

Interreg Caraïbes

Fonds européen de développement régional



SARG'COOP 
Programme caribéen de coopération de
lutte contre les algues sargasses

CONFÉRENCE INTERNATIONALE SUR LES **SARGASSES**

DU 23 AU 26 OCTOBRE 2019

— COMPLEXE WORLD TRADE CENTER, GUADELOUPE —



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The Prime Minister of the French Republic, Mr. Edouard PHILIPPE,

The President of the Guadeloupe Region, Mr. Ary CHALUS,

As well as their partners

Are pleased to invite you to

The International Sargassum Conference

From October 23rd to 26th, 2019

At the World Trade Center Complex in Guadeloupe

Major strandings of Sargassum seaweed have reached Caribbean Sea beaches since 2011. However, the unprecedented scale and intensity of the 2018 crisis posed a new and major threat to the economy, ecology and health of the inhabitants of the territories involved.

This conference lays the foundations for efficient and pragmatic cooperation to provide functional and operational responses to Sargassum strandings that have become recurrent. It will bring together Heads of State, heads of regional and international organizations, companies, members of the civil society, researchers and academics from the Caribbean. The conference also aims to present the operational projects already implemented at regional level, to create the tools to support the most relevant initiatives and to identify possible funding.

The first day will be devoted to the state of knowledge on the theme of Sargassum and remote sensing. The highlight of this first day: the announcement of the winners of the «Sargassum» Call for Projects in partnership with the National Research Agency. It constitutes the starting point for long-term action to federate initiatives at the regional level.

The second day will be dedicated to sharing experiences and highlighting strategies for combating, collecting and recycling in the territories. Finally, the last day, which will be of an institutional nature, will bring together Caribbean Heads of State and multilateral organizations, thus providing an opportunity to start thinking about the definition of a common geopolitical strategy.

Moreover, beyond the mobilization on a regional scale reflected by the calling of the Conference, the Guadeloupe Region is attentive to supporting companies in implementing innovative solutions. In conjunction with the Conference, a trade show, Sarg'Expo, will be open to companies involved in the detection, collection, treatment and recycling of Sargassum. For more information on Sarg'Expo: <https://www.sargexpo.fr/>

For more information on the Sargassum International Conference:
<https://www.sargassum2019.com/>

EDITORIAL OF THE PRIME MINISTER OF THE FRENCH REPUBLIC



Since 2011, the coastline of the Caribbean Sea and the central Atlantic Ocean has been experiencing increasingly worrying episodes of Sargassum seaweed strandings. 2018 was marked by a sharp increase in the phenomenon, the economic, tourist and environmental consequences of which were particularly significant throughout the maritime basin.

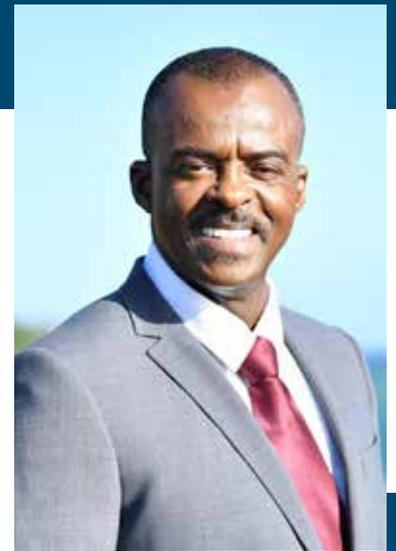
Faithful to its commitments in the field of environmental preservation, France has decided to create the conditions for a vast international mobilization. This is the mission I entrusted in 2017 to the Senator of Guadeloupe, Dominique Théophile, who visited several Caribbean States concerned by Sargassum strandings.

The Guadeloupe Region is co-financing, with the support of European INTERREG funds, the implementation of a multi-annual study and monitoring program. Its aim is to cover and document in a very precise way all aspects of the phenomenon, whether scientific, economic, environmental or health. The international conference to be held in Guadeloupe from October 23rd to 26th will be the starting point for this mobilization, both for knowledge and applied research and for solutions for the control and treatment of Sargassum.

