Ecosystem engineering by different seagrasses in the Caribbean: Editorial comment on the article "Little giants: A rapidly invading seagrass alters ecosystem functioning relative to native foundation species" by Muthukrishnan et al. (2020)

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Seagrasses are important ecosystem engineers in shallow coastal areas. They provide habitat for associated organisms (autogenic engineering) and modify the biophysical environment (allogenic engineering) (e.g., Gutiérrez et al. 2011). In the Caribbean Sea, three native seagrasses—*Thalassia testudinum*, *Syringodium filiforme* and *Halodule wrightii*—engineer important meadow ecosystems that include beneficial functions, i.e. ecosystem services like coastal protection, provision of fish nursery grounds, water purification, and nutrient recycling (Ziegler 1999; Beck et al. 2001; Barbier et al. 2011). The study by Muthukrishnan et al. (2020) now investigates how another seagrass, *Halophila stipulacea* that originates from the Indian Ocean, could change ecosystem functions in the Caribbean Sea. This particular seagrass, although comparably small in size, is a very successful species, likely because of its ability to overcome nutrient scarcity (Cardini et al. 2018). This observation, together with the engineering role of *H. stipulacea*, justifies the use of the term “little giants”.

H. stipulacea invades the Caribbean Sea among other regions since about 1 decade (Willette and Ambrose 2009; Willette et al. 2014). The pilot study by Muthukrishnan et al. (2020) conducted in the US Virgin Islands National Park thereby combines two hot topics in marine biology: ecosystem engineering and invasive species. It uses field surveys of seagrass abundance change in comparison to native seagrass species. This is complemented by bioassays to evaluate how replacement of native seagrasses by *H. stipulacea* may change ecosystem functioning. The study is highly relevant and timely due to the recent spread of *H. stipulacea* to many

new regions. There are pronounced gaps of knowledge on the functional impact of its spread, not only for the Caribbean, but also other areas, e.g. the Mediterranean Sea where *H. stipulacea* competes with the endemic seagrass *Posidonia oceanica* (Gambi et al. 2009).

The aim of the study by Muthukrishnan et al. (2020) is unique in that a different than usual approach to the evaluation of invasive engineering species is used. This is achieved by the assessment of multiple processes—particularly resource support for higher trophic levels and habitat creation for associated organisms—that inform on ecosystem functioning. Thereby, a very valuable ecosystem-wide view to the management of seagrass habitats is provided as the spread of invasive species is a major component of global ecological change. How and when to manage particular species is an essential, yet difficult, question to answer. Ideally, such management decisions should be based on the specific impacts of invading species including both their effects on native competitors and how they may or may not play similar roles in broader ecosystem functioning. The study by Muthukrishnan et al. (2020) very well contributes to this context.

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