Sargassum invasion across South Florida

University of Miami
Florida International University
Florida Atlantic University

Nov 1st, 2018

2018: South Beach, Miami

Miami Herald

Heavy Seaweed Build-Up Has Some Staying Away From South Florida Beaches

CBS Miami

By Ted Scouten June 29, 2018 at 6:11 pm Filed Under: Beach, Beaches, Live TV, Miami, Seaweed

NATIONAL

Masses Of Seaweed Threaten Fisheries And Foul Beaches

npr

Photo credit: Michael Montero/UM News

Consequences on the economy

- Negative impact on tourism industry
- Fisheries habitat loss
- Navigation problem
- Increased operational costs for beach maintenance and coastal management
- Human health

Consequences on wildlife

- Block light from reaching light-dependent organisms (seagrasses and corals)
- Enrich coastal waters with nutrients as it decomposes and the ensuing bacterial activity consume oxygen needed to support sea life
- Could provide needed nutrient for red-tide on the east coast of Florida
- Attracts insects, crabs, sea lice
- Traps turtles

What is Sargassum ?

- Brown algae (class Phaeophyceae)
- 350+ different species
- Only 2 species are pelagic (natans and fluitans)

Benthic species


Pelagic species

Sargassum is **an important part** of the marine ecosystem, hosting many larvae and juvenile animals in the open sea.

Photo credit: Jason Arnold (jasonarnoldphoto.com)

Knowledge gaps

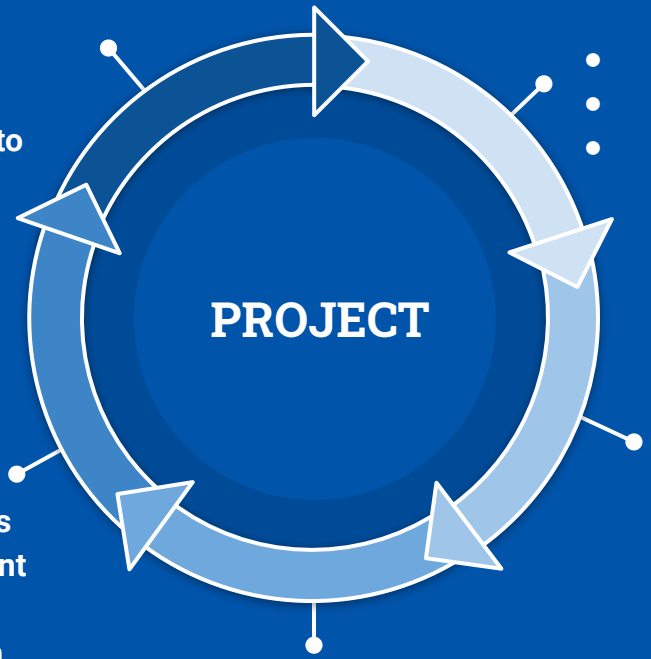
1. Is the abundance decreasing or increasing ?
2. What is their origin ?
3. What is the impact to beaches and coast ?
4. Beach restoration after major events ?
5. Bacteria levels associated with sargassum beaching ?
6. Risk of invasive species introduction ?
7. How to evaluate the economic costs for Florida ?
8. What are the economic opportunities ?

SOCIOECONOMICS **(UM, FIU & FAU)**

- **Evaluation on local and regional economies**
- **Transfer results and knowledge to managers, government, private sector and citizens**

MONITORING & MANAGEMENT **(UM, FIU & FAU)**

- **Ground measurements**
- **Remote sensing tracking algorithm**
- **Monitoring and analysis**



BIOLOGICAL ASSESSMENT **(FIU & FAU)**

- **Identifies sargassum species**
- **Evaluate the decomposition rates**
- **Nutrients and heavy metal content**
- **Primary productivity (growth)**
- **Community species composition**
- **Introduced alien species**

