THE FUTURE ECOSYSTEM FUNCTIONING OF THE BLACK SEA UNDER CHANGING CLIMATOLOGICAL AND FISHERIES

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Objective: End-to-end models have increased the understanding of ecosystems at a broader scale including the feedbacks and interactions between coupled physical, chemical and biological systems. With such models, not only are the impacts of anthropogenic activities such as fishing and pollution examined, but long-term effects of climate variability and its consequences on the ecosystem scale could have also been investigated. This study aims to present the simulation of the future changes in the Black Sea ecosystem under projected future climatological and physical conditions.

Methods: In this work, an Ecopath with Ecosim (EwE) – BIMS-ECO coupled physical – biogeochemical end-to-end modelling approach was used.

Results and Discussion: Future simulations of the Black Sea ecosystem showed that, under contemporary fishing exploitation levels, most significant fish species are likely to experience significant decreases in their stocks. These species were found to be anchovy, predatory species, and certain demersal fish species. In such circumstance, due to released predation pressure and weakening resource competition, species like sprat, shad and red mullet will likely substitute these species in their respective environments and develop their populations. Further, examining the indicators related to the energy flows, it was shown that increased primary production in the Black Sea bores the possibility to deteriorate the food web structure and functioning and may cause increasing dominancy of opportunistic organisms so as to reinstate undesirable conditions of eutrophication across the food web. Under such situation, management of fish stocks and their exploitation levels were found to be the most effective tool to prevent catastrophic events in the ecosystem. However, sustainable management of fish stocks could only be possible when considered together with their peers' stock dynamics rather than only evaluating the stock progressions of economically important species in isolation from the ecosystem-wide impacts of anthropogenic and climatologic stressors as well as the nonlinear interactions in the food web with other lower and higher trophic level organisms.

Keywords: Black Sea, climate variability, fish stock management, modelling