UWI-CERMES Sargassum Activities
UWI-CERMES Activités Sargassum

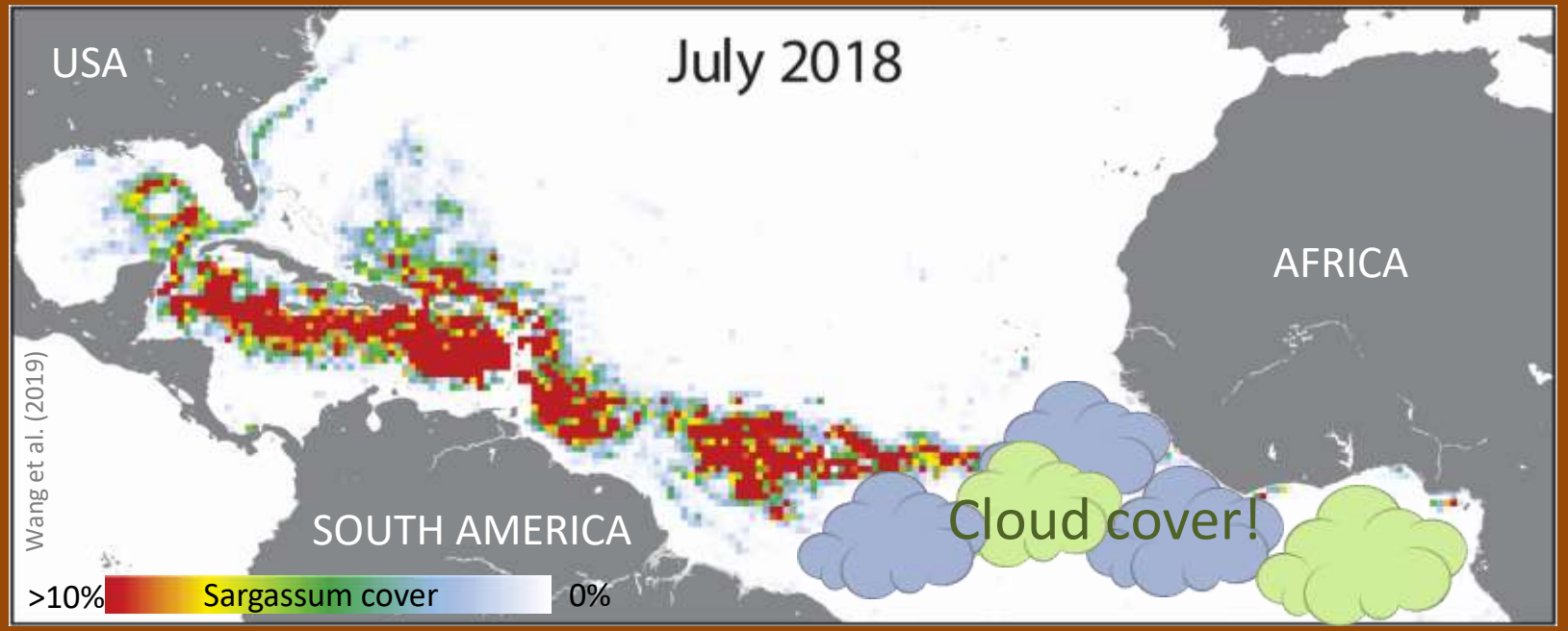
Section 1: Dr. Shelly-Ann Cox
Section 2: Anne Desrochers (PhD candidate)

Contributors: Hazel A. Oxenford, A. Karima Degia, J. Cumberbatch and P. McConney

Rotary District 7030 Conference
Thursday, 22 April 2021 | 1800 hrs

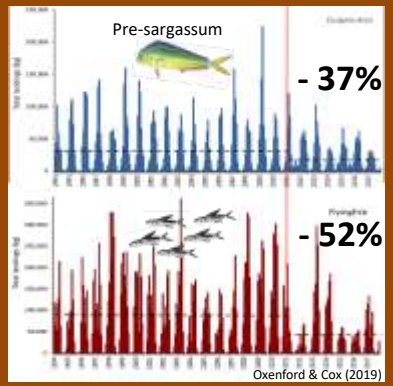
Photo credit: W. Paul Doyle

The Great Atlantic Sargassum Belt
La Grande Ceinture de Sargasses de l'Atlantique