CITIZEN INVOLVEMENT **(UM & FIU)**

- **Engage the community in marine conservation research**
- **Provide additional data to the scientific team**

DISPERSION PREDICTION **(UM & FAU)**

- **Empirical model for sargassum motion (buoys)**
- **Forecast model**

Modeling the dispersion of sargassum

Photo credit: Sean Nash

Photo credit: CARTHE

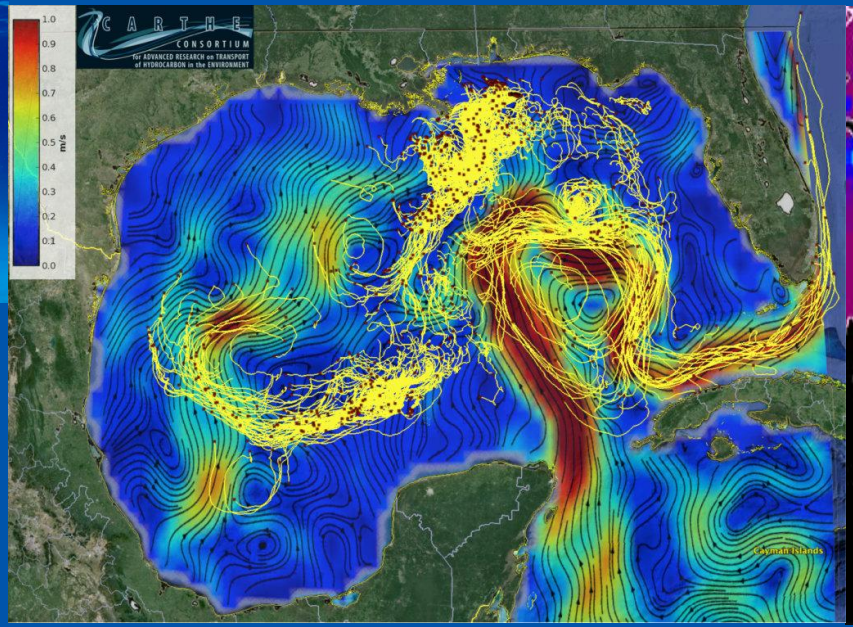


Photo credit: CARTHE

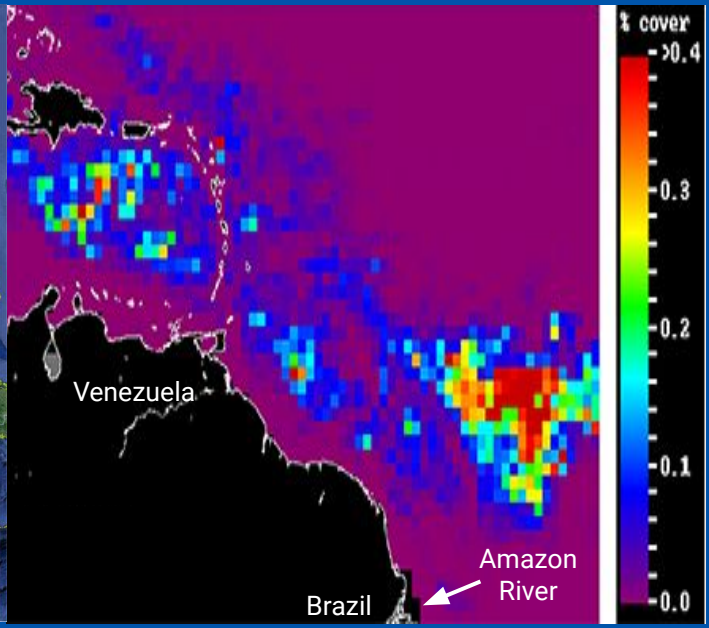
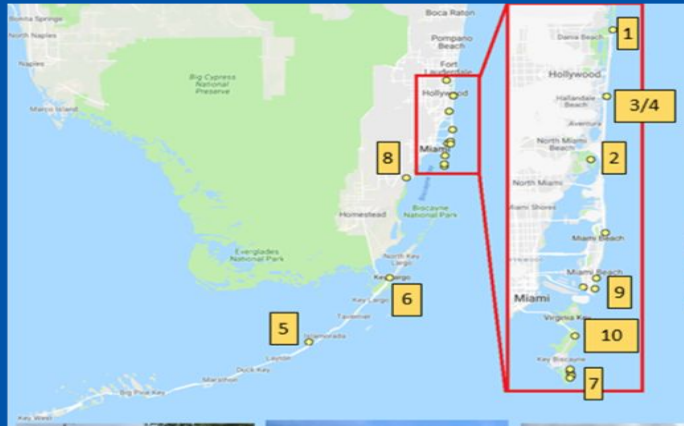


