

DEMERSAL ICHTHYOFAUNA OF THE CENTRAL AEGEAN SEA: DECLINING TRENDS IN SPECIES RICHNESS

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Abstract

Data collected from 462 commercial bottom trawl hauls in the central Aegean Sea, during 1995-2006, indicated that species richness of the local ichthyofauna has significantly decreased. It is most likely that while the fishery was driven by the most resilient target species, at the same time it had a dramatic effect on numerous other less robust species. Our findings identified certain warning signs reflecting ecosystem degradation and further study through longer monitoring will contribute to the clarification of trends.

Keywords: Aegean Sea, Biodiversity, Fisheries

Introduction

The bottom trawl fishery represents some 20% of the total marine production in Greece with almost 45% of the catch being usually discarded at sea [1]. In order to estimate the long-term impact of commercial fishing on the ichthyofauna diversity of the central Aegean Sea, 462 records of bottom trawl hauls were collected on board commercial vessels between 1995 and 2006 (2001-2002 excluded).

Material and Methods

Fish species identification was done on board by trained scientific personnel, who did not interfere with the normal fishing practices of the crew. An annual biodiversity index was constructed by calculating the number of species by year, in 1000 repetitions of randomly selected predefined number of hauls, so that to exclude spatial and effort effect in the biodiversity trend [2]. The annual trend was then expressed by the slope of a linear regression when regressing number of species upon year.

Results and Discussion

Overall, a total of 171 species were recorded (138 bony and 33 cartilaginous fish), belonging to 79 families and 28 orders [Table 1]. More than three quarters of the bony-fish species encountered were perch-likes (Perciformes), flatfish (Pleuronectiformes), cods (Gadiformes) and scorpionfishes (Scorpaeniformes). These were also the groups of fishes exhibiting some of the higher abundances (Catch Per Unit of Effort > 300 individuals per hour of trawling). Skates and rays (Rajiformes) accounted for almost half of the chondrichthyans. Our results revealed that certain species were absent from the catches during the last 4 years of the study; these were the bony-fishes: *Acantholabrus palloni*, *Anthias anthias*, *Arnoglossus imperialis*, *Arnoglossus rupepelli*, *Argyropelecus hemigymnus*, *Callionymus risso*, *Centrolophus niger*, *Deltentosteus quadrimaculatus*, *Echelus myrus*, *Epigonus telescopus*, *Hymenocephalus italicus*, *Stomias boa*, *Spondyliosoma cantharus*, *Symphurus nigrescens*, and the chondrichthyans: *Centrophorus granulosus*, *Chimaera monstrosa*, *Dalatias licha*, *Myliobatis aquila*, *Raja circularis*, *Squatina aculeata*, *Squatina oculata*.

Tab. 1. Number of species encountered and fishery dependent abundance (CPUE) by family and order taxon

	Order	No of families	No of species	CPUE (number per hour)
Bony-fish	Perciformes	24	59	1577
	Pleuronectiformes	6	16	344
	Gadiformes	8	15	1737
	Scorpaeniformes	4	15	434
	Anguilliformes	4	6	30
	Citaeiformes	2	3	113
	Syngnathiformes	2	3	196
	Myctophiformes	1	3	9
	Stomiiformes	2	2	7
	Zeiformes	2	2	253
	Lophiiformes	1	2	9
	Ophidiiformes	1	2	3
	Tetraodontiformes	1	2	7
	Atheriniformes	1	1	35
	Aulopiformes	1	1	23
	Aulopiformes	1	1	9
	Beryciformes	1	1	35
	Chlorophthalmidae	1	1	367
	Ophidiiformes	1	1	18
	Ophichthidae	1	1	3
Osmeriformes	1	1	225	
Total	66	138		
Chondrichthyans	Rajiformes	3	15	89
	Squaliformes	4	6	96
	Carcharhiniformes	2	6	89
	Squatuliformes	1	2	1
	Torpediniformes	1	2	7
	Chimaeriformes	1	1	10
	Hexanchiformes	1	1	1
Total	13	33		

The observed decline in the number of species caught in the central Aegean in recent years is further illustrated by the negative and highly significant ($P < 0.001$) slope of the linear regression, relating number of fish species

encountered with year [Fig. 1], and suggesting that species richness was reducing by an average of 1.83 species per year, during the studied period. Analogous declining trends were also observed for certain phylogenetic indices in the Greek seas [3], and can be accredited to a series of reasons associated to fishing impact on particular vulnerable species and habitats [4], as well as environmental impact and specifically climate change causing the 'tropicalization' of Eastern Mediterranean [5] which exacerbate biodiversity loss. In fact, specific marine species may be more vulnerable to exploitation and/or changing conditions owed to a number of factors such as older age at maturity, lower reproductive rate, poor adaptation capabilities [6].

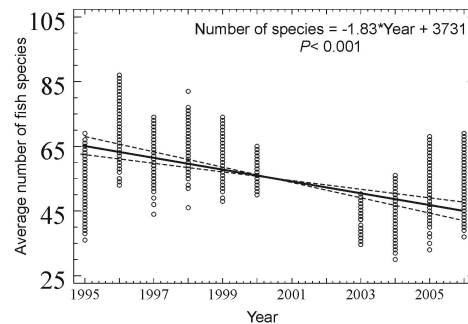


Fig. 1. Annual trend of fish species richness as inferred by a linear regression of Average number of species upon Year

Hence, although our findings identified certain warning signs reflecting ecosystem degradation, further study through longer monitoring will contribute to the clarification of trends.

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