

## Taking a Regional Perspective on the Pelagic *Sargassum* Influx

## Una Perspectiva Regional sobre la Afluencia de Sargazo Pelágico

## Une Perspective Régionale sur L'afflux de *Sargassum* Pélagique

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### ABSTRACT

GCFI and several partners in the Caribbean region are variously working to better understand the origins of the *Sargassum* influx and to address the myriad impacts being observed on fisheries and livelihoods. At the 64<sup>th</sup>, 65<sup>th</sup> and 67<sup>th</sup> GCFI meetings, sole presentations were made about the *Sargassum* influx. The 68<sup>th</sup> GCFI marks the first time that multiple presentations will focus on this subject, potentially in diverse sessions and related to differing aspects of research and impact assessment. We will bring together the content of these various presentations in a framework that will highlight the status of knowledge in relation to subjects such as oceanography, coastal habitats and living resources, and impacts on fisheries and livelihoods. This presentation will serve as a wrap-up about directions in research and management, and comment on networking achieved at the 68<sup>th</sup> GCFI. It will also indicate gaps in knowledge and outstanding needs for partnership building and support.

KEY WORDS: Pelagic *Sargassum*, *Sargassum*, influx

### INTRODUCTION

Massive quantities of pelagic *Sargassum* occurred throughout the Caribbean in 2011, impacting aquatic resources, fisheries, shorelines, waterways, and tourism. Similar events have occurred since then, with a particularly heavy influx of *Sargassum* observed during 2015 (Doyle and Franks 2015). At previous GCFI meetings, Dr. Jim Franks of the Gulf Coast Research Laboratory, University of Southern Mississippi and past Chair of GCFI has presented research into the pelagic *Sargassum* influx with various partners (Franks et al. 2011, Johnson et al. 2012). The 68<sup>th</sup> GCFI in Panama City was the first time that a dedicated technical session was focused on ‘*Sargassum* in the Gulf and Caribbean’, and moderated by Jim Franks.

In our summary at the end of the session we took a framework approach to provide an overview of the status of research and management of the pelagic *Sargassum* influx. We addressed the following key aspects of the pelagic *Sargassum* influx:

- i) Characterization of the influx, understanding of causes and vulnerabilities,
- ii) Sectors impacted and types of management responses, and
- iii) Stakeholders, research priorities and needs for support.

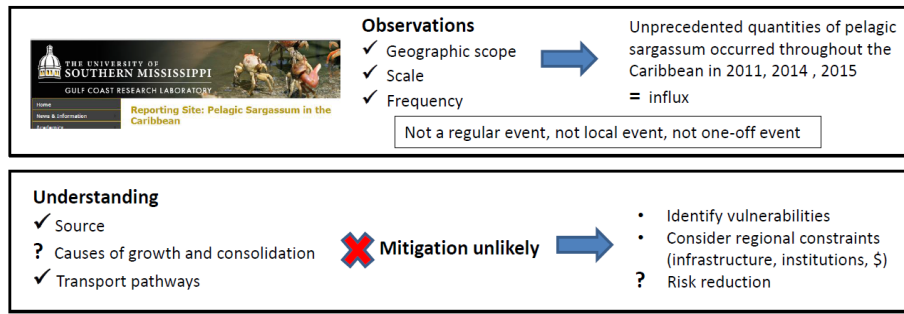
### FINDINGS

#### Characterization of the Influx, Understanding of Causes and Vulnerabilities

Observations of the pelagic *Sargassum* influx have been recorded online via the reporting site ‘Pelagic *Sargassum* in the Caribbean’ which is hosted by the Gulf Coast Research Laboratory of the University of Southern Mississippi. From this there is a level of knowledge about the geographic scope of the influx, the scale and frequency of its occurrence. This information helped to highlight that unprecedented quantities of pelagic *Sargassum* occurred throughout the Caribbean in 2011, 2014 and 2015, that the influx experienced in those years was not a regularly-occurring event, that it was not only experienced locally but was a regional event, and that the influx was not a one-off event. Researchers have been investigating the source of the pelagic *Sargassum*, exploring possible causes of its growth and consolidation, and investigating the transport pathways that have brought it to the Caribbean. This work suggests that mitigation of causal factors and management of growth and transport pathways are unlikely to be feasible. Instead, management of the influx involves the identification of natural and human vulnerabilities, consideration of regional constraints on management (such as available resources and infrastructure), and likely requires a management focus on risk reduction. These are presented schematically in Figure 1.