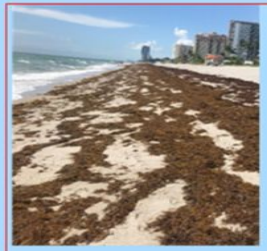
Photo credit: Wang and Hu, 2016

Beach monitoring

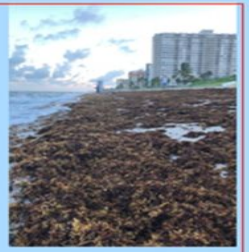


1. Dania Beach
Sept. 28, 2018
Category 2

2. Oleta River State Park
Aug 2, 2018
Category 3

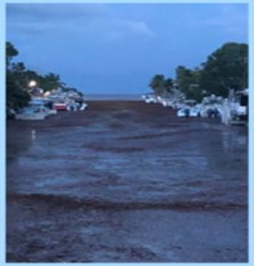


3. Hallandale Beach
Aug 18, 2018
Category 2

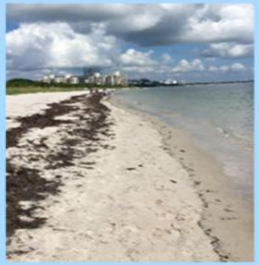


4. Hallandale Beach
Oct 1, 2018
Category 3

5. Islamorada
Aug 12, 2018
Category 1



6. Key Largo
Sept. 6, 2018
Category 4



7. Bill Baggs State Park
Sept. 15, 2018
Category 1

8. Deering Estate
Aug. 15, 2018
Category 3

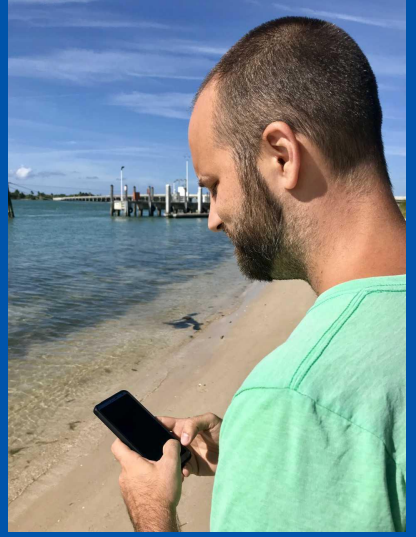
9. Miami Beach Pier
Sept. 14, 2018
Category 1

10. Crandon Park
July 10, 2018
Category 3

Informative map (Category 1-5)

Engaging the community

- Attend community events to present the project and encourage participation
- Train local groups to follow sargassum reporting protocol
- Report sargassum sightings on social network (CitSciMobile, iNaturalist, SEAFAN, or a dedicated website)
- Build on Bay Drift study results
- Provide real time map updates

