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Improving the usage of fisheries statistics in Vietnam for production planning, fisheries management and nature conservation

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Abstract

The organisation of a fisheries statistical system dictates the potential usage of its information output. Information is used for planning of food production (fish as a commodity), for fisheries management (fish as a renewable natural resource), and for nature conservation (fish as an indicator for ecosystem quality). In this sequence, the required temporal, spatial and categorical resolution of data increases, while aggregation into meaningful ecological spaces requires a subtle way of organising the data flow. The effective usage of the present fisheries information of Vietnam is constrained by (1) its low categorical resolution and (2) the non-transparent aggregation of data into mere administrative spaces. Information requirements can be better articulated with the instalment of mandatory evaluation procedures at all levels in the fisheries administration. Our examples range from the national administration of the 4 million ton marine fisheries in Hanoi, to the local administration of a fishing commune in the Red River Delta.

Keywords: Categorical, temporal and spatial resolution; Aggregation; Monitoring; Information requirements; Evaluation

1. Introduction

> "Statistics is like counting crabs in holes" (Vietnamese expression)

Management of fisheries and marine coastal resources cannot be effective without reliable information on ecosystem changes and the causes of those changes. Robust fisheries and environmental monitoring systems are indispensable to address questions regarding long-term changes in the coastal ecosystem and regarding impacts both of fishing and of other human activities in the coastal zone [1]. Whereas information needs for fisheries management generally dictate short-term annual input of information for decision making, long-term biological information is needed to differentiate between natural and human-induced changes in fish stocks and ecosystems and to take action accordingly [2]. In many parts of the world, the main supply of such information is through monitoring of fisheries input (fishing effort) and output (catch), i.e. through fishery-dependent monitoring. Fishery-independent monitoring through experimental surveys is difficult to maintain by developing nations, as they are expensive and often cannot generate the amount of data needed for the evaluation of states or changes, especially not in the highly diverse tropical coastal and marine environments. Long-term monitoring of fish stocks, therefore, is almost by necessity dependent on information obtained through the fisheries exploiting them and with that on the official fisheries statistical system in use.

Fishery-dependent monitoring entails at least the collection of three essential parameters in fisheries statistics: catch (C), fishing effort (f) and catch-rate (C/f) (Appendix A). Catch and Effort Data Collection Systems (CEDRS) maintained to address information needs for fishery management vary in their degree of administrative and statistical sophistication [3]. Over the past few decades, the methodological core of fisheries monitoring programmes—sampling strategies, data collection and in recent times also data storage and handling—has been consistently addressed in institutional assistance and in capacity building in fisheries

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management by developing nations. Much less attention was given to the better usage of monitoring information by improving the evaluative capacity of the fisheries administration. In capacity building in fisheries management and research so far, the focus was on data-intensive methods for fish stock assessments, using information on stock structure, on age-specific growth and mortality rates and on catch and effort data. For that purpose, time series of high-quality data are needed. Such series are often difficult to maintain because of the high costs involved in data collection procedures, the institutional set-up and in the maintenance of the knowledge base. The required precision in data collection shows the inefficiencies of the present systems more clearly, leading to frustrations over the applicability of knowledge contained in standard but very analytic fisheries science. The answer to such inefficiencies may not be just 'more data'. Instead, the answer may lie in the development of management practices that maximise the use of the existing data, information and knowledge on catch and fishing effort and in the improvement of the capacity of an administration to evaluate such information. This presumes an organisational set-up in which it is possible to develop the diagnostic powers [1] needed to turn the information contained in the monitoring data into a growing body of knowledge.

In this paper, we will categorise the usage of fisheries statistics in the domains of food production, fisheries management and nature conservation. We identify the differences in data resolution and aggregation required in these domains. Next we examine the fisheries data in the statistical system of Vietnam as available at various administrative levels—from landings per harbour to the national production of marine fish—to assess how well the data collected and processed in the system can be turned into information needed for decision making in these domains. After having identified the major constraints in the generation of information, we suggest improvements to be made in the countrywide fisheries administration.

2. Categorising the usage of fisheries information

The organisation of a fisheries statistical data collection system dictates the potential use of the information it produces. We distinguish three domains of usage: for production planning purposes (fish as a commodity), for fisheries management (fish as a renewable resource), and for nature conservation and environmental impact assessment (fish as an indicator for ecosystem quality) (Table 1). Each of these domains is ultimately related to management objectives [4, p. 230], which can be generalised with the slogans: "Feed the people", "Set levels of resource usage" and "Retain the integrity of nature". These three objectives, which often conflict while they may represent three different 'world views' [5], relate to different information requirements to evaluate whether these objectives are reached.

Differences in information requirements associate with differences in categorical, temporal and spatial resolution in catch (C), fishing effort (f) and catch per unit of effort (C/f) data [6] (Fig. 2). The resolution of data gathered by a CEDRS depends mostly on sampling considerations and is thus constrained by the financial capabilities of the organisation (Appendix A). Requirements with respect to temporal resolution in fisheries data are the least problematic: catch and fishing effort usually are needed as annual totals or averages. Higher resolutions (quarterly, seasonally, weekly) are sometimes necessary, for instance, when regulatory action on effort allocation through fishery closures (temporal or spatial) has to be justified. Spatial resolution is much more important and demanding, both in fisheries management and in nature conservation (Table 2). In fisheries management, sufficient spatial resolution is necessary to determine the effects of the spatial allocation of fishing effort on stocks, confined to particular ecological spaces. Issues in environmental management entail habitat structure, species diversity, and trophic composition; all spatially defined ecosystem properties which require that indicators obtained through fishery-dependent information should be unequivocally related to fishing grounds. Categorical resolution in fisheries data refers to the number of catch categories distinguished on either taxonomic (species, genera, families), ecological (habitat, trophic groups, migration) or other grounds as required for fisheries management. This is usually limited to single species of economic value—abundant or highly valued species to which a fishery is directed. Information criteria refer to biologically acceptable, economically efficient and socially beneficial harvest levels of important species, for which suites of reference points have been constructed [7]. For nature conservation, all fish species or subsets of ecologically highly-valued species and relations between them become important. Information criteria refer to biological diversity, viability of ecologically important non-resource fish species, annual variation in catch of non-target species [8,9]. Everything calls for a high categorical resolution of data on catch and fishing effort, to ensure the early warning and early control functions [1][1] of fisheries monitoring systems. Therefore, categorical information requirements for nature conservation purposes are highest and not necessarily

[1] The basic functions of environmental monitoring systems are 'early control'—judging causal connections between measures and effects, and 'early warning'—testing of main categories of possible effects, for example, through scenario studies.