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**1<sup>st</sup> SPC Heads of Fisheries Meeting**  
*(Noumea, New Caledonia, 9–13 August 1999)*

## Information Paper 22

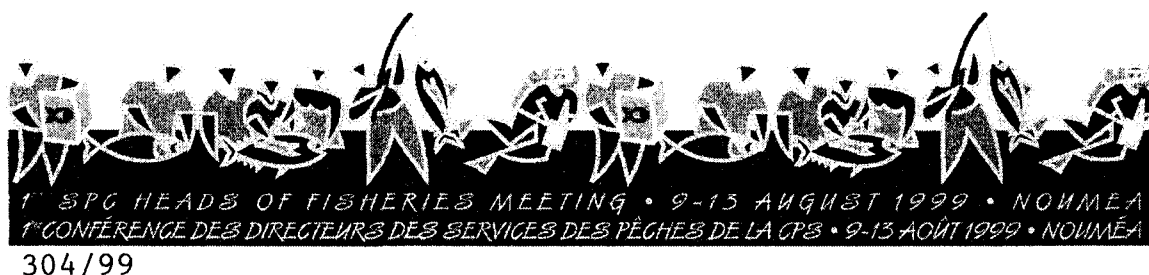
Original: English

# **The Involvement of Students in the Collection of Artisanal Fishery Data – A New Way Forward**

**Paper tabled at the MRAG Workshop on Aspects of Coastal Resource  
Management – Suva, Fiji, 30<sup>th</sup> June to 2<sup>nd</sup> July, 1999**

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304/99

## **The Involvement of Students in the Collection of Artisanal Fishery Data - A New Way Forward**

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### **Abstract**

Traditional subsistence and artisanal fisheries provide sustenance, employment and income to vast numbers of Pacific islanders, and are of great importance to national economies and food security. The pervasive lack of subsistence fisheries data across the region and the worrying number of accounts of collapsing stocks and species extinctions are of growing concern to authorities involved in the management of coastal fishery resources.

The author explores new grounds on how to overcome two fundamental hurdles for the successful management of subsistence fisheries. It is argued that under a scenario of increasing fishing pressures and changing societies, basic data to found management decisions upon, and awareness of the new generation towards the vulnerability of their resources are fundamental.

The proposed way of achieving both is through the "Artisanal Fisheries Student Census". Secondary schools integrate an assignment into their science curriculum, within the framework of which students get lectured on coastal resources and fisheries, and then record their household's fishing activity over a short period of time. The collected data flow back to competent authorities who analyse them and make them available for fisheries management purposes. The paper describes in some detail key considerations for the successful implementation of such a programme.

### **Introduction**

The terms subsistence fisheries and artisanal fisheries are not readily separated. They generally exploit the same resources of the coastal environment. They are also sometimes referred to as coral reef fisheries. While the adjectives *subsistence* and *artisanal* generally hint at the fate of the catch in how it is intended to be used (eaten/sold), *coral reef* describes the environment the fishery exploits. For matters of simplicity, the term to be used in this paper is *artisanal fisheries*, and stands for small-scale, capital extensive, community based fishery, exploiting coastal marine resources. The use of the catch and the exact coastal ecosystem the catch was taken from is of no direct importance in the context of the following discussion.

### **Background**

The case of the importance of artisanal fisheries in the Pacific has been made time and time again. Artisanal fisheries are an important part of the cultural heritage of the people of the Pacific islands, and provide large sectors of the populations with daily sustenance, labour and basic income. Some of the highest consumption rates of seafood world-wide are reported from the Pacific islands, and artisanal fisheries are crucial to national food security and economic welfare.

Yet many coastal ecosystems are not performing very well, overfishing is increasingly becoming a problem, and accounts of collapsing, traditionally exploited stocks and local species extinctions are becoming legion [3] [5] [9] [10] [14]. Reasons, ranging from natural disasters all the way to central authorities failing to deliver sound management of the resources have been invoked. The bottomline being that there is growing cause for concern.