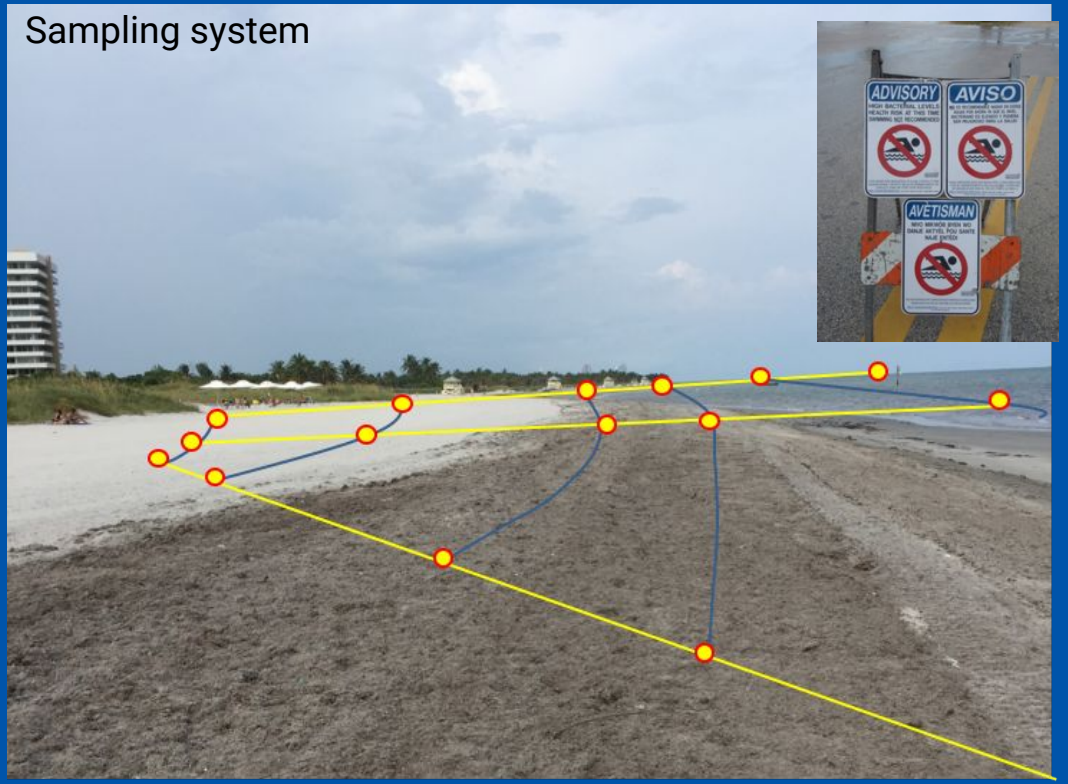


Citizen reporting sargassum

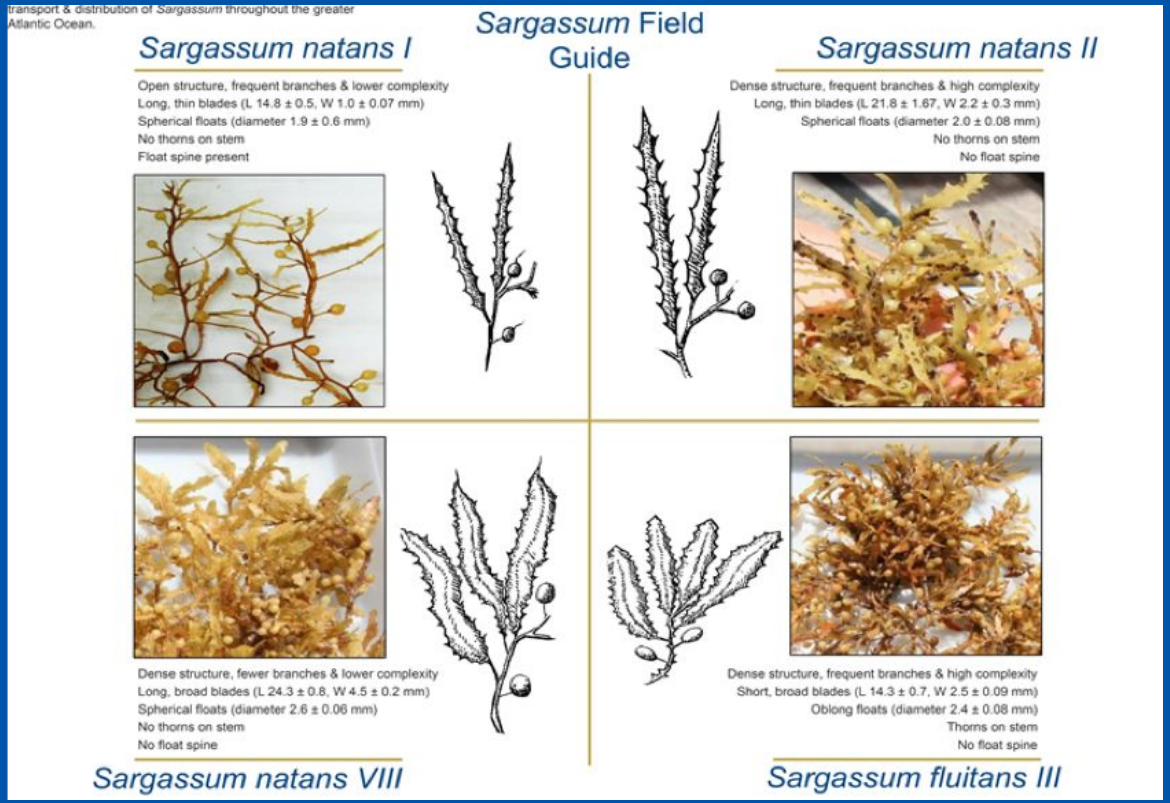
Community outreach events

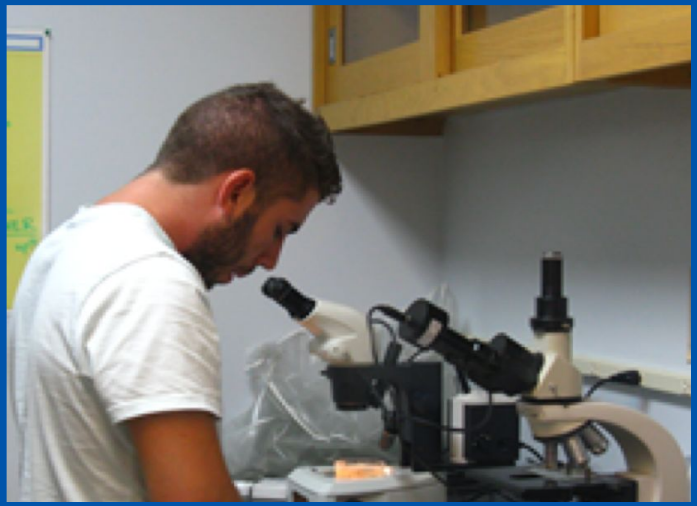
Beach management : sampling system

- Consequences of **sargassum integration** on bacteria levels, and beach closures
- Implement a sampling program with transects across the seaweed integration zone before, during, and after seaweed events



Species identification and nutrient analysis





FIU College of Arts, Sciences & Education - Institute of Water and Environment
Southeast Environmental Research Center