#### Sectors Impacted and Types of Management Responses

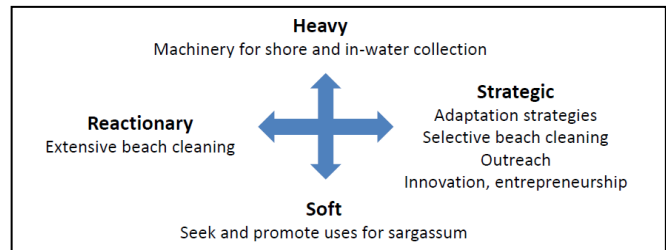
Impacts of the pelagic *Sargassum* influx on natural resources (coastal habitats, biodiversity, water quality) and economic sectors (including human health and livability of human settlements) are well known, as listed in Figure 2. We noted that impacts of the pelagic *Sargassum* influx are both direct, due to the arrival of enormous quantities of *Sargassum*, as well as indirect, from attempts to manage or remove *Sargassum* from affected areas, with knock-on effects through the economy. In developing an appropriate management response we are seeing uncertainties associated with the re-occurrence of the influx, and if it occurs, then uncertainties about the timing and scale of impacts. The goals and feasibility of management have been questioned, taking into account the ecological services of *Sargassum* and its positive environmental



**Figure 1.** Status of knowledge in relation to characterization of the influx of pelagic Sargassum, understanding of causes and vulnerabilities

SECTORS IMPACTED	INDIRECT IMPACTS
Fisheries	Beach cleaning causing coastal erosion
Tourism	Beach cleaning causing mortality of biodiversity
Recreation	In-water removal causing fisheries and uncertain biodiversity impacts
Coastal zone management	Knock-on effects through economy
Biodiversity including habitat	
Vessel transit	
Public health (H2S)	
Livability of human settlements	
Urban stormwater/drainage	
Emergency response	
Energy production, desal	
Property values	

**Figure 2.** Impacts of the pelagic Sargassum influx



**Figure 3.** The range of management responses to the pelagic Sargassum influx.

impacts, trade-offs against the economic impacts of the influx, especially on the national economies of small island developing states. A need to undertake cost-benefit analyses and to better prioritize vulnerabilities was highlighted. Management responses have ranged across a spectrum from reactionary to strategic, and from heavy or hard engineering approaches to softer adaptive solutions, as shown in Figure 3.

**Stakeholders, Research Priorities and Needs for Support**

The broad groups of stakeholders involved in the pelagic Sargassum influx in the Caribbean are listed along the bottom of Figure 4. It was noted that there is existing basic but credible information for coastal resource managers about the pelagic Sargassum influx, provided via the GCFI FactSheet (Doyle and Franks 2015). There is also an existing platform for discussion and sharing about research and management, provided by SPAW-RAC. New events in the Caribbean region and growing resources in support of knowledge sharing about the pelagic Sargassum influx were noted, such as the Sargassum Symposium that was coordinated by the Centre for Resource Management and Environmental Studies at the University of the West

Indies in 2015.

A series of priorities for research were listed, including causation, ecology, monitoring and measurement of direct and indirect impacts (bio-physical, socio-economic and public health), monitoring of response actions, and forecasting. Fundamental needs were identified for policy development, enhanced communications, education and outreach, capacity building for managers, building compliance with best management practices, encouraging adaptation, and strengthening partnerships and financial resources to permit researchers to fill gaps in knowledge (Figure 4). Addressing these priorities and needs will enable scientists, policy makers and the public to better address the challenges presented by the pelagic Sargassum influx in the Caribbean.

**CONCLUSION**

The first Sargassum session at the 68<sup>th</sup> GCFI permitted us to develop an overall schematic framework that seeks to depict the state of play and activities to date on key areas of research, impacts, management and priority needs going forward in relation to the pelagic Sargassum influx in the Caribbean (Figure 5). We look forward to continuing the productive sharing of knowledge and networking that was achieved at the 68<sup>th</sup> GCFI by those involved in this important emerging coastal and marine topic.

