

Chapter 12

Time Series Database Analysis on Fishery in Greece

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ABSTRACT

Statistical institutions collect and store multi-aspect fishery data in databases, but do not provide any on-line processing. Extraction and processing of datasets through known statistical software are not sufficient in case an in-depth data analysis is needed. The developed Information Platform consists of a multidimensional database storing spatial fishery time series in Greece and software modules comprising known statistical and original data mining procedures. The platform provides the capability to find out temporal and spatial features of fishery processes and analyzes sustainability, fish species at biological risk, biodiversity, seasonality and relations among them. This solution supports researchers in the fields of marine biology and ecology to study changes in fish communities and marine ecosystems and facilitates experts and managers to take decisions concerning fish resources exploitation and preservation. The presented approach can be also applied on fishery time series of other fish regions, for example in Black Sea.

INTRODUCTION

The first level of scientific concepts on fishery analysis includes collecting and storing reliable spatial and temporal datasets on the state of living stocks and economic activities. The second transforms datasets into meaningful information and knowledge, aiming at highlighting processes and their specific characteristics in the field. The third one provides the ability to use information

and knowledge for developing innovative solutions of environmental issues on fish resources with considerations of economics and society (Zalewski, 2011).

This book chapter presents time series database analysis on fishery in Greece by developing and using the information platform corresponding to the second and particularly the third level of scientific concepts.

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The following two reasons comprise a motivation for the development and application of information platform on fishery in Greece:

1. Usually, statistical institutions of all countries collect and store multi-aspect statistical fishery data in databases but do not provide any on-line processing and
2. For deriving useful information and knowledge according to economical activities and natural processes regarding fish resources, in-depth spatial and temporal analyses of fishery data are required.

The basic objectives of this book chapter are as follows:

- To reveal the development and basic functions of information platform on fishery analysis, which integrates the multidimensional time series database and software modules containing known statistical and original data mining procedures;
- To show the implementation of the information platform on multi-aspect spatial and temporal fishery data of Greece;
- To illustrate the software application in order to carry out specific analyses for fishery sustainability, fish species at risk, biodiversity and seasonality, as well as find out the relations among them. Besides, the obtained analytical information can be used for taking decisions on environmental, economic and social problems.

BACKGROUND

Statistical institutions at international and governmental level study economical, social and natural processes yearly on the base of the following three criteria (Economic Commission for Europe of the United Nations, 2000):

1. Legislation, accounting, or organizational;
2. Geographical and
3. Activity.

Many indicators such as quantities, values, prices, population and many others are statistically accounted by countries, areas, towns etc. The obligations of statistical institutions are mainly to collect data and estimate statistical aggregates. Collected data is usually multi aspect, spatial and temporal, and stored in large scale databases. In principle statistical institutions provide database querying by their Web sites, but not a detailed on-line processing. Therefore, the work of scientists and experts in statistical institutions is not oriented to a deep scientific data analysis needed in decision-making, management and business activities in different branches. As a result, in many cases they simply extract small datasets and process them by known statistical software. This approach is not sufficient for an in-depth data analysis. Besides, there is lack of a system approach and the issue of comprehensive data analysis becomes more apparent when the relationships between data are part of the analysis. Consequently, large scale databases of statistical institutions are only considered as a reliable source of spatial and temporal data on many different fields of human activities and interests.

The above mentioned weaknesses are detected in the National Statistical Service of Greece (NSSG) or HELSTAT (Hellenic Statistical Authority). NSSG is an authorized institution responsible for collecting, storing and publishing data from different branches. In this frame it is responsible for marine fishery statistics and the related database. Every year NSSG publishes the “Results of the sea fishery survey by motor vessels” bulletin, which contains analytical data for marine fishery. Since January 1964 it has been conducting a monthly survey of marine fishery. Primary data for each fishing vessel, independently, is collected by a monthly non-electronic statistical

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