

## A preliminary assessment of sargassum associated biodiversity: Implications for management

## Una evaluación preliminar de la biodiversidad asociada al sargazo: implicaciones para la gestión

## Une évaluation préliminaire de la biodiversité associée aux sargasses : Implications pour la gestion

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### EXTENDED ABSTRACT

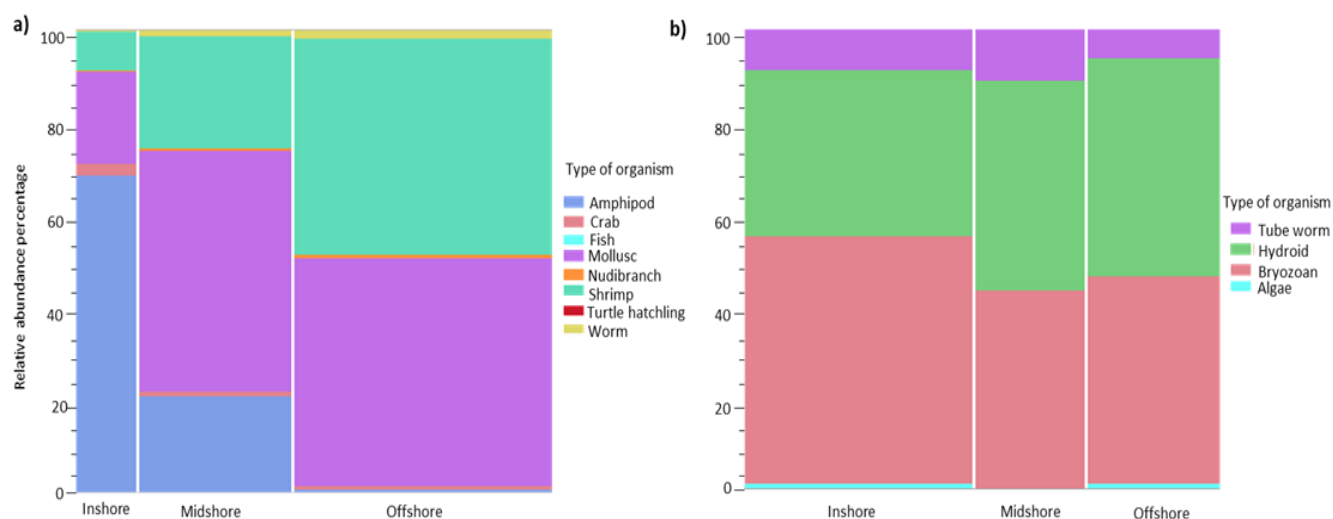
Over the past decade, mass accumulation and decomposition of pelagic sargassum along the coasts of Eastern Caribbean islands has resulted in negative socio-economic and ecological consequences (Milledge and Harvey 2016). During influx events, floating mats of sargassum typically comprising several morphotypes of *Sargassum natans* and *S. fluitans* beach along the shore and result in management challenges for fisheries, tourism and nearshore coastal ecosystems (Oxenford et al. 2021). Whilst beached sargassum presents a plethora of management challenges, floating mats at sea provide essential foraging habitats, nursery grounds and shelter for a wide variety of associated and endemic species (Martin et al. 2021). The ecological value of sargassum presents a challenge for coastal managers when using in-water harvesting as a strategy to minimise the impacts associated with beached sargassum. To date, the trade-offs among social and ecological objectives for beach and in-water harvesting remains largely unknown; there is a need to understand the effects of harvesting on sargassum associated species and the overall consequences of harvesting on the ecosystem over the long term. To better understand the biodiversity associated with incoming mats, this study examines spatial differences in the abundance and diversity of sargassum associated fauna at various distances from shore.

In this study, biodiversity associated with sargassum mats was classified into three main groups: epiphytic fauna; clinging fauna; and free-swimming fauna. Epiphytic fauna is described as any sessile organism which grows on the sargassum, this includes hydroids, tube worms and encrusting bryozoans. Clinging fauna describes organisms that exhibit very limited range of movement and spend their time clinging to or climbing around the sargassum, these include crustaceans, polychaetes, molluscs, flatworms, the sargassum frogfish, seahorses, juvenile fish and turtle hatchlings. Free-swimming fauna refer to larger species that swim inside and beneath the sargassum mat (e.g., fish, juvenile turtles and adult turtles).

Using a combination of net sampling and underwater video footage, biodiversity assessments were conducted inshore (< 50 m), mid-shore (50 – 500 m) and offshore (> 600 m) for July and August 2021. For net sampling, three replicate samples were collected within each zone using a 1 mm mesh dipnet. Subsequent to collection, samples were washed in buckets of freshwater to separate the collected organisms from the sargassum. After rinsing, residual water was filtered through a 0.06 mm mesh sieve and the collected clinging fauna was preserved in 70% ethanol until they were identified. After the removal of clinging fauna, 12 sargassum thalli from each morphotype (*S. natans* I, *S. natans* VII and *S. fluitans* III) were selected for epifaunal assessments. An estimate of the abundance of epiphytic fauna was measured by placing the sargassum thalli between two clear rectangular acrylic plates, divided into 1 × 1 cm squares. Percent cover was then estimated by counting the number of square divisions occupied by sargassum with and without epiphytes on both sides of the plates. Collected sargassum was sorted by morphotype and the wet weights were recorded. For video analysis, a GoPro HERO 9 was attached to a 1-meter-long PVC frame using a buoy for flotation and weights at the bottom to help sink and stabilize the structure. Within each zone 15-minute footage was recorded. The first 5 minutes of each video were discounted (considered adjustment time) while the remaining 10 minutes were broken into five 2-minute segments and analysed using the Visual Fast Count technique.

A total of 17 collections (6 inshore, 6 mid-shore and 5 offshore) resulted in the identification of 26 species associated with the sargassum. Offshore samples recorded the highest number of species observed within a given zone as well as the highest number of unique species (not observed in any other zone). Furthermore, free-swimming fauna (predominantly *Caranx* spp.) were only observed in offshore samples. Amongst the collected clinging fauna, shrimps and molluscs were the predominant organisms observed within mid-shore and offshore zones. However, within the inshore zone, amphipods were the most abundant (Figure 1a). Unlike clinging fauna, epiphytic organisms showed a relatively consistent pattern across the three zones with hydroids and bryozoans being the most abundant (Figure 1b). Given the epiphytic nature of these species, a major change in the epifaunal composition was not expected as sargassum moves from one zone to the next.

These preliminary results indicate that while a variety of epiphytic and clinging fauna are abundant within inshore and mid-shore environments, free-swimming fauna (valuable economic species) appear to have abandoned the mats this close to shore. Thus, in-water collection from inshore or mid-shore (0 – 500 m) may very well prove to be an appropriate strategy to prevent significant shoreline strandings of the seaweed and/or to harvest fresh sargassum for use. However, further investigations are required: (1) to determine whether or not there are significant trends in the spatial and temporal distribution of



**Figure 1.** Relative abundance (%) of taxonomic groups of clinging fauna (a) and epiphytic fauna (b) collected from pelagic sargassum mats by dipnet sampling within inshore, mid-shore and offshore zones. Width of bars represents relative abundance of associated fauna among the three zones.

sargassum associated species; and (2) to better understand the trade-offs among social and ecological objectives for beach and in-water removal of sargassum.

**KEYWORDS:** pelagic sargassum; mobile fauna; epiphytic fauna

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