular basis (for example, year to year). The layout, simplicity and self-explanatory nature of the logbook determine the quality of the returns. Furthermore, simplicity and clarity play an important role in terms of costs.

Modest costs

A well-designed package, consisting of teaching aids, exercise materials and logbooks for a given school, plus the necessary manpower and computing power to handle the generated data, constitute the bulk of the costs to be incurred by the student census. Compared to classic fisheries surveys, expensive in terms of administration, logistics and manpower requirements, these costs should be quite modest, and decrease over time, since the designing of

the materials and the construction of the database is an upfront cost that is incurred only once.

The simplicity demanded by the logbook for the sake of data quality clearly limits the depth of analysis that can be performed on the collected data. The student census is thus limited to collecting rather simple types of fisheries information. Also, the scope for comparison of generated indicators with other studies, where data were collected in a controlled, classic manner, is questionable, since there is no direct way of guaranteeing or controlling nominal student data integrity as such.

Yet, errors inherent to the sampling process do not affect the usefulness of generated indicators for purposes of trend-line generation within the local context. This means that if a consistent source of error throws off an indicator by a certain amount, it still gives rise to a trend comparable to one arisen from data not suffering from the same source of error.

Errors only come to bear when nominal values from different areas, and collected in different ways are compared directly. For that reason, discrepancies this study detected between socioeconomic data collected by the students and the household survey become irrelevant, once such generated indicators are analyzed over time, and used to gauge the local context (while remaining limited to the local context).

The importance of involving youth in this line of work must be emphasized. This is a time in which community management and co-management of small-scale fisheries resources has been embraced as the right way forward by many, and where the feelings of community ownership and involvement have been recognized as the cornerstones for positive action and responsible resource exploitation.

To emulate a programme entailing youth monitoring and understanding fishing activity on their own shores, providing them with a sense that they are contributing substantially to sustainable resource exploitation and conservation, constitutes a useful and sound step towards community-based management of subsistence and artisanal fisheries.

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