Study on changes in phytoplankton structure to infer water quality in the southern basin of the Caspian Sea

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Abstract

Phytoplankton is one of the most important biological groups in the aquatic environment, and its study and monitoring at different years reveals environmental changes as well as understanding of water quality. The aims of the present study are to study the structural pattern of phytoplankton with emphasis on new distinctive species (especially harmful and toxic), native and favorite species and dominant species in the Caspian Sea in 2018-2019, as well as the comparsion of the results with studied in 1996-1997, 2009-2010, and 2013-2014 years. Sampling was performed in 8 transects in 5 to 30 meters depths, of the Iranian Caspian Sea basin. Based on the results, the maximum and minimum phytoplankton abundance (million/m^3) were recorded in winter (358±43) and summer (61±13), respectively. Bacillariophyta as the first dominant division formed more than 80% of phytoplankton abundance. Comparison of the results obtained in the year 2018-2019 with previous years (1996-1997, 2009-2010, and 2013-2014) showed that the percentage abundance of bacillariophyta decreased from 1996-1997 to 2009-2010. However, its increasing trend observed from 2013 to 2018-2019 (in present study). After the disturbtion of the Caspian Sea in the early of 2000s, the present study found positive evidences for ecosystem recovery, including reduced diversity of harmful and toxic species, reduced participation of cyanophyte in total phytoplankton abundance, increased abundance and diversity of native and local species, absences of *Pseudonitzschia seriata* as toxic and harmful species in summer of 2019, lower coefficient of changes, more uniform distribution and higher stability of dominant native and resident species (*Cyclotella meneghiniana, Thalassionema nitzschioides and Binuclearia lauterbornii*) Compared to Pseudonitzschia seriata. Important negative points in the water quality of this ecosystem were the high intensity of abundance and distribution of *Pseudonitzschia seriata* in winter, and its significant abundance in the spring as non-cold season.

Keywords: Phytoplankton, Monitoring, Status of ecosystem, Caspian Sea, Iran.