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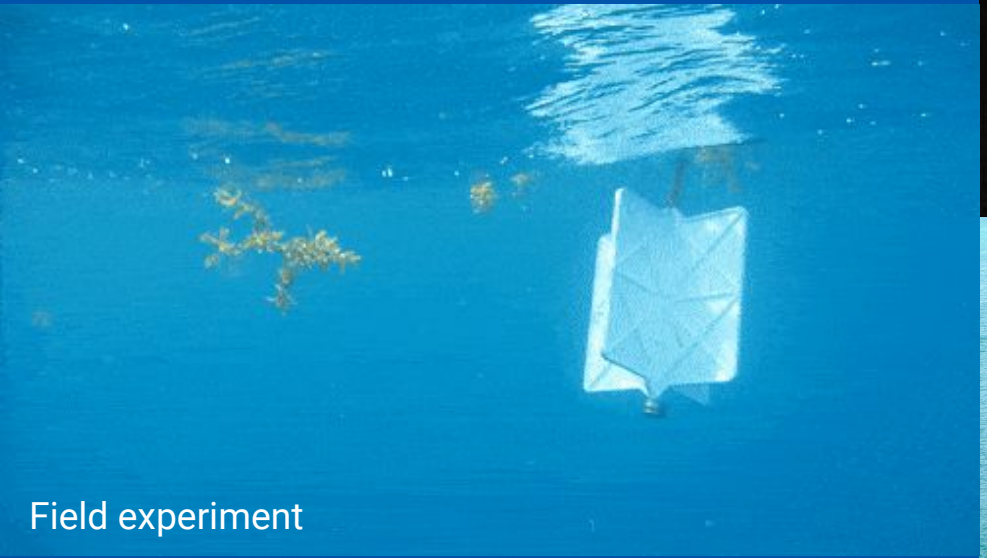
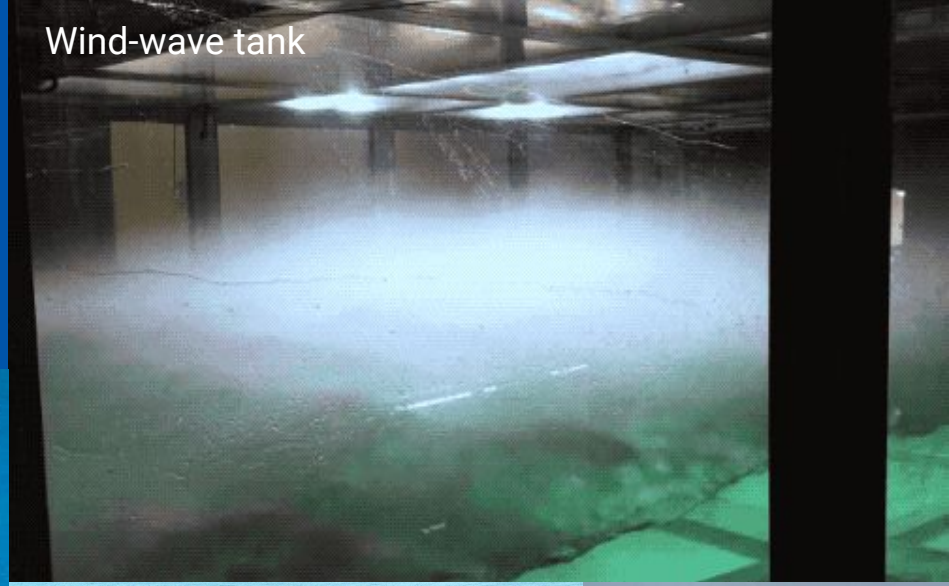
CAChE Nutrient Analysis Core Facility

The CAChE Nutrient Analysis Core Facility represents three distinct services and opportunities through its related but distinct spaces at Florida International University; first, it serves as a NELAC-accredited nutrient analysis laboratory to directly support research; second, it contains a dedicated student area for education and training related to traditional water quality analyses; and finally, it provides a space where students and faculty can work to improve or innovate technologies, and develop alternative or novel techniques, including the use of liquid, gas and ion Chromatography.

Infrastructures



Field experiment



Wind-wave tank

Research vessel, helicopter and satellite imagery (CSTARS)

Drones

Summary

With the expertise of the assembled multidisciplinary universities and leveraging university infrastructures:

- Gain an understanding of something that we know little about
- Publicly available results will guide development of policy and procedures to mitigate future impacts (for local authorities and stakeholders)
- Provide early sargassum warning to help preparation
- Open the doors to new business opportunities

For a 3 year-long project, we estimated a total cost of $1.5 million.


Sargassum: the ‘new normal’ ?
Photo credit : Taneos Ramsay