A striking element against this background of sounding alarm bells is the pervasive lack of quantifiable information to describe the current situations, and to compare them with what these were, ten, thirty or fifty years ago. Sound time series of fishing pressures, yields, biological parameters of exploited species and the like do hardly exist in the Pacific. Historical or "equilibrium" exploitation levels are mostly inferred from local knowledge and accounts, and scientific estimates [6]. Independent Pacific Nations who have carried out more than one comprehensive national artisanal fisheries census are few.

For the obvious reason of lacking coastal fisheries data, because of a lacking overall picture of resource performance and exploitation, discrete management and conservation moves in the Pacific often end up being catastrophe driven, and occur at points in time when an exploited species becomes so rare as to face the threat of local extinction [3] [9]. The information such actions are based upon is of the toggle-switch type (e.g. there are clams / there are no more clams). Action is remedial in nature, rather than managerial and conservationist.

For reasons of financial and manpower constraints, intensive data collection along modern fisheries science standards is unpracticable in the Pacific context [5] [8]. Governments simply cannot afford the studies, so that the usefulness of modern fisheries science as the foundation to artisanal fisheries management in the Pacific is being openly questioned [6].

However, in a setting of growing populations posing higher demands on the limited natural resources they gain their sustenance from [11], in a setting of new and more efficient fishing gear introductions [14], in a setting of arising urban fish markets and cash-intensive international markets for live reef fish and aquarium species, modern and traditional management systems alike, including those which are reported to have been successful in the past, are confronted to the challenge of change [4]. Confronting these pressures blindfolded, i.e. without access to basic resource information, is not a good idea.

### **Confronting change: A case for data and for awareness**

The fact that scientists and sociologists have not yet managed to devise a system to collect meaningful artisanal fisheries data in a sustainable and timely manner in the Pacific, should not deter us from searching for new ways of eventually succeeding. The question to ask is not "*Should we keep trying at all?*", but rather "*How can we make it work and what kind of data can we get?*".

Data are crucial in obtaining a picture of what a resource looks like and how it evolves [1] [5]. Management decisions based on trends obtained from the analysis of time series are achieved with a higher degree of comfort. Data allow us to "measure", what management decisions achieve over time, and allow for adjustments to be made. Without resource information, no matter in which form it comes, monitoring and evaluation of adopted management regimes is very difficult and highly subjective [12]. In the same line of thought, it is not important whether the management systems we are looking at be traditional or modern.

Fishing communities world-wide have proven skills in fooling themselves, when it comes to explaining why the fish they want to catch are gone, or why the fish they used to catch were twice as large. Explanations for reduced catches are colourful and can range from cyclones having hit the shores thirty years ago [7], all the way to the firm belief, that the targeted fish are still there, but that they have become so clever they can't be caught anymore. Rarely do we hear accounts of fishing communities blaming themselves for overfishing stocks and jeopardising the resource base through the use of destructive fishing methods. One invoked reason for this is the rapid loss of traditional knowledge within rural communities (as a function of change and modernisation) [13], and a concomitant limited understanding of resource dynamics and the impacts of interactions.

For decades, authors have pointed out the need for awareness raising within the young generation, in order to help them to an understanding of the importance, the value, the natural dynamics and the vulnerability of their coastal resources, which one day will be for them to

exploit and to sustain [13]. Without this fundamental understanding, and the adopted sense that the exploitation of the coastal resources is not only a privilege, lest a God given right, but goes hand in hand with duties and responsibilities towards these same resources, there will be no easy way to management, whether it be community or government based.

How to raise awareness? Communities can be approached through the media, the churches, the village councils, the schools, etc., and there are various levels within a community which can be targeted. Cultural implications invariably play an important role in this type of considerations, and must be carefully assessed. Options are plenty. When it comes to matters of education, the social group which generally displays most potential for absorption and for change, and the institution which has most potential for delivery of the message are generally the young and the schools they visit.

### **The Idea of the Artisanal Fisheries Student Census**

The idea to work with students to collect fisheries data is not a new one [2] [15], and is inherently simple and straight forward. The Artisanal Fisheries Student Census (AFSC) is conceived as a partnership programme between the Department of Fisheries and the national education sector, and resides firmly on participatory principles. In a nutshell, the AFSC operates as follows: The Fisheries Department prepares a range of materials ( log books, teaching support material, workbooks) for a secondary school which participates in the programme. Students from that school log information in their households on fishing activity, bring it back to their school, where it is pooled and sent off to the Fisheries Department, which seeks the information. There, the data are fed into a database, get analysed and stored, and can henceforth be used for fisheries management purposes. The achievements of an operative AFSC are twofold; 1) artisanal fisheries data are generated and 2) awareness for the coastal resources is raised among the young of the fishing communities.

