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eDNA - A modern tool for the preservation of marine ecosystems: the example of the sea of Montenegro

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Abstract

The Mediterranean region is one of the most responsive to climate change in the world. The increase in air and sea surface water temperatures and salinity has already been observed in the Adriatic Sea. These factors, combined with navigation, increase the possibility of spreading invasive alien species (IAS). Since IAS could have severe negative consequences on marine biodiversity and biosecurity, biota monitoring in ports is necessary. Ballast water, hull fouling and bilge water are the main ship compartments which must be controlled. Targeted IAS can be detected from these media by metabarcoding. Metabarcoding is the XXI century biological tool for rapid and effective species identification at all stages of its life history. It consists of the extraction of DNA (eDNA) from water or sediments and the identification of multiple species. Here we consider the possibility of early detection of IAS that could appear in the sea of Montenegro in the near future, using metabarcoding: algae *Rugulopteryx okamurae*, ctenophore *Mnemiopsis leidyi*, barnacle *Austrominius modestus* and fish *Plotosus lineatus*. We will take samples from port Bar and port Kotor or/and marina Tivat. Recently discovered tubeworm *Ficopomatus enigmaticus* in Montenegro (in 2023) could have been detected by metabarcoding. According to Montenegrin laws, it is forbidden to bring non-native species into national waters with ballast and other waters, that is, it is mandatory to treat these waters adequately to prevent any form of sea pollution. Two of four species that could appear in the Montenegrin sea waters, presented here, are on the List of IAS of the Union concern of Regulation 1143/2014. Metabarcoding could serve as the most reliable early detection methodology for unwanted marine species and could accelerate and strengthen the capacity for monitoring, prevention, suppression and conservation law enforcement regarding marine IAS.

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Keywords: ballast water, early detection, eDNA, marine invasive species, metabarcoding.

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