Multi-sectoral impacts
Impacts multisectoriels

FISHERIES/PÊCHE

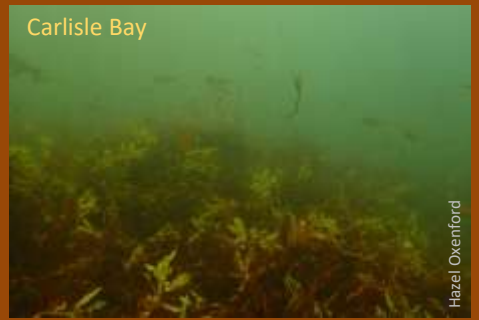


HEALTH/
SANTÉ

TOURISM/
TOURISME

FINANCE

ENVIRONMENT/
ENVIRONNEMENT



CERMES and Sargassum

Education and public awareness

UWI-CERMES has been at the forefront of communicating sargassum science & innovations since the very first influx in 2011:

- Presentations at numerous regional and international events
- Hosted Sargassum Symposia in 2015 & 2018

CERMES et Sargasses

Éducation et sensibilisation du public

UWI-CERMES a été à l'avant-garde de la communication des sciences et innovations sargasses depuis le tout premier afflux en 2011:

- Présentations lors de nombreux événements régionaux et internationaux
- A organisé des symposiums Sargasses en 2015 et 2018