For a process looking this simple, there are numerous hidden mistakes to be made which will make the effort fail. The following points have to be taken into account in order to guarantee the success of the AFSC;

#### **1) Keeping it simple and cheap**

Classic fisheries surveys are very expensive and demand a large number of trained fisheries personnel. The simple layout of the AFSC is such as to overcome these drawbacks and to generate time series of artisanal fisheries data.

In order to achieve the required simplicity, and maintain it over time, the whole AFSC programme has to be kept rational at all levels. Student logs have to be kept as simple and short as possible. Generating too much data entails manpower time for data input which might not be available. Data to be collected have to be simple and serve a specific analytical cause (e.g. time spent at sea + no. of fish caught = CPUE). There is no scope for complicated data and sophistication. The student log, in all its apparent simplicity, has to undergo a thorough streamlining exercise in order to achieve optimum output for minimal input. Also, and most importantly, the simpler the log, the higher the chances of "good quality" data return from the students.

It is one of the characteristics of modern fisheries scientists to be curious and to ask for more and more refined data, in order to feed increasingly complex analytical fishery models. This approach is not sustainable within the context of Pacific artisanal fisheries, and although justified through the inherent biological complexity of the exploited ecosystems, the "*curiosity-trap*" should not be re-activated with the AFSC. It must be actively avoided. The AFSC can generate data, but it is a method which is very clearly limited to simple data, for reasons of both data quality assurance and cost.

## 2) Clearly perceived interests

In order for the workload to be handled successfully and achieve good results, the partners involved in the AFSC programme need a clear vision of their interests. Within the AFSC framework, the involved partners are individual schools and the Fisheries Department.

- *The Fisheries Department*

The interest of the Fisheries Department rests focused in one point, the collection of artisanal fisheries data on a permanent basis. An easy mistake is to only recognise this prime interest, since it lies at the source of the activity as a whole. In order to guarantee the "ongoing" element of the AFSC programme, it is also in the interest of the Fisheries Department to foster good relationships with the participating schools, recognise their interests, and ensure that the commitments by the Fisheries Department towards participating schools are upheld. Failing to do so would entail loss of interest, and henceforth loss of cooperation from participating schools.

- *The participating school*

The interest of the participating school is less focused than it is for the Fisheries Department. Schools integrate the AFSC as an assignment into their science curriculum. The assignment should be preceded by a number of lectures on local coastal resources and their associated fisheries, in order to guarantee the full understanding of the subject by the students. In the ideal case, some of the teaching support material is provided in appropriate format by the Department of Fisheries (handouts, posters, etc.). By doing so, an item of local and practical interest is introduced into the classroom, "tailor made" and provided at no cost from outside the school.

Through understanding the purpose and the importance of the AFSC, through the availability and contemplation of previously collected information in the area, and their direct involvement, students are encouraged to develop a sense of ownership and responsibility towards these resources. They see themselves and their school getting involved in constructive community work, all of which is instrumental in bringing about a positive learning experience, which in turn benefits the school.

## 3) A demand based approach

It is the author's belief, that in a scenario where interests are clear and clearly perceived by the involved parties, a demand based system for cooperation has most potential for success. Partners engage in the activity at their own free will, and actively pursue their own interests by doing so. In the case of the AFSC, this means that a school who wishes to participate, approaches the Department of Fisheries, and asks to become a cooperating school under the AFSC programme.

To this effect, the Fisheries Department has to advertise the AFSC programme publicly, by working through the media and/or the Department of Education, or by directly approaching schools and teachers. The "marketing skills" of the Fisheries Department so become an ingredient at the onset of the programme, which will somehow command the speed at which the programme will take off. Once the scheme gets going, it is geared to develop a momentum of its own, which requires minimal tendering. This point is important again in keeping costs down.

