

# DOES POLLUTION THREATEN FETHIYE-GOCEK BAY (TURKEY) SPECIALLY PROTECTED AREA MARINE ECOSYSTEM AND ITS FUNCTIONING?

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## Abstract

Fethiye-Gocek Specially Protected Area (SPA) is one of the 14 SPAs in Turkey and it is located in the south-west corner of the Anatolian peninsula - on the Mediterranean coast. Fethiye-Gocek Bay hosts more than double of the normal population in summers. Marinas exceeding the carrying capacity and pollution from land based sources threatens the marine ecosystem. The main aim of this project was to determine the biodiversity of this beautiful bay but main hydro-chemical, biological and pollution parameters were also determined in order to understand the ecosystem and the risks for its functioning.

*Keywords: Marine Parks, Coastal Systems, Pollution*

## Introduction

The coastline of Fethiye-Gocek SPA is about 235 km and it covers 817 km<sup>2</sup> area including coastal and marine areas of all figures (landscapes, bays, islands etc.). Total population of the area is 181,000 (2009) and this number is almost double during the high seasons (from April to November). Fethiye-Gocek bay is naturally protected from strong winds and less affected by the main current system (the Asia Minor current) even though the total depth at the large entrance of the bay is about 800m deep. This natural harbor has 5 marinas with totally 1210 yacht capacity and the marinas are almost full during summer months. Besides the in situ marine pollution, the input of pollutants from land-based sources threatens the area; since the level of almost all the critical pollution parameters exceed the limits especially in the Fethiye inner bay.

## Results and Discussion

The data is obtained very recently (April and August 2008) and totally 15 stations were visited in the Bay. Sea surface temperature was relatively high in the summer (up to 29.4 °C) and seasonal thermocline was well established and generally observed at 20-60m. The surface salinity was measured in the range of 37.37 – 39.47 ‰ and it was reduced down to 31.86 ‰ at some coastal stations where there is fresh water input. The RDCP data revealed that currents were relatively weaker in summer months and stagnant water masses were especially observed near coastal zones. The reverse current system was characteristics of the Bay where surface and deep currents were in different directions and mainly directed towards to inside of the Bay at the surface.

The Secchi Disc Depth was measured in the range of 10-28 m in the Bay except a very low value (4.8m) recorded in Fethiye inner bay. It was assumed that the bottom of the euphotic zone coincided with the bottom of the shallow inner Bay. It seems this affected the bottom autotrophic production by blue-green algae since scuba diving results showed that life was poor at this location. The high level of suspended sediment (16.8-29.6 mg/L) caused the extinction of the light at shallower depths with respect to those observed in the Mediterranean offshore. The level of oxygen saturation was determined in the range of 96-110% except some unacceptable values (47-59 %) obtained near the Fethiye and other inner bays. These extreme values were definitely far from the general picture, since the minimum level of oxygen saturation in the deep offshore waters were determined as of 70-80% due to effective vertical mixing and overturning [1]. The level and distribution of nutrients measured in the area showed similar patterns with the previous work [1] and low concentration of nutrients (PO<sub>4</sub>: 0.7-8.5 μM; NO<sub>3</sub>: 0.06-0.16 μM; NH<sub>4</sub>: Below Detection Limits; Si: 4.74-18.1 μM) caused low level of autotrophic production. The average chlorophyll-a concentration representing the phytoplankton biomass was 0.3 μg/L (Range: 0.09-1.06 μg/L) in the surface waters and the primary production was dominated by regenerative production.

Heavy metal concentrations in the Bay were in the range of acceptable limits (e.g. Copper: 3.00-9.50 μg/L; Zinc: 14.00-47.6 μg/L) and the highest concentrations were detected in the Fethiye inner bay. The same trends were observed for total phosphorus, nitrogen, organic carbon and heavy metals within the sediment samples and maximum concentrations were measured in the inner bay. Microbial pollution level were generally under the limits but they exceeded the limits over twice in the inner Fethiye bay (e.g. Total Coliform: 930 individual/100 mL) causing unhealthy recreational waters to be present in the study area.

In summary, Fethiye-Gocek bay has very regular Mediterranean lower trophic level ecosystem. The level of pollution caused by heavy boating activities for leisure and input of pollutants by land based sources (e.g. municipal wastes) is

at the very sensitive limit. The biogeochemical cycling seems to be open to change due to the external strains like the input of additional nutrients from the land. Scuba diving between 0-55m in the same study showed that even though the area is under the risk of pollution, the biodiversity is rich (e.g. 24 taxonomic group and 1545 species were determined in the area where 44 of them were recorded for the first time along the Turkish coasts). The area is being one of the attractive tourist (both national and international) point with its marbles nature and its historical/cultural richness but everybody should note that sustainable development (e.g. in tourism sector) is only possible with the efforts for sustainable nature and effective environmental protection.

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## References

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