Long-term and seasonal changes of nutrients, seston and phytoplankton concentrations in the Lower Danube (Bulgarian-Romanian stretch)

Roumen Kalchev¹, Doina Ionca², Michaela Beshkova¹, Ivan Botev¹ and Cristina Sandu²

With 8 figures and 2 tables in the text

Abstract: Data of nutrients, seston and phytoplankton abundance compiled from literature and routine monitoring and covering the last 55 years were analysed for long-term and seasonal trends. Most of the data originated from the stretch between 376 and 554 river-km and varied in the following approximate ranges: NH₄-N 0.1–0.5, NO₃-N 0.5–2.0, and PO₄-P 0.025–0.25 g m⁻³. The calculated dissolved inorganic nitrogen (DIN) and PO₄-P loads were within 2–14 and 0.3–1.4 kg s⁻¹, correspondingly. The SPM (suspended particulate matter) concentration and load have decreased continuously 6–8 times till today with min-max values of 21–340 g m⁻³ and 116–1875 kg s⁻¹. DIN load showed an increase of about 50 % on average in 1988–1998 compared to the previous 1950–1985, followed by a slight decrease of approximately the same degree during 2000–2005. PO₄-P load varied stronger than DIN load increasing 2–3 times during the 1990s. Then after a gap of 5 years and about 2 times lower values within 1995–1999 it has reached the same or little higher levels than in the 1990s. The attempt to compare phytoplankton abundance from different periods by converting the different quantitative measures into one (biomass) showed that the recent phytoplankton concentrations are very similar to those of the end of 1990s, despite the temporary reduction of nutrient concentrations caused to great extent by dilution. Moreover, there are some indications that the share of phytoplankton from SPM may continue to increase during the 2001–2005. Bearing in mind the extent of changes of DIN, PO₄-P and SPM loads more detailed analyses are needed in order to decide about the degree to which each of the factors influences the trophic status of the Lower Danube River. Unfortunately the outlined decreasing tendency in nutrient concentrations after the 90s of the previous century neither is sustained by a permanent PO₄-P load decrease, nor could be supposed indirectly from lower phytoplankton biomass in this river stretch.

Key words: Key words: nitrogen, phosphorus, suspended particulate matter, phytoplankton, chlorophyll-α.

Authors’ addresses: ¹ Institute of Zoology, Bulgarian Academy of Sciences, 1, Tsar Osvoboditel Blvd, 1000 Sofia, Bulgaria.
² Institute of Biology, Romanian Academy, Spl. Independentei 296, 060031 Bucharest, Romania.