VISIT OUR WEBSITE / VISITEZ NOTRE SITE INTERNET

https://www.cavehill.uwi.edu/cermes/projects/sargassum/home.aspx

Medium-term forecasting

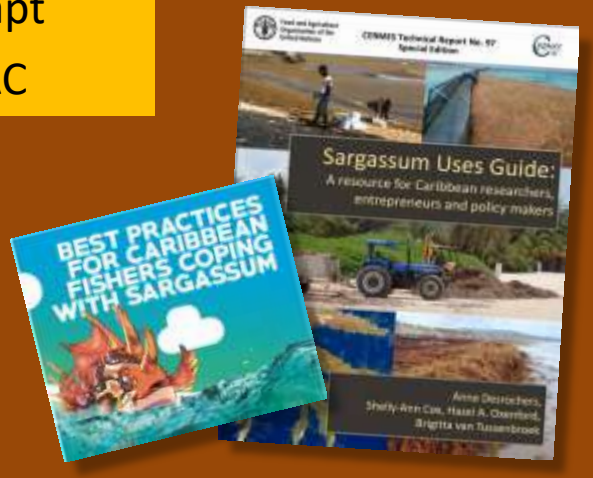
Research projects underway

CC4FISH Sargassum

SargAdapt

SarTRAC

Good practice guides



Management strategies

Prévisions à moyen terme

Projets de recherche en cours

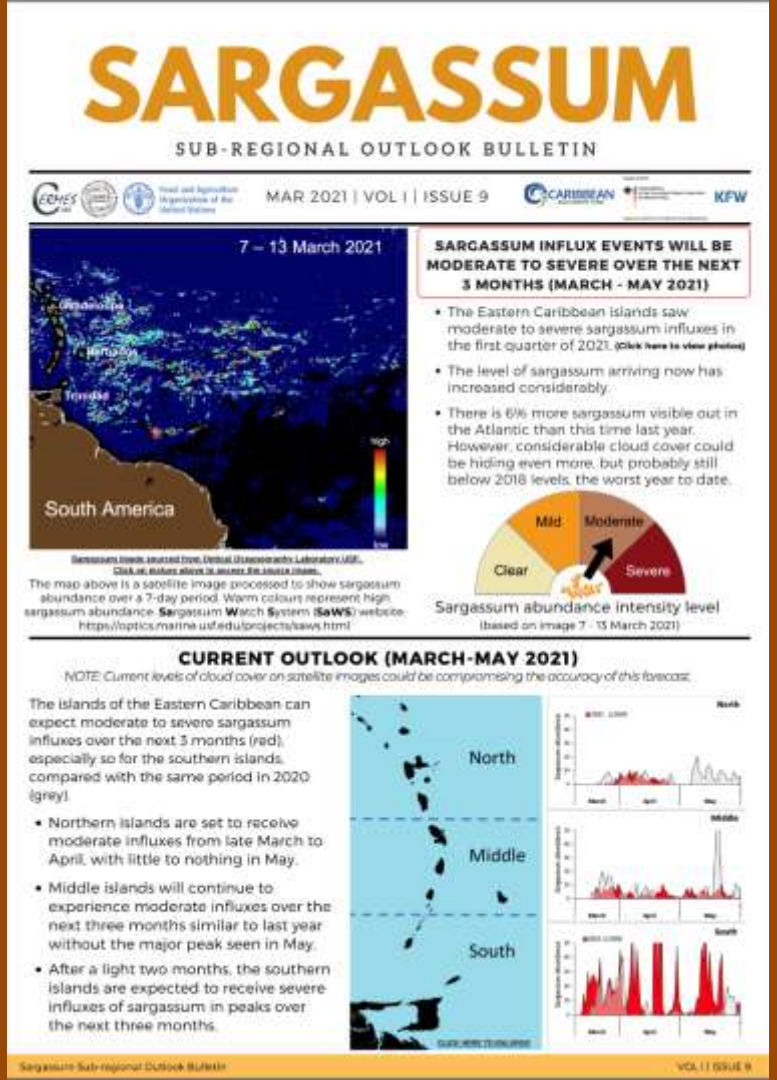
CC4FISH Sargassum

SargAdapt

SarTRAC

Guides de bonnes pratiques

Stratégies de gestion



SARGASSUM

SUB-REGIONAL OUTLOOK BULLETIN

MAR 2021 | VOL I | | ISSUE 9

7 – 13 March 2021

South America

The map above is a satellite image processed to show sargassum abundance over a 7-day period. Warm colours represent high sargassum abundance. **S**argassum **W**atch **S**ystem (**SaWS**) website: https://optics.marine.usf.edu/projects/saws.html

SARGASSUM INFLUX EVENTS WILL BE MODERATE TO SEVERE OVER THE NEXT 3 MONTHS (MARCH - MAY 2021)

- The Eastern Caribbean islands saw moderate to severe sargassum influxes in the first quarter of 2021. **(Click here to view photos)**
- The level of sargassum arriving now has increased considerably.
- There is 6% more sargassum visible out in the Atlantic than this time last year. However, considerable cloud cover could be hiding even more, but probably still below 2018 levels, the worst year to date.

Clear | Mild | Moderate | Severe

Sargassum abundance intensity level

(based on image 7 - 13 March 2021)

CURRENT OUTLOOK (MARCH-MAY 2021)

NOTE: Current levels of cloud cover on satellite images could be compromising the accuracy of this forecast.

The islands of the Eastern Caribbean can expect moderate to severe sargassum influxes over the next 3 months (red), especially so for the southern islands, compared with the same period in 2020 (grey).

- Northern islands are set to receive moderate influxes from late March to April, with little to nothing in May.
- Middle islands will continue to experience moderate influxes over the next three months similar to last year without the major peak seen in May.
- After a light two months, the southern islands are expected to receive severe influxes of sargassum in peaks over the next three months.

North

Middle

South

Sargassum Sub-regional Outlook Bulletin VOL I | ISSUE 9

Sub-regional Sargassum Outlook Bulletin provides medium-range (3-monthly) island-scale forecasts of sargassum influxes to the Eastern Caribbean

Le Bulletin sous-régional sur les perspectives des sargasses fournit des prévisions à moyen terme (tous les trois mois) des afflux de sargasses vers les Caraïbes orientales à l'échelle insulaire

https://www.cavehill.uwi.edu/cermes/projects/sargassum/outlook-bulletin.aspx

FAO/CERMES

Sargassum Management Policy Brief

Note d'information sur la politique de gestion des sargasses

http://www.fao.org/documents/card/en/c/cb4154en

Project SargAdapt

Problem: Since 2011, islands in the Eastern Caribbean have been experiencing Sargassum influx events

Project long title: Adapting to a new reality: managing responses to influxes of sargassum seaweed in the Eastern Caribbean as ecosystem hazards and opportunities

PROJECT GOAL

To reduce the impacts of and improve adaptation to sargassum influxes in the Eastern Caribbean, with emphasis on converting a climate-linked ecosystem hazard into an asset that supports opportunities for socio-economic development.

PROJECT DURATION: Dec 2019 to Dec 2022

OVERVIEW

THREE CORE PROJECT COMPONENTS

1. Knowledge Mobilised
2. Capacity Developed
3. Adaptation Plans Institutionalised

PARTICIPATING COUNTRIES

Barbados, Dominica, Grenada, St. Lucia, St. Vincent & the Grenadines

Grant funding **USD $981,392.75**
From the EBA Facility of the Caribbean Biodiversity Fund

A project of the Caribbean Biodiversity Fund Ecosystem based Adaptation Facility with financing from the International Climate Initiative (IKI) of the German Federal Ministry for Environment, Nature Conservation, and Nuclear Safety through KfW

Project Components

1. KNOWLEDGE MOBILISED

Enhancing knowledge / understanding of patterns and impacts of sargassum

Outcome: Stakeholders' knowledge enhanced to appropriately respond and adapt to sargassum influxes with good practices.

