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Concept Note on the Invasion of Pelagic Sargassum in West Africa

Conceptual Background

Pelagic Sargassum, commonly referred to as gulfweed or seaweed, is a floating brownish pungent alga. It blossoms naturally in the Sargasso Sea, spanning 2 million square mile in the warm waters of the North Atlantic Ocean.

The first serious recorded invasion of Sargassum along the shorelines in Africa was in the winter of 2011 spanning from Morocco (South of Casablanca) to the Gulf of Guinea.

The ecological data gathered from surveys and in situ observations in nearby coastlines indicates that this invasive macro-algae occupies rocky bottom of between 1 to 5 meters deep in protected inter-tidal pools and sheltered embayment which were eventually washed ashore and exposed to coastal areas along the coastlines of the Gulf Guinea. The movement of the Sargassum along the Gulf of Guinea demonstrates the high capabilities of marine species to disperse and colonize new shallow coastal habitats outside its natural range.

Causes of Sargassum Invasion

The unprecedented quantity of large mats pelagic Sargassum in the Antilles Islands of the Caribbean in the spring of 2011 were subsequently reported along the coasts of Sierra Leone, Liberia, Côte d'Ivoire and Benin in West Africa.

For a period of about 18 months prior landing, back traces from the Sargassum sighting location were made using a high resolution numerical ocean current data recorder. Traces point to the North Equatorial Recirculation Region (NERR) of Brazil (see Figure 1).

It is suggested that the Sargassum consolidates in the Accumulation Region and blossoms in the NERR. It is reported that when the North Equatorial Counter Current broke down, this caused its flushing-out in the spring of 2011. Further research suggests that Sargassum cycles are closely linked to seasonal change of sea surface temperature. As shown in Figure 1, this result to the movement of Saraassum into the Eastern Caribbean and Northwest African coastlines.

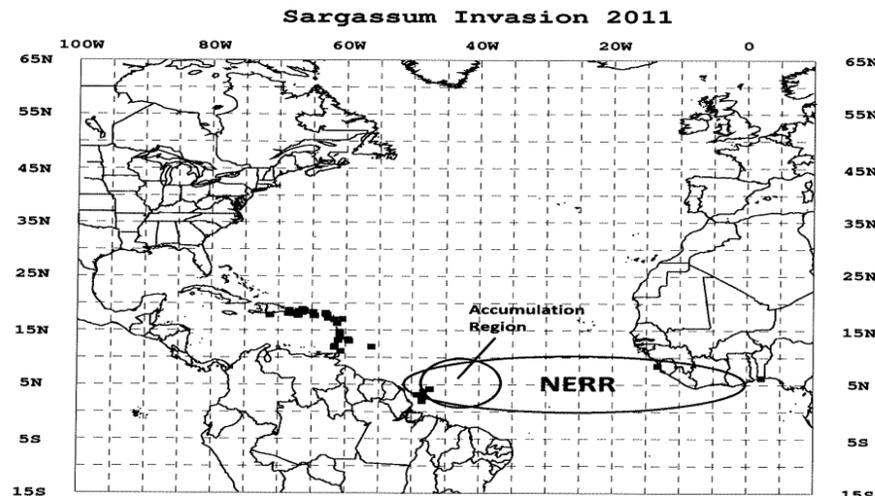


Figure 1. **Black Squares:** Locations of reported sightings of large quantities of *Sargassum*. (Note the two locations in West Africa)
NERR: North Equatorial Recirculation Region.
Accumulation Region: North Brazil Current retroflexion and large eddies.

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It should be noted that surface waters of the NERR are warm and relatively rich in nutrient coming from the Congo River, equatorial upwelling, coastal upwelling off West Africa, the Amazon River and from Northwest Africa iron-rich dust. This nutrient value enhances the growth of Sargassum.

Maps of the sea surface temperature indicate that the NERR and the Accumulation Region are the warmest regions in the Atlantic Ocean. And that species of the pelagic Sargassum do not propagate sexually, but simply fragment for the formation of new growth.

Some arguments to the probable causes for the proliferation of the massive seaweed are as follow:

- *warming and changing of ocean temperature due to global climate change;*
- *increased land based nutrients and pollutants (which include nitrogen-heavy fertilizers and sewage waters) washing into the ocean water;*
- *flow of nutrients from the Congo River, Amazon River, Northwest Africa iron-rich dust etc.*
- *And, maritime traffic as the most likely potential introduction vector.*

Evidently, the primary vector of introduction of Sargassum in the Gulf of Guinea is unknown.

Effects

Recent reports on the invasion of Sargassum in West Africa is becoming a regional phenomenon, impacting aquatic resources, fisheries, waterway, shorelines and the tourism sector in particular.



Figure 2: Recent invasion of Sargassum in Côte d'Ivoire and in Sierra Leone.

