

The development of a rapid sampling protocol to assess the biodiversity associated with pelagic sargassum

El desarrollo de un protocolo de muestreo rápido para evaluar la biodiversidad asociada con el sargazo pelágico

Le développement d'un protocole d'échantillonnage rapide pour évaluer la biodiversité associée aux sargasses pélagiques

¹KRISTIE S. T. ALLEYNE, ²MAKEDA CORBIN

¹The World Maritime University- Sasakawa Global Ocean Institute

²Centre for Resource Management and Environmental Studies (CERMES), Faculty of Science and Technology, The University of the West Indies, Cave Hill Campus, Barbados, w2005261@wmu.se and makeda_c@hotmail.com

EXTENDED ABSTRACT

Over the past decade unprecedented blooming of pelagic sargassum has occurred across the Equatorial Atlantic from West Africa to the Caribbean. Mass accumulation and decomposition of stranded sargassum has resulted in a plethora of management challenges for fisheries, tourism, nearshore coastal eco-systems, public health and the socioeconomic welfare of coastal communities (Chávez et al. 2020). In-water harvesting has been suggested as a desirable management solution to prevent shoreline inundation. However, pelagic sargassum functions as an important floating ecosystem to a diverse assemblage of fauna (Martin et al. 2021). Thus, destruction of the associated biodiversity is a concern and has not been adequately examined to assess the potential impacts of in-water harvesting (Oxenford et al. 2021). This needs to be assessed in a practical and systematic way, but to date, methods across the Tropical Atlantic have been ad hoc and highly variable with no established sampling protocol (Alleynes 2022).

In this study, we (1) conducted a systematic literature review to identify published scientific methods used to collect information on biodiversity associated with pelagic sargassum; and (2) developed a rapid protocol for conducting biodiversity assessments based on trial and error of methods and recommendations from the literature. During the literature review 22 scientific and environmental databases were searched to identify primary studies focused on biodiversity of sargassum communities. Key search phrases: 'Sargassum AND Biodiversity', 'Sargassum AND Faunal Communities', 'Sargasso Sea AND Faunal Communities', 'Sargassum AND Fauna' and 'Sargasso Sea AND Biodiversity', were used to identify relevant articles. Full details of the methodology used to identify and select articles during the review process is described in Alleyne (2022).

Following the review process, methods used to collect information on epiphytes (i.e., hydroids, bryozoans, tube worms, epiphytic algae), clinging fauna (i.e., amphipods, shrimps, crabs, flatworms, sargassum frogfish, sea turtle hatchlings), and free-swimming fauna (i.e., Fishes, sea turtles) associated with pelagic sargassum were subsequently tested in the field. Within the reviewed literature (30 articles), a variety of nets, hook and line, video recordings, bare-handed collections and collection of fauna with plastic bags were used to collect organisms associated with pelagic sargassum (Figure 1). Overall, nets were utilized across the majority of studies (93%; 28 articles) with hand-operated nets being the predominant net type.

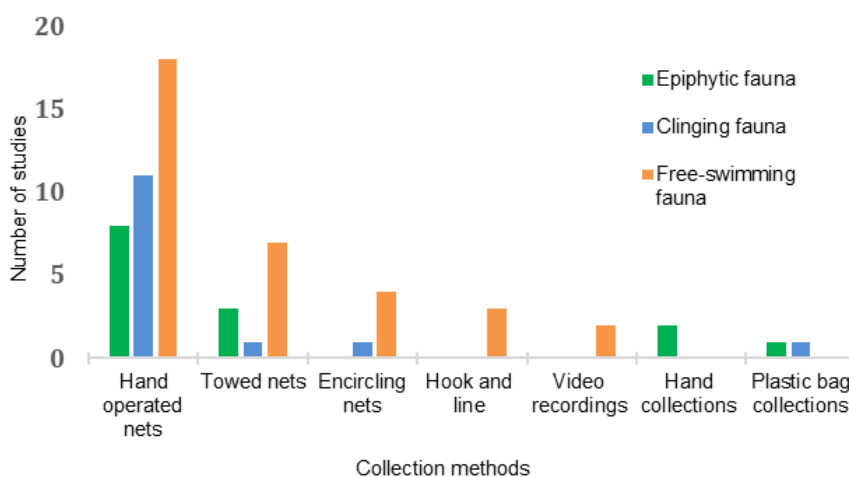


Figure 1. Methods used across studies (n=30) to assess various types of epiphytic fauna, clinging fauna and free-swimming fauna associated with pelagic sargassum

During field testing, efforts focused on the evaluation of net, video and hand collections. The most appropriate methods for collecting information on organisms across the three biodiversity groups were then used to develop a simple sargassum monitoring protocol (Alleyne et al. 2022). This protocol provides detailed step by step, easy to follow instructions on how to: (1) select the target biodiversity group; (2) conduct net sampling; (3) conduct video sampling; (4) separate organisms from the sargassum; and quantify biodiversity across the three groups. Additionally, the protocol identifies manuals that can be used to aid in the identification of collected biodiversity and outlines steps for preserving organisms until they can be accurately identified. This protocol is intended for use by anyone interested in tracking the variability in the biodiversity associated with incoming sargassum mats over space and time.

KEYWORDS: pelagic sargassum; mobile fauna; epiphytic fauna

LITERATURE CITED

- Alleyne, K.S. 2022. How is Pelagic Sargassum-Associated Biodiversity Assessed? Insights from the Literature. *Gulf and Caribbean Research* 33 (1): GCFI 14-GCFI 23.
- Alleyne, K.; Irvine, J.; Corbin, M.; Oxenford, H. 2022. Sargassum Monitoring Protocol: monitoring sargassum-associated biodiversity. *SargAdapt Good Practice Guide Series: 4*. University of the West Indies, Centre for Resource Management and Environmental Studies (UWI-CERMES), Barbados, 23 pp. https://www.cavehill.uwi.edu/cermes/projects/sargassum/docs/tools/smp_vol_04_biodiversity_2022_v3.aspx
- Chávez, V.; Uribe—Martínez, A.; Cuevas, E.; Rodríguez—Martínez, R.E.; van Tussenbroek, B.I.; Francisco, V.; Estévez, M.; Celis, L.B.; Monroy—Velázquez, L.V.; Leal—Bautista, R.; Álvarez—Filip, L.; García—Sánchez, M.; Masia, L.; Silva, R. 2020. Massive Influx of Pelagic Sargassum spp. on the Coasts of the Mexican Caribbean 2014–2020: Challenges and Opportunities. 2020. *Water* 12, 2908 doi:10.3390/w12102908.
- Martin, L.M.; Taylor, M.; Huston, G.; Goodwin, D.S.; Schell, J.M.; Siuda, A.N.S. 2021. Pelagic Sargassum morphotypes support different rafting motile epifauna communities. *Marine Biology* 7 (168), 115pp. doi:10.1007/s00227-021-03910-2.
- Oxenford, H.A.; Cox, S.-A.; van Tussenbroek, B.I.; Desrochers, A. 2021. Challenges of turning the sargassum crisis into gold: current constraints and implications for the Caribbean. *Phycology* 1 (1), 27–48, doi:10.3390/phycology1010003.