Activities:-

- Research and data collection
- Economic assessment
- Monitoring protocols
- Tools & guidance materials
- Knowledge platform

2. CAPACITY DEVELOPED

Enhancing technical and institutional capacity

Outcome: Networks and partnerships built among science, industry and community stakeholders to promote best practices and innovation and sustain adaptation to sargassum influxes.

Activities:-

- Establish network of stakeholders
- Capacity development packages
- Delivery of training
- Regional Action Learning Group
- Technical and Organisational Assistance

3. ADAPTATION PLANS INSTITUTIONALISED

Adaptation through practical applications

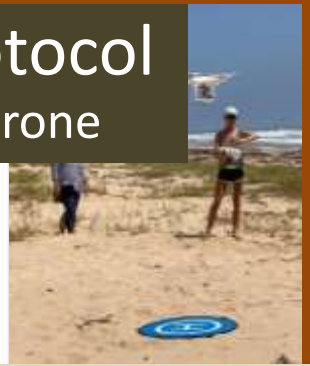
Outcome: Sargassum-smart communities with tangible climate adaptation benefits and reduced climate risk

Activities:-

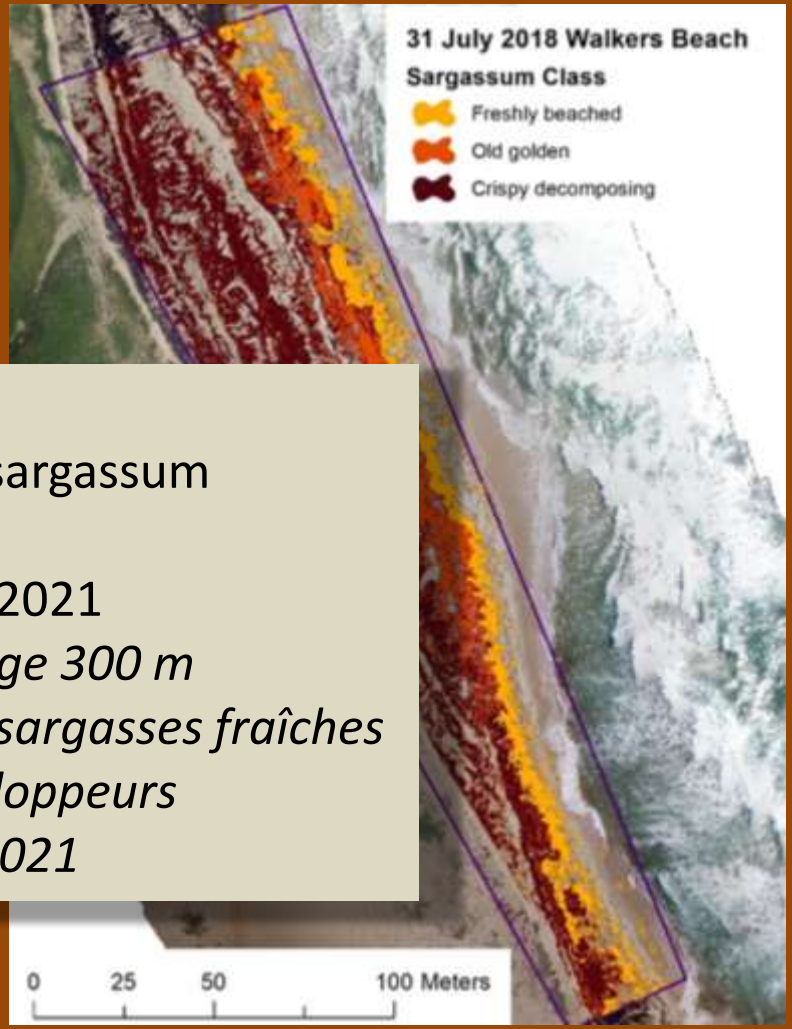
- Continue production of the Eastern Caribbean sub-regional Sargassum Outlook Bulletin
- Community based demonstration projects
- Sargassum Symposium III w/ Expo
- Community and Sectoral Adaptation Plans
- Lessons learned

FOR MORE INFORMATION:
EMAIL: cermes@cavehill.uwi.edu
PROJECT WEBSITE: https://www.cavehill.uwi.edu/cermes/projects/sargassum/sargodapt