In my opinion, this conference must meet several objectives, consistent with sharing knowledge and experiences on a Caribbean scale: answering questions raised by the public, providing solutions to company managers who fear for their business activities; and finally, identifying ways of recycling this seaweed which can also constitute an opportunity for innovation and development. As for me, I will express at this conference the support of the national community for the populations concerned and the attention that my government and I attach to this issue, which requires treatment that is transversal, international and sustainable.

Edouard PHILIPPE

EDITORIAL OF THE PRESIDENT OF THE GUADELOUPE REGION



In Guadeloupe, in the coastal regions of the Caribbean Sea and the Gulf of Mexico, the massive invasion of Sargassum seaweed has caused unprecedented damage to the security of property and populations, the local economy and biodiversity.

In response to these observations, the Guadeloupe Region, within the framework of its powers in the field of decentralized cooperation and its recent accession to the Organization of Eastern Caribbean States (OECS), wanted to create a model and stimulate genuine cooperation between local authorities and the associative and private sectors within the affected territories.

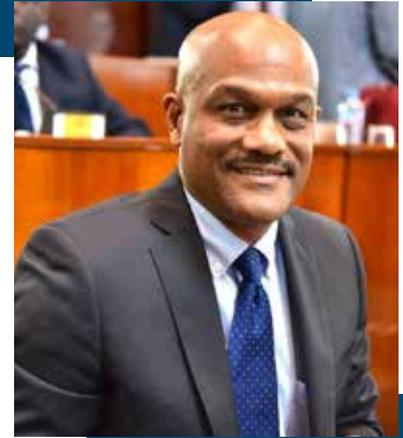
Thus, the Conference will officially launch SARG'COOP, the Caribbean Program of Cooperation in the Fight against Sargassum seaweed. This ambitious project, financed by INTERREG, is supported by the Regional Authority, which is positioning itself as a leader in this multitude of still underdeveloped solutions.

The Conference embodies a commitment on the part of partner and participating governments to improve the resilience and coordination of territories but also to increase the protection of populations while ensuring a rationalization of resources.

The International Summit on 26 October is a decisive step for the peoples of the Caribbean. The objective is that our populations should no longer have to suffer from the harmful consequences of Sargassum seaweed but that they may instead benefit from the opportunity that the strandings represent. To this end, we will defend a common position in favor of including this phenomenon on the agenda of national and international bodies.

Ary CHALUS

EDITORIAL OF SENATOR DOMINIQUE THEOPHILE REGIONAL ADVISER, HEAD OF FRENCH MISSION FOR SARGASSUM



I am delighted that, owing to the Guadeloupe Region's determination and voluntarism (thank you to President CHALUS), this conference has been made possible and is taking place in Guadeloupe.

I would like to express my deep satisfaction at seeing the realization of the main recommendation contained in the report I had the honor to present to the Prime Minister on February 5, 2019. I called for the holding of an international conference on Sargassum in Guadeloupe, consistent with the international discussions that had been conducted on this topic in other forums, and I am thinking in particular of the reflections initiated under the auspices of the Association of Caribbean States.

I wish to thank very deeply the Governments of Mexico, the Dominican Republic and Saint Lucia for giving me their warmest welcome, as well as our Eastern Caribbean partners, during my visits to their territories as part of the mission entrusted by the French Prime Minister (Edouard PHILIPPE).

I am very happy that we have the opportunity to receive them in Guadeloupe and naturally I welcome them.

This is an exceptional opportunity to discuss a subject that now conditions the future of our regions.

I wish you all a great conference.

Dominique THEOPHILE

EDITORIAL OF THE DIRECTOR GENERAL OF THE ORGANIZATION OF THE EASTERN CARIBBEAN STATES (OECS)

Combating Climate Change, Together

The yearly influx of Sargassum presents yet another environmental challenge for the small island developing states of the Eastern Caribbean that may be attributed to the changing climate, increased ocean temperatures and pollution.

In 2018, more than 20 million tons of Sargassum carpeted the surface of the Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico; seriously affecting quality of life, human health, well-being, and Socio-economic activities such as coastal tourism, fisheries and navigation.

We call on the private sector and civil society to join with government rising to these unique challenges being faced in the region.

