Unpacking economic costs of aquatic invasive species: evidence from the InvaCost database

Melina Kourantidou[1, 2]

[1]University of Southern Denmark, Department of Sociology, Environmental and Business Economics, Denmark: [2]Hellenic Centre for Marine Research, Institute of Marine Biological Resources and Inland Waters, Greece

Although the notorious effects of invasive alien species on recipient aquatic ecosystems are well recognized, significant knowledge gaps persist with respect to the ways they affect social and economic wellbeing. InvaCost, an openly available database that compiles and standardizes costs of invasions from across the globe and over more than half a century, is the first of its kind to shed light on connections of aquatic invasion costs with a number of social and ecological dimensions. It offers the opportunity to respond to questions such as how costs are distributed across space, time, taxonomic groups and sectors of the economy while it also helps delve into the nature of the costs themselves (ie whether damage costs, management expenditure or other). This type of analysis allows for mapping the landscape of costs of aquatic invasions through providing for example insights on how these costs have evolved over time, at different spatial levels (i.e. global, Europe, Mediterranean, Nordics), under specific management regimes (i.e. protected areas), their connections to different introduction pathways and vectors among many others and even insights on species that are seen as liabilities by some and as assets by others. It has further allowed for separately assessing costs of different groups of aquatic invasions such as those of invasive crustaceans and fish. Most importantly, the release of the database has allowed for meaningful interactions between natural and social scientists that are necessary for successful conservation outcomes and has particularly helped advance our understanding of costs of invasions in aquatic ecosystems as well as highlight the knowledge gaps present. At the same time, it offers opportunities to explore expectations regarding costs into the future, that combined with lessons learned from the past can help advance policy design and management while also supporting cost-efficient management strategies. An improved understanding of drivers of costs and trends across different descriptors can help avert economic losses and provide valuable input to resource economists and managers alike for evaluating trade-offs embedded in different policy options as well as for optimizing management and determining future research needs. The results of the analyses conducted thus far generally point at rapid increase of costs of aquatic invasions over time with signs of those being underestimated, taxonomic biases towards few species, regional biases towards specific countries and large knowledge gaps for certain habitats such as marine ones. The living nature of the database allows for updates, corrections and continuous improvements as more data or advances in knowledge and understanding of invasion costs become available.

Keywords: aquatic invasion costs, InvaCost, knowledge gaps, trade-offs, improved conservation