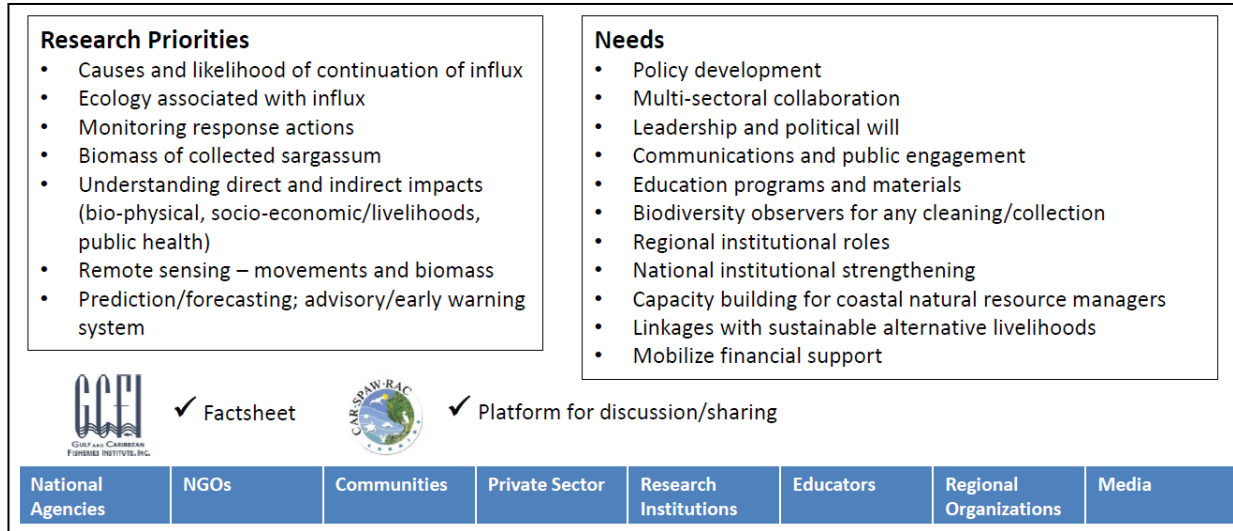
**ACKNOWLEDGEMENTS**

Our thanks to the presenters in the first Sargassum session at the 68<sup>th</sup> GCFI and to the participants in the associated small gathering of researchers and managers who shared about their current activities and research related to the Sargassum influx, anticipated future directions, and needs for support and networking.

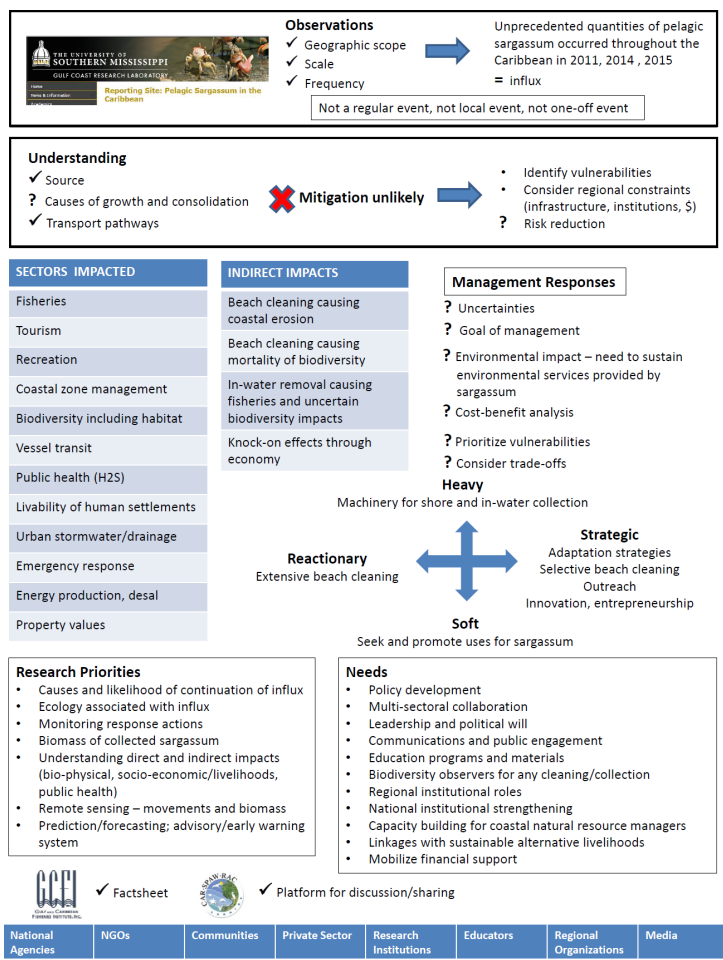
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**Figure 4.** Research priorities and needs for support, with list of stakeholders in the pelagic Sargassum influx.



**Figure 5.** Framework depicting knowledge, impacts and priority needs associated with pelagic Sargassum influx in the Caribbean region.