Influences of tropical marine flora on juvenile herbivore communities in southwestern Grenada

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Introduction

Several reef fish species are known to experience ontogenetic shifts during their lifetime, moving between habitats to fulfil age-specific biological requirements. Both mangroves and seagrasses are known nursery habitats[1], but the relative importance of these two systems is not understood.

Because of the functional importance of herbivores in the reef ecosystem, where they exert critical pressure on community dynamics[2], we focused on two grazer families: Scaridae and Acanthuridae. Mangroves and seagrasses, through nursery provision to these fish, would indirectly dictate the health of the adjacent reefs.

Figure 1: A juvenile schoolmaster taking refuge among mangrove roots and seagrass

Objectives

a) Determine whether juvenile grazer density differed between sites with both seagrass and mangroves and those with only seagrass.

b) Assess whether juvenile density varied by family among different sites and treatments.

c) Evaluate how juvenile density was affected by seagrass cover (a measure of complexity).

Methods

Our data was collected between September and October 2018, along the southwestern coast of Grenada. We measured temperature and salinity of the water; conducted a fish count along a 30m x 2m belt transect using an underwater visual census method by snorkelling; and quantified bottom cover using a 0.25m^2 PVC quadrat at five-meter intervals along the transect[3].

Results

There was no significant difference in the relative density of the two families of grazers between treatments. Overall, parrotfish were more abundant than surgeonfish, making up 70% of total juveniles observed.

There was a significant correlation between seagrass cover and overall juvenile density observed, and between seagrass cover and the densities of each grazer family ($p < 0.05$).

Mean seagrass cover increased significantly with increasing distance from shore, and all sites had at least 50% cover at 25m and 30m from shore.

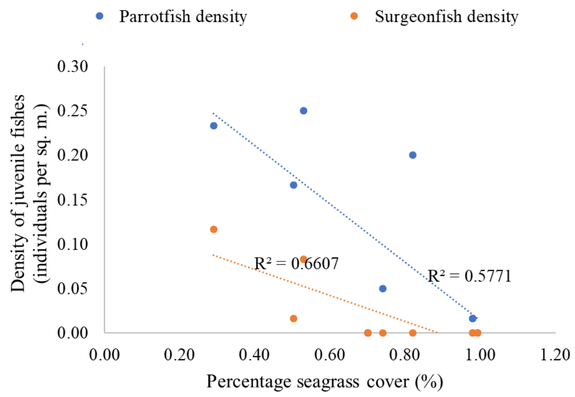

Figure 2: Density (individuals per square metre) and linear regression of both juvenile parrotfish and surgeonfish families in relation to percentage seagrass cover (%) for all sites.

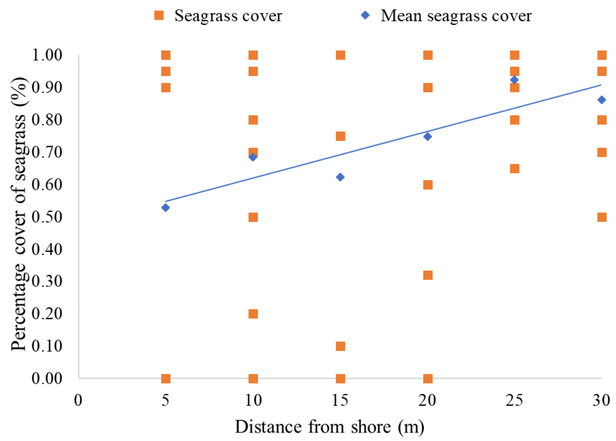

Figure 3: Mean seagrass percentage cover (%) and its linear regression in relation to increasing distance from shore (metres), for all sites.

Conclusions

Since there was no significant difference between treatments, it may be that seagrasses and mangroves are similarly important as nursery habitat for reef grazers. As such, both ecosystems should be given similar recognition and legal protections.

Parrotfish were more abundant at all sites than surgeonfish. This implies that the scarids may be more dependent on nursery habitats than the acanthurids, and so parrotfish-specific conservation programs should take these habitats into account.

Finally, grazer fish are keystone species; higher grazer diversity may increase reef resilience against disease or overfishing, and rates of herbivory may differ between grazer families, making community composition an important factor for reef health[2]. Thus, both mangroves and seagrasses should be recognized for their importance to juvenile grazer fish, and their indirect impacts on reef health and resilience.

References

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