Drone Monitoring Protocol
Protocole de Surveillance de Drone



- Mapping 300 m section of beach
- Classifying image to detect fresh sargassum
- Working on tools with developers
- Hope to have protocol ready mid 2021
- *Cartographie d'une section de plage 300 m*
- *Examen de l’image pour détecter sargasses fraîches*
- *Travailler sur des outils avec développeurs*
- *S'attend à avoir un protocole mi 2021*



Adaptation Institutionalised / Adaptation Institutionnalisée

- Continue production of **Sargassum Outlook Bulletin**
- Implement community-based **Demonstration Projects**
- Convene third **Sargassum Symposium** in 2022
- Develop Community and Sectoral **Adaptation Plans**

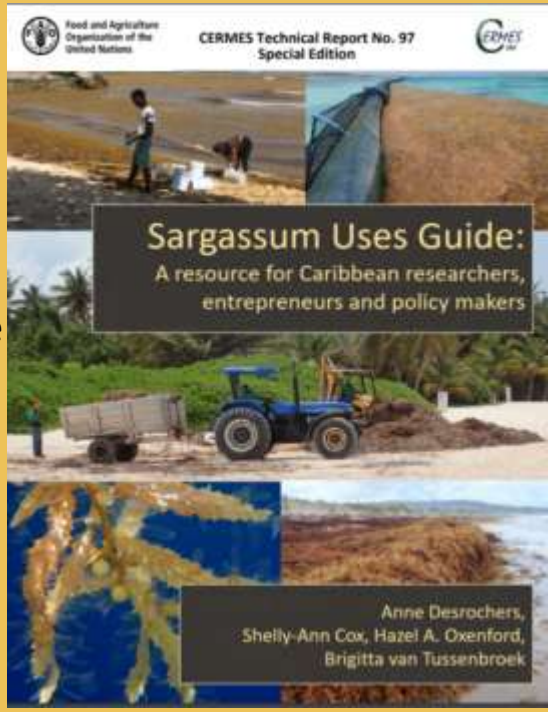
- Poursuivre production du **Bulletin Perspectives Sargasses**
- Concevoir **Projets de Démonstration** communautaires
- Organiser le troisième **Symposium sur les Sargasses** en 2022
- Élaborer **Plans d'Adaptation** communautaires et sectoriels

Sargassum Uses and Opportunities
Utilisations et Opportunités des Sargasses

- UWI-CERMES & FAO-CC4FISH
- For: researchers, entrepreneurs and policy makers
- *Pour: chercheurs, entrepreneurs et décideurs*

- Overview of chemical composition
- Potential uses
- Biomass scalability index
- Case studies
- Directory
- Challenges, implications & moving forward

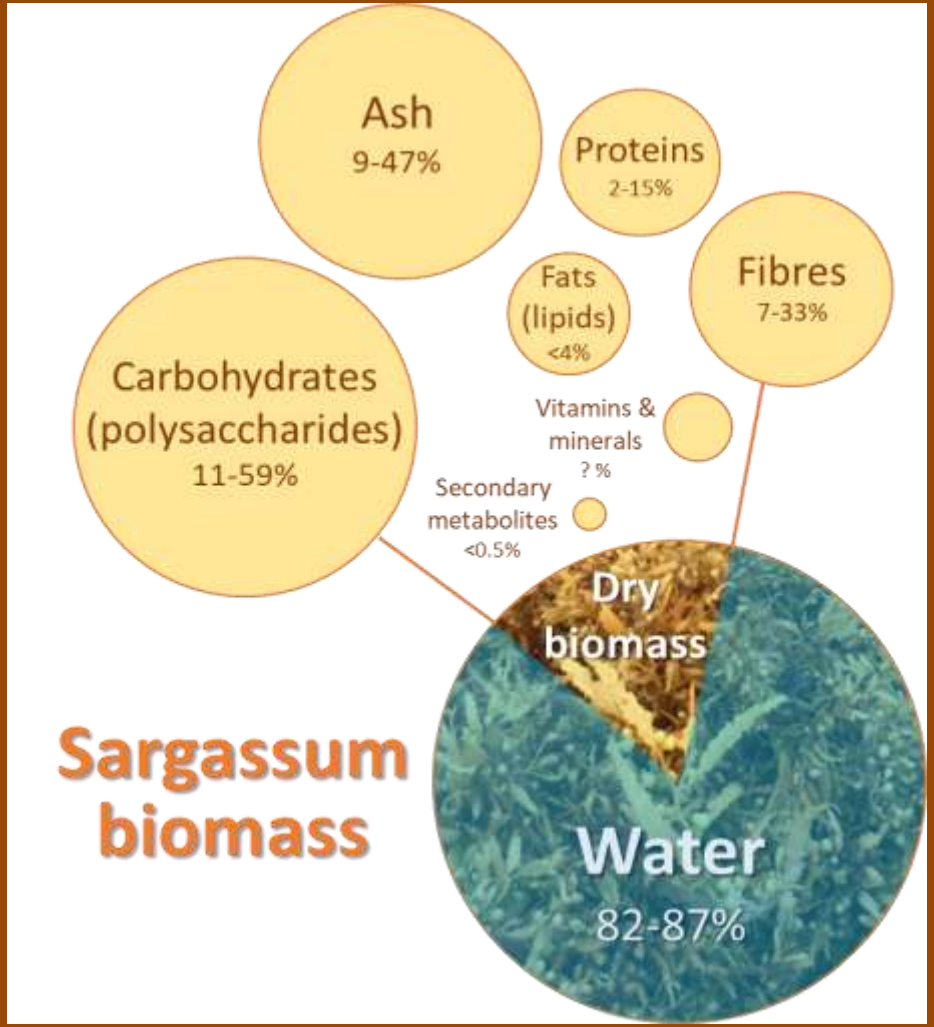
- Aperçu de la composition chimique
- Utilisations potentielles
- Indice d'évolutivité de la biomasse
- Études de cas
- Annuaire
- Défis, implications et aller de l'avant



