

**Phytoplankton and
environmental variables as
a water quality indicator
for the beaches at
Matrouh, south-eastern
Mediterranean Sea,
Egypt: an assessment**

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KEYWORDS

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Abstract

This study was carried out to determine the water quality of the beaches at Matrouh, south-eastern Mediterranean Sea, Egypt, by studying environmental variables as well as phytoplankton abundance and community structure. Surface water samples were monitored from a series of beach sites over a period of five seasons during 2009–2010. A total of 203 phytoplankton species were identified from seven algal divisions. Seasonal differences in the quantitative and qualitative composition of the phytoplankton communities in the different sites were marked. Nutrient concentrations and phytoplankton abundances were found to be poorer than those of many other areas along Egyptian coast. The Shannon-Wiener Diversity Index classified Matrouh water as being between clean and moderately polluted, whereas the WQI demonstrated that it was between good and excellent. It can be concluded that the index based on WQI is currently more suitable than the phytoplankton species index for assessing the quality of the water of the Matrouh beaches.

The complete text of the paper is available at <http://www.iopan.gda.pl/oceanologia/>

1. Introduction

In marine environments, biotic and abiotic environmental factors have important effects on phytoplankton succession and abundance. The eastern Mediterranean Sea is one of the most oligotrophic marine areas in the world (Azov 1991). This pattern may have altered in the last few years, however, because of unfavourable hydrographic and hydrochemical changes, perhaps in response to human activities. In contrast to other areas in the Mediterranean, there has been little published data on the environmental variables and phytoplankton along the Egyptian Mediterranean coast. Moreover, such data as there are have been reported mainly from hot spots, which usually show higher concentrations of nutrient salts reaching more than 50 μM dissolved inorganic nitrogen, 15 μM dissolved phosphate and 70 μM silicate, as well as the presence of harmful blooms of algae like *Alexandrium minutum* Halim, *Prorocentrum triestinum* J. Schiller and *Skeletonema costatum* (Grev.) Cleve as the predominant species (Dorgham 1997, Mikhail 2001, El-Sherif & Mikhail 2003, Ismael & Dorgham 2003, Dorgham et al. 2004, Gharib & Dorgham 2006, Shams El Din & Abdel Halim 2008).

Tourism has become one of the most important factors in the economies of many areas along the Egyptian coast; most of the associated amenities are located there. The success of the tourist industry in those areas is often associated with an intact natural environment, and so water quality is an important factor for tourists in their choice of destination and should not be underestimated. The coastal zone of Egypt, including several beaches, has been exposed to various environmental problems. Matrouh is one of the most beautiful cities in Egypt, with many beaches where people can relax and enjoy themselves. Estimates of water quality based on physicochemical properties give us a clear picture. Reflecting the composite influence of different water quality parameters, the water quality index (WQI), is also useful for the classification of waters, and can give us an indication of the health of the water. Finally, the species composition of the phytoplankton community is an efficient bioindicator of water quality (Shashi Shekhar et al. 2008).

The aim of the present study was to evaluate the quality of water off the beaches of Matrouh by assessing its physicochemical status as well as the phytoplankton community structure, diversity and distribution.

2. Material and methods

2.1. Study area

Matrouh is located on the north-western Mediterranean coast of Egypt,

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