Second International Symposium on GIS/Spatial Analyses in Fishery and Aquatic Sciences

India with drainage

The Western Ghat region

The North-Eastern region

Fish Occurrence Points

The fish occurrence points mapped over different geographic and political regions of India (SRIVASTAVA et al, page 55)

Volume 2 ABSTRACTS

Predicted orange roughy grounds off south-eastern Australia. Red indicates a high likelihood scaling to yellow with a low likelihood, land is green/brown, water is blue. (BARRATT et al, page 51)

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Fishery/Aquatic GIS Research Group (2002)

GIS mapping of marine species feeding grounds through analysis of satellite imagery

Vasilis VALAVANIS[1], Argiris KAPANTAGAKIS[2], Stratis GEOGRAKARAKOS[3], Isidora KATARA[4] and Andreas PALIALEXIS[5]
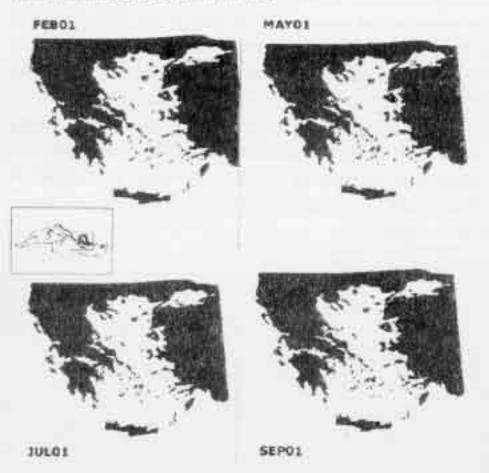
1/-2/	Senior Researchers, Institute of Marine Biology of Crete, Iraklion, 71003 Greece
3/	Assistant Professor, University of Aegean, Mytelene, 81100 Greece
4/-5/	Senior Undergraduate Students, University of Crete, Iraklion, 71409 Greece

The objective of this work is to introduce a GIS methodology for the mapping of coastal and offshore feeding grounds as these are derived from anomalies in distribution and concentration of sea surface temperature (SST) and chlorophyll (CHL), respectively. Climatologies for these parameters are calculated for SE Mediterranean from two time-series of satellite imagery (AVHRR/SST 1993-2001 and SeaWiFS/CHL 1997-2001), which are processed in an ARC/INFO GIS environment. Environmental anomalies are calculated on a monthly basis for the period January 1998-December 2001. Mapped areas between the two datasets, which commonly describe above-average CHL and below-average SST anomalies, calculated the derived feeding grounds. The methodology includes processing of image data to grid data, transformation of grid data to vector data and a series of vector integrations between the two environmental datasets.

The proposed methodology for mapping marine feeding grounds applies to feeding habits of many marine species, especially those of small pelagic fish (anchovy and sardine) and pelagic cephalopods (long-finned and short-finned squids). Results from the GIS analysis (including a series of 48 images) are compared to surveyed fisheries catch data for small pelagic fish and cephalopods as well as to officially mapped areas of fishing fleet activity in SE Mediterranean. The testing reveals known fishing activity areas and introduces alternative fishing grounds, which may be used as spatial measures in contributing to the resolution of the problem of managing over-fished areas.

GIS Map 43(1). Derived fishing grounds (in gray) in selected months of 2001 in SE Mediterranean.

1/ vasilis@imbc.gr 2/ akap@imbc.gr 3/ stratisg@aegean.gr 4/ isidora10@yahoo.com 5/ andreaspal@pathfinder.gr

Analysis of fisheries catch data in relation to temperature anomalies in SE Mediterranean using GIS

Argiris KAPANTAGAKIS[1], Vasilis VALAVANIS[2], Stratis GEOGRAKARAKOS[3], Andreas PALIALEXIS[4] and Isidora KATARA[5]

1/-2/ Senior Researchers, Institute of Marine Biology of Crete, Iraklion, 71003 Greece
3/   Assistant Professor, University of Aegean, Mytelene, 81100 Greece
4/-5/ Senior Undergraduate Students, University of Crete, Iraklion, 71409 Greece

Environmental anomalies in the distribution of sea surface temperature (SST) are compared with surveyed fisheries catch data for four pelagic species in SE Mediterranean: European sardine (Sardina pilchardus Walbaum, 1792), European anchovy (Engraulis encrasicolus Linnaeus, 1758), long-finned squid (Loligo vulgaris Lamarck, 1798), and short-finned squid (Illex coindetii Verany, 1839). The comparison aims to identify what percentage of each species' catch is associated with SST anomalies, which are a strong indication of persistent front and/or upwelling processes that result to accumulation and increase in chlorophyll concentration. Environmental anomalies are extracted by a time-series of monthly AVHRR SST images (1993-2001) while species catch are officially sampled on a monthly basis through a network of 25 observing stations scattered in the Aegean and Ionian Seas (SE Mediterranean). Both datasets are processed in an ARC/INFO GIS environment. The time frame of the study includes approximately three fishing seasons (January 1998 to September 2001).

Catch data distribution is organized in statistical rectangles of 60x30km. It is assumed that catch data are associated to SST anomalies when both following conditions are met: a) the spatial extent of the anomaly occupies more than 50% of the area in a statistical rectangle and b) at least 50% of anomaly's spatial boundary falls inside a statistical rectangle. Results show that an average 62.4% of sardine catch, 62.7% of anchovy catch, 62.6% of long-finned squid catch, and 55.5% of short-finned squid catch are associated with SST anomalies during the study period. In addition, results show several areas where the spatial association between SST anomalies and fisheries catch data more often appears, a spatial measure that may be used for species population management and fisheries forecasting purposes.

GIS Map 43(2). Sardine catch areas (red) on SST anomalies (green) for May 2000 in SE Mediterranean Sea.

1/ akap@imbc.gr 2/ vasilis@imbc.gr 3/ stratisg@aegean.gr 4/ andreaspal@pathfinder.gr 5/ isidora10@yahoo.com