### **Operational steps of the Artisanal Fisheries Student Census**

In order to keep the AFSC programme simple, cheap and flowing, tasks have got to be clearly allocated between the Fisheries Department and the participating schools, and be well planned ahead of time. The best planning framework implemented by the Fisheries Department for the purpose of the AFSC programme is probably one which embraces the

official timetable of the national education system, usually subdivided into, terms or semesters.

It is also estimated, that within the Fisheries Department one person should and can be in charge of the entire AFSC programme. The main duties include planning and communication with participating schools, the dispatching and collecting of materials and data handling (input).

The following flow chart (fig.1.) diagrammatically represents the discrete steps involved in one cycle of the AFSC programme, leading to the collection of data from one school.

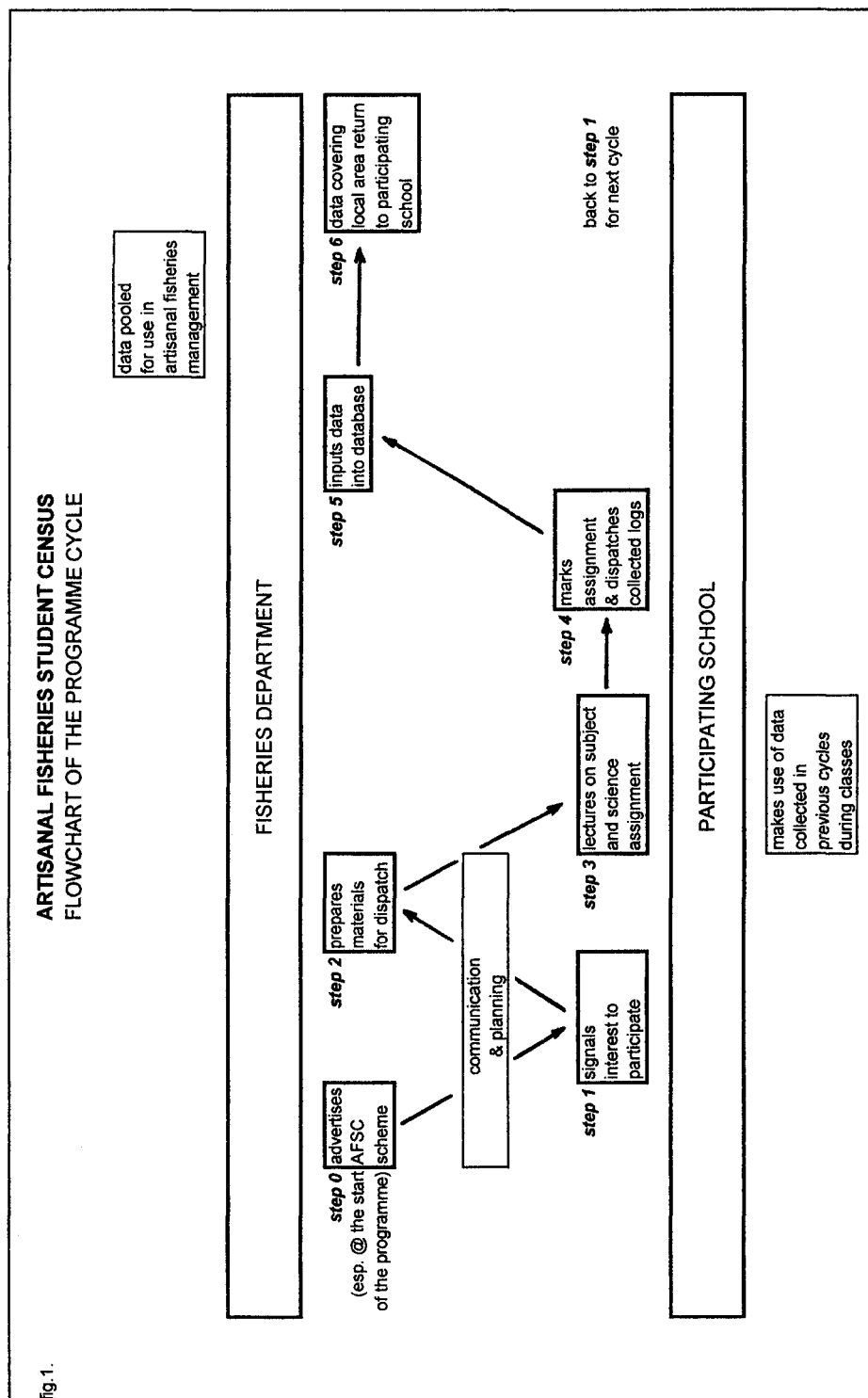


fig. 1.