What is sargassum made of?

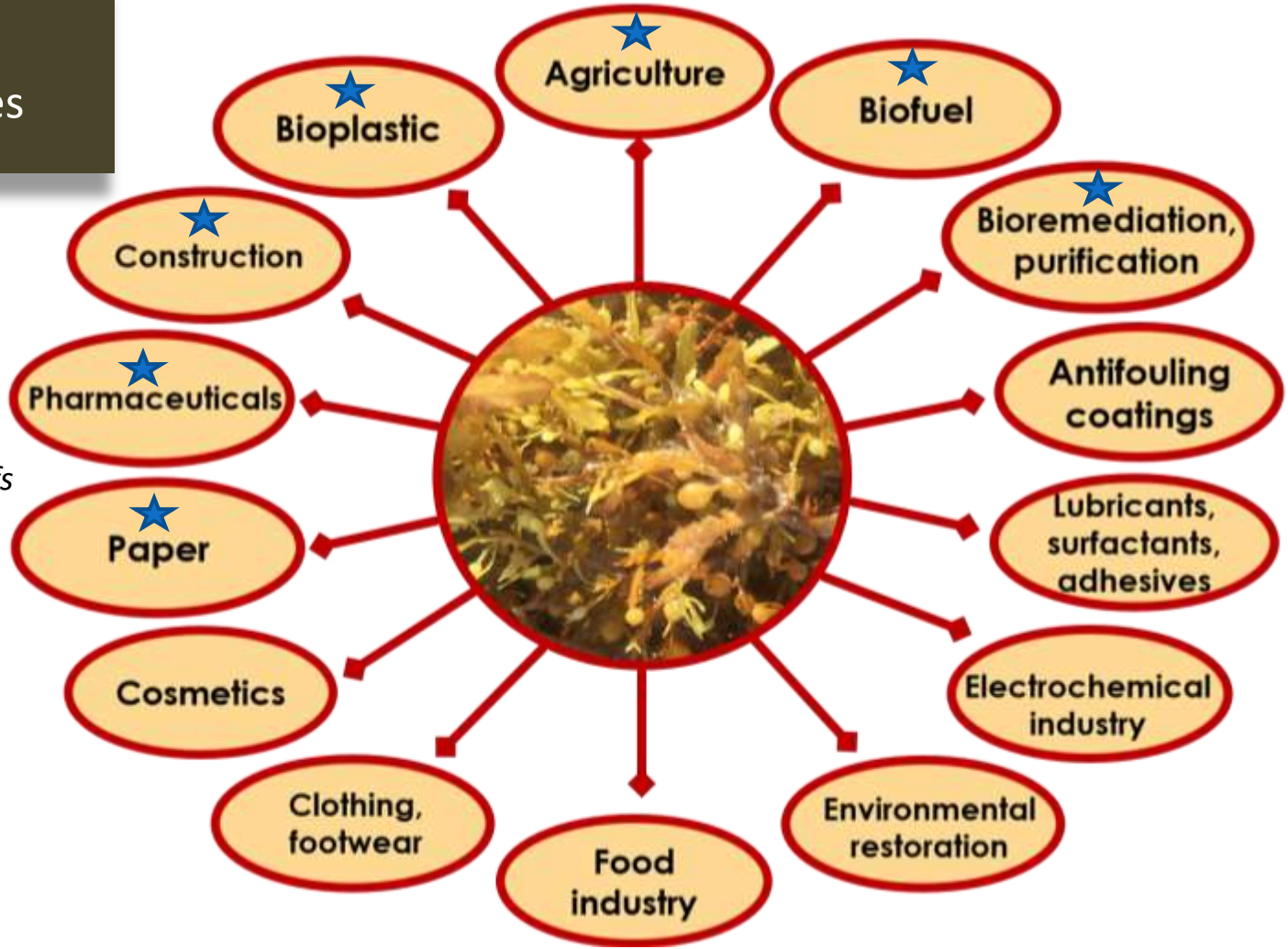
De quoi est fait le sargasse?