Ecological Effects

Unfortunately, there is very little knowledge of the ecological impacts of invasive seaweeds on the ecosystem in general which need to be assessed. Undocumented reports suggest that massive influx of seaweed has resulted to fish kills, beach fouling, coastal dead zones, and using machinery to remove seaweeds impact beach habitats.

Social Effects

Although seaweed possess no danger to the human health as they are apparently not toxic, their massive deposit on beaches (as shown on Figure 2) has negative impact on the socio-economic livelihood (tourism, fishery industry etc.) of affected communities.

Importance of Sargassum

Besides the ecological and social impacts, it is noteworthy to underpin that Sargassum provides refuge for migratory species and serves as an important nursery habitat for a vast array of invertebrate and fish species that are closely associated with the ecosystem. At least, "127 species of fish and 145 invertebrate species have been associated with the presences of Sargassum algae".

Further research shows that there are two species of Sargassum involved in the Sargassum influx, namely the Sargassum Natans and Sargassum Fluitans. The floating Sargassum “provides a noticeable habitat and anchor point for pelagic species that are ecologically important” (Laffoley, 2011)¹. Of these species, 10 are known to be endemic to our ecosystem which includes the Sargassum crab, Sargassum shrimp, Sargassum pipefish, Sargassum anemone, Sargassum slug, Sargassum snail, juvenile swordfish, triggerfish, filefish, driftfish, and the Atlantic sea turtles.

Of all these marine vertebrate species, the Atlantic sea turtle are mostly threatened as they depend on Sargassum not only to provide structural complex habitat, but also as refuge from predators, protection against threat from poaching, coastal development and fisheries by-catch. This implies that Sargassum plays an important role during the critical neonate cycle of sea turtle. Emerging studies point that seaweed can also be used as bio-fuel, fertilizer, and livestock feed.

Postscript Action

In an effort to seek solution to seaweed invasion, affected countries in the region, Sierra Leone, Liberia, Côte d'Ivoire, Ghana and Benin have informed Abidjan Convention and UNEP Headquarters of the recurring influx of Seaweed their shorelines, requesting technical support to address the problem. In response to these requests, UNEP Abidjan Convention Secretariat intends

- Support and facilitate an expert study with the aim of identifying major factors driving the spread of the marine algae Sargassum in the region. Such a study could commence by;
- Convening a Regional Expert Group Meeting in preferably one of the affected countries to share information, build knowledge on the phenomenon, identify and promote best regional initiatives and management practice, and develop regional cooperation on ocean governance arrangement;
- Establishing National Policies and common Regional Strategy on the collection of seaweeds using “Green Brigades”, a borrowed practice from Guadeloupe for replication in affected countries across in the region.

Proposed Approach and Justification

Preventing the occurrence of marine bio-invasion is by far the best option to avoid ecological damage, which can be costly considering the wider ecological and social ripple effects.

As much as the seaweed invasion is affecting most countries in the Gulf of Guinea, tackling the problem will require a regional coordinated action beyond national jurisdiction to manage the spread and prevent further damage to the composition of our native marine vegetation.

To this end, the Abidjan Secretariat has initiated discussions with UNEP Global Programme of Action to provide needed technical support to affected countries in West Africa.

Executing Partners

¹ Laffoley 2011; The protection and management of the Sargasso Sea: The golden floating rainforest of the Atlantic Ocean. Summary Science and Supporting Evidence Case. Sargasso Sea Alliance

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In the context of the Post-2015 Sustainable Development Goal 13 and 14 and the UN negotiations of a new global agreement for biodiversity in areas beyond national jurisdiction, UNEP Abidjan Convention Secretariat will therefore play the lead role in responding to the Sargassum/Seaweed invasion in West Africa, working in tandem with affected Contracting Parties/Countries of the Convention and plethora of partners working on marine and coastal biodiversity management:

- UNEP Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities.
- USAID West Africa Biodiversity and Climate Change Project-WABiCC.
- United Nations Development Programme-UNDP.
- The Sargasso Sea Commission.
- CBD Sustainable Ocean Initiative.
- The Cartagena Convention Secretariats.
- The Barcelona Convention Secretariats.
- ECOWAS Commission.
- Mano River Union-MRU Secretariat.
- The African Development Bank-AfDB.
- The Global Environmental Facility-GEF.
- Southern Mississippi University.

Implementing Partners

While a regional approach will be adopted to combat the influx of Sargassum/Seaweed invasion in West Africa, affected Countries (concerned Government Ministries and Agencies) will ensure implementation of adaptive strategies at national level for better management of the influx of seaweed in their respective countries.

Proposed Timeline

The proposed Regional Expert Group Meeting is expected to take place tentatively 10th – 12th November 2015 in Freetown-Sierra Leone to share information, map-out a robust regional strategy and subsidiary action(s) in response to the prevailing seaweed invasion in the region.