

Is Zebra Mussel A Potential Threat for Native Fauna in Alpaslan II Reservoir Watershed?

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Introduction

Zebra mussel, *Dreissena polymorpha*, is a biofouling organism inhabiting generally in freshwater ecosystems (Figure 1). The zebra mussel is considered as a harmful invasive epibiont species for hydroelectric and nuclear power plants due to its rapid infestation on the water supply systems clogging pipes, hydraulic structures (Aksu et al., 2017). However, investigations on zebra mussel problems are focused on technical and economic damages and, there are limited ecological assessments about zebra mussel on the native fauna.



Figure 1. *Dreissena polymorpha* (Zebra mussel)

Alpaslan II Dam is recently constructed on Murat River, a tributary to the Euphrates River, for mainly power generation and irrigation purposes (Figure 2). Inci et al. (2004) considered the zebra mussel as a technical risk for the HEPP during the construction period and they suggested control methods to prevent its colonisation. However, after the impoundment period, we observed dense populations of zebra mussel both in upstream and downstream sections of the Alpaslan II reservoir. The aim of this study was to assess the potential impacts of zebra mussel on the native fauna in upstream and downstream sections of Alpaslan II Dam Lake.

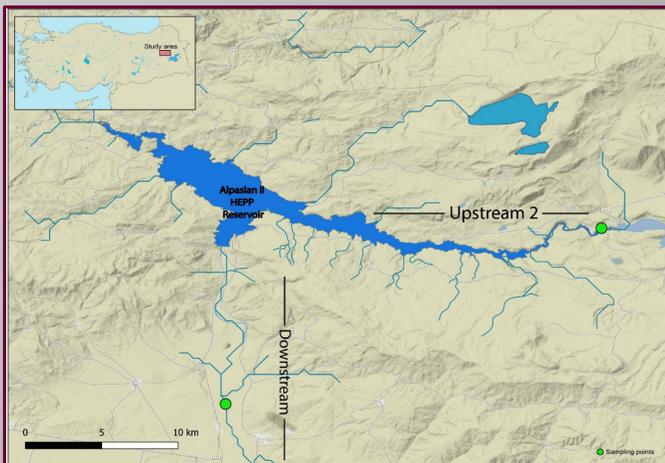


Figure 2. Location of Alpaslan II Reservoir

Materials and Methods

Zebra mussels were collected in spring and autumn between 2020 and 2022. along 100 m stretch of the littoral zone by manual picking of individuals from submerged objects where they attached. Physical and chemical parameters of water including temperature, pH and salinity were measured in-situ.

Results and Discussion

In the study area, dense zebra mussel colonies were found on several living organisms (e.g. plants, crustaceans) and on stones, boulders, soft sediment and even on anthropogenic waste materials such as plastic bottles (Figure 3). Abundance of the zebra mussels was markedly higher than *Unio* sp.



Figure 3. Zebra mussel colonies on different submerged objects

We observed co-occurrence of zebra mussel and native bivalv *Unio* sp., gastropods *Ancylus fluviatilis*, *Radix labiata*, crab *Potamon potamios* in the same habitats both in upstream and downstream of the reservoir (Figure 4).



Figure 4. Various benthic invertebrates shared the habitat with zebra mussel

Water temperature ranged between 5.2 and 9.4°C in the downstream and between 6.8 and 17°C in the upstream (Table 1). Although the threshold temperatures for larval development and reproduction of zebra mussel on the Euphrates River are reported to be 8.5°C and 11.5°C, respectively (Hengirmen et al., 2002), and high water velocity is considered a limited factor the zebra mussel colonization, our results suggest that the zebra mussel appears to be able to reproduce at lower temperatures and high flow rate especially in the downstream. The other environmental conditions seems appropriate for development of zebra mussel population.

Table 1. Physical and chemical parameters measured in the study area (T: water temperature. DO: dissolved oxygen)

Parameters	Upstream		Downstream	
	min	max	min	max
T (°C)	6.8	17.8	5.2	10.8
DO (mg/L)	9.26	12.6	8.9	10.74
Salinity (ppt)	0.31	0.60	0.26	0.27
pH	7.30	7.77	7.31	8.74

To the best of our knowledge, there are some evidence about negative impacts of zebra mussel on the population and size of some fish and other aquatic species. It can attach and settle on other aquatic organisms such as adult mussels, crabs, crayfish and macrophytes. The intensive grip on aquatic organisms partially obstruct the movement, feeding, mating, avoiding predators, and shelter (Berber et al., 2018). Mass mortality of zebra mussels can cause considerable releases of nutrients and ammonia, which is highly toxic to juvenile unionid mussels (Strayer 2009). Zebra mussels reduce phytoplankton due to their filtering activity causing a decrease in pelagic production (Higgins & Vander 2010; Karatayev et al. 2015). Additionally, zebra mussel infestation is direct competition with native unionids for food resources (Strayer and Malcom 2018). The high colonization success of the zebra mussel in the Alpaslan II reservoir watershed may considered a potential threat for the native fauna. However, detailed observations and analysis on ecological impacts of the zebra mussel should be carried out.

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