Graphique français non disponible, veuillez vous référer à la traduction audio.



Potential Uses
Utilisations Potentielles

Agriculture
Biocarburant
Bioremédiation, purification
Revêtements antisalissures
Lubrifiants, tensioactifs, adhésifs
Industrie électrochimique
Restauration environnementale
Industrie alimentaire
Vêtements, chaussures
Produits de beauté
Papier
Médicaments
Construction
Bioplastique



Pollutants/Polluants - Arsenic

- High biosorbent properties – adsorb and absorb heavy metals and pollutants
- High levels of arsenic from Mexican-Caribbean Sea
- May limit potential uses
- Need for frequent testing
- *Propriétés biosorbantes élevées - adsorbe et absorbe les métaux lourds et les polluants*
- *Niveaux élevés d'arsenic dans la mer du Mexique et des Caraïbes*
- *Peut limiter les utilisations potentielles*
- *Besoin de tests fréquents*

Element concentrations in pelagic *Sargassum* along the Mexican Caribbean coast in 2018-2019

ABSTRACT

Arsenic and chlordecone contamination and decontamination toxicokinetics in *Sargassum* sp.

Agriculture

Animal Husbandry / Élevage

- Used as feed supplement to improve productivity, health, stress tolerance, immune system
- Rich nutritional composition
- Protein content <15%, however prebiotic activity
- Reduced livestock CH_4 emissions: GHG mitigation?
- *Utilisé comme complément alimentaire pour améliorer productivité, santé, tolérance au stress, système immunitaire*
- *Composition nutritionnelle riche*
- *Teneur en protéines <15%, mais activité prébiotique*
- *Réduction des émissions de CH4 du bétail: atténuation des GES?*

Agriculture

Crop Production	La Production Agricole
Soil amendment: biochar	*Amendement du sol: biochar*
Mulch	*Paillis*
Compost	*Compost*
Fertilizer - plant tonic, bio-stimulant	*Engrais - tonique végétal, bio-stimulant*
Crop protection	*Protection des cultures*
Growth substrate for mushroom	*Substrat de croissance pour champignon*

Biofuel / Biocarburant

- Bioethanol / Bioéthanol
- Bio pellets / Granulés bio
- Biomethane / Biométhane

Energy Algae

Pharmaceuticals / Médicaments

Unique polysaccharides & secondary metabolites used in pharmaceuticals

Used as thickeners, stabilisers, for controlled-release drugs and also have biomedical properties

Used in traditional Chinese medicine

Polysaccharides uniques et métabolites secondaires utilisés dans les produits pharmaceutiques

Utilisé comme épaississant, stabilisant, pour les médicaments à libération contrôlée et possède également des propriétés biomédicales

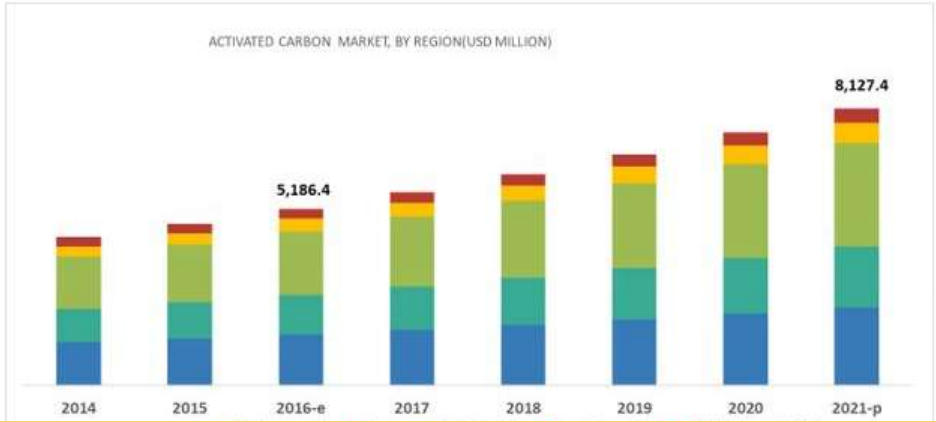
Utilisées en médecine traditionnelle chinoise