## **The student log book and the data to collect**

The student log book, which is produced by the Fisheries Department and dispatched to participating schools, is the heart piece of the AFSC. It is in the student log book where the data get recorded onto daily log sheets. Its design, layout and appeal will be commanding factors for the quality of data returned. In previous trials, students logged information on household fishing activities for one entire week (Monday - Sunday).

It is suggested that the student log book be sub-divided into three distinct parts; 1) the guidelines, 2) a one page questionnaire on student identity, village, and household fishing gear assets and 3) a series of single page log sheets to record household fishing activity (one single page per day). The exact make-up of the student log book will vary from country to country, and will depend on the characteristics of the fisheries it tries to collect data from. The following points describe the suggested general design of the student log book.

### **1) The guidelines**

The fisheries department has no direct control over the number and content of lectures that the students get on the subject matter, nor on the provided explanations on how to use and fill out the log book. For this reason, a summary of simple guidelines on how to log the data should be printed at the beginning of the log book. If a student is not sure about how to go about the task, he/she can revert to the guidelines at the front of the logbook to seek clarification.

Should the log sheets ask for the measurements of fished species, then the guidelines should also contain figures of the range of species expected to be reported, and the way they are meant to be measured.

In order to guarantee best understanding of the log book and the involved tasks, the Fisheries Department can also provide the participating schools with a "Student Workbook", containing a range of training exercises specific to the task of handling the log book.

### **2) The first questionnaire: student identity, village, household and fishing gear assets**

The questions on this page are filled in once, and are of socio-economic nature. Questions covering the following topics can be found on this page;

- length of village coastline
- no. of households in village
- no. of people in household
- list of fishing gear owned by household
- use of the catch (eat/sell)
- amount of fish consumed (buy/catch)

From data of this type it is possible to compute general indicators for fishing intensity, as well as analyse some important economical aspects related to rural consumption patterns, sale and purchase of seafood. Some of the information might be available from other sources (e.g. national population census). If such is the case, the questions should not be repeated in the questionnaire in order to keep data handling workload as low as possible.

### **3) The daily single page log sheets**

For every single day the assignment lasts, one of these sheets is filled out by the student, recording the fishing activity by the members of his/her household. Questions asking for specific information on the household fishing activity of the day and outcome are found on these pages, and can include the following;

- no. people who fished

- no. of fishing trips
- trip duration
- fishing gear used
- catch table (name of species/no. caught/mean length)

From such a small amount of daily data, quite a few indicators can be inferred from. These include species diversity in the catch, mean length of caught species, mean length and mean catch of fishing trips, gear efficiency, gear preference, catch per unit effort, mean household fishing effort, etc. These are all indicators which become of great value to fisheries managers, once they have been collected over a reasonable period of time, and start yielding meaningful trends.

## Discussion

The access to time series of fisheries data is of great value as a foundation to management regimes in any kind of fishery. The coincident lack of data and growing need for resource management should induce scientists to look for ways of generating the necessary information. In situations where data collection as a sustained effort has consistently failed, it should be possible to take advantage of the mistakes, by learning from them. The Artisanal Fisheries Student Census is such an effort, which recognises the reasons for previous failures, and tries to overcome these problems by actively avoiding them through the design of a new method.

It is hoped that the Artisanal Fisheries Student Census, which currently stands as a theoretical construction, will find use and implementation in the Pacific region. In order to have the theory substantiating into practical lessons, the FAO Sub-regional Office for the Pacific Islands, in conjunction with the Fisheries Division of Samoa, is currently executing a project which analyses the potentials of the method in the field, aiming specifically at testing the quality of returned data that an active AFSC programme generates. Hopefully, the lessons drawn from that project and the ones to follow will bring Pacific nations a step closer to eventually achieving sustained artisanal fisheries data collection, and contribute to a brighter outlook for the future management of the coastal resources in the Pacific.

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