Activated Carbon / Charbon Actif

High adsorptive capacity – multi-industry

Capacité d'adsorption élevée - multi-industrie

Water & wastewater treatment	Traitement de l'eau et des eaux usées
Air & gas purification	Purification de l'air et du gaz
Pollution bioremediation	Bioremédiation de la pollution
Cosmetics	Produits de beauté
Food processing & beverage	Transformation alimentaire et boisson
Pharmaceutical & medical	Pharmaceutique et médical
Agriculture	Agriculture
Electrochemical industry (supercapacitors)	Industrie électrochimique (supercondensateurs)



Global Activated Carbon market value (projected):
Valeur marchande mondiale du Charbon Actif (projetée):

US$8 bn / 8 milliards USD!

Paper Products / Produits en Papier

Cellulose fibre is the major constituent of paper products

Advantages of using algae-based cellulose vs wood

Algae-based paper products mostly handmade

Algal-based paper made in Chile for fruit protection and preservation during export

Fibre de cellulose est principal constituant des produits en papier

Avantages de la cellulose à base d'algues par rapport au bois

Produits en papier à base d'algues pour la plupart faits à la main

Papier à base d'algues fabriqué au Chili pour la protection et la conservation des fruits lors de l'exportation

Construction

Demand for sustainable building materials

Algae biomass used for foam boards, insulation sheeting, slabs and bio-asphalt

Brown seaweed used to make furniture and particle board

Demande de matériaux de construction durables

Biomasse d'algues utilisée pour les panneaux de mousse, les feuilles isolantes, les dalles et le bio-asphalte

Algues brunes utilisées pour fabriquer des meubles et des panneaux de particules

Bioplastics / Bioplastiques

Plastic pollution is a worldwide concern

Bioplastics provide an alternative to petroleum-based plastics

Macroalgae-based bioplastics gaining interest: can use as feedstock or as extraction products

La pollution plastique est une préoccupation mondiale

Les bioplastiques constituent une alternative aux plastiques à base de pétrole

Les bioplastiques à base de macroalgues gagnent en intérêt: peuvent être utilisés comme matière première ou comme produits d'extraction

Sargassum Biomass Index

Indice de la Biomasse des Sargasses

Graphique français non disponible, veuillez vous référer à la traduction audio.

Challenges in developing uses with Sargassum
Les défis du développement des utilisations avec Sargassum

Unpredictability & inconsistency in supply	Imprévisibilité et incohérence dans l'offre
Variable composition	Composition variable
Salt & sand content	Teneur en sel et sable
Pollutants – Heavy metals	Polluants - Métaux lourds
Harvesting & equipment	Récolte et équipement
Health related issues	Problèmes liés à la santé
Transport & storage	Transport et stockage
Monitoring, regulations & management plans	Suivi, réglementation et plans de gestion
Access to research & development funding	Accès au financement de la recherche et du développement

Summary / Résumé

Many potential applications already commercialised in region

Research/commercialisation in many countries

More testing to understand composition, presence of metals

No one-use-fits-all, consider local context / impacts (environmental, social, economic)

De nombreuses applications potentielles déjà commercialisées dans la région

Recherche / commercialisation dans de nombreux pays

Plus de tests pour comprendre la composition, la présence de métaux

Pas de solution universelle, tenez compte du contexte / des impacts locaux (environnementaux, sociaux, économiques)

Contact Information / Coordonnées

Shelly-Ann Cox, Ph.D.

Postdoctoral Research Associate

Associé de recherche postdoctoral

shelly-ann.cox@cavehill.uwi.edu

Anne Desrochers, M.Sc.

PhD Candidate

Doctorant

anne.desrochers@mycavehill.uwi.edu

Directory of Researchers & Entrepreneurs / Annuaire des Chercheurs & Entrepreneurs:

Sargassum Uses Guide (Page 124)

https://www.cavehill.uwi.edu/cermes/projects/sargassum/docs/desrochers_et_al_2020_sargassum_uses_guide_advance.aspx

Centre for Resource Management and Environmental Studies (CERMES), University of the West Indies, Cave Hill Campus, Barbados

Kim Baldwin