Innovative and successful initiatives such as Algas Organics, by OECS 30 Under 30 Winner, Johanan Dujon, should be supported and replicated.

Despite our vulnerabilities, we can reconcile economic growth with climate resilience by effective resources management, strategic utilization of the information and tools, and through partnerships and collaboration.

This International Conference on Sargassum is a substantial step in the right direction, bringing together scientists, policy-makers, and entrepreneurs; and serving as a hub for innovative ideas, deepened cooperation, and collective action.

It was estimated that cleanup of Sargassum could cost the Caribbean at least \$120 million in 2018.

While we will not shy away from this challenge, on the frontlines of a war we did not start, we do, however, call on those responsible to provide support.

We look forward to working with our OECS Member States and the wider regional and international community to better understand and plan for our new reality through the elaboration of a regional response plan and harmonized Sargassum management protocols.

We hold strong to the belief that the whole is stronger than the sum of its parts, and that together, we can find



Dr. Jules DICACUS

EDITORIAL OF THE SECRETARY GENERAL OF THE ASSOCIATION OF CARIBBEAN STATES (ACS)

No matter which part of the Greater Caribbean you come from, Sargassum and invasive species affect you. The number one priority of the Association of Caribbean States is ensuring the sustainable development of the Greater Caribbean and the protection and preservation of our common patrimony, the Caribbean Sea.

You only have to look to the South Eastern end of our Caribbean Sea, for example, and you will see that the invasive seaweed is stifling the Flying Fish, popular on plates and a staple for the Barbadian economy, and those of the Eastern Caribbean. Look to the North West and you will see Sargassum covering Mexico's Caribbean beaches. The government has spent some US \$17 million to remove over half a million tonnes of this biohazardous species. There are no boundaries; Sargassum affects our biggest democracy and our smaller ones too.

Since 2011, when the first massive bloom invaded our Caribbean blues and greens, we have not allowed Sargassum to suffocate us. In 2015, the ACS and its Caribbean Sea Commission organized the symposium examining the impact of Sargassum: Challenges, Dialogue & Cooperation towards Sustainability of the Caribbean Sea. We are raising awareness of this hazard- whether through representation at the United Nations or engaging with young people and coastal communities. We are engaging with scientists, innovators and policy-makers who can help us solve this problem. That is why we are actively cooperating with the Regional Council of Guadeloupe on The International Sargassum Conference.

This conference and its exposition - Sarg' Expo 2019 can only move us forward with science-based, innovative, business-smart and culturally-friendly solutions - solutions that will benefit the 280+ million people of the Greater Caribbean.



Dr June SOMER

EDITORIAL OF THE PRESIDENT OF THE REGIONAL COMMISSION ON COOPERATION, EUROPEAN AFFAIRS AND UNIVERSITY



Focus on the International Conference on Sargassum Seaweed, the first event of its kind in the Caribbean that will put the islands of Guadeloupe in the spotlight, and for a few days at the heart of today's environmental preoccupations.

Guadeloupe welcomes all Caribbean policy makers and economic actors around a common issue: the massive invasion of Sargassum seaweed.

In response to this challenge: SARG'COOP, the first cooperation program, initiated by the Guadeloupe Region, aims to structurally influence national and regional strategies for risk reduction and management of Sargassum seaweed.

SARG'COOP is a true win-win partnership that builds on a shared vision of environmental policy and protection of natural environments among Caribbean states and territories. We are thus touching on a problem that is at the heart of INTERREG Caraïbes 2014-2020 Operational Program. It involves creating together operational tools to better anticipate the impact of climate change and strengthen the resilience of island territories.

As the cornerstone of the cooperation program with our Caribbean partners, the Conference marks the political commitment of Caribbean Heads of State and regional international institutions such as the ACS and the OECS.

Together, we are building common awareness for the preservation of our environment and our ways of life.

Marie-Luce PENCHARD

EDITORIAL OF THE PRESIDENT OF THE REGIONAL COMMISSION ON ENVIRONMENT, WATER AND LIVING CONDITIONS



Our ambition within the regional community is to transform this wave of Sargassum seaweed on our Caribbean and American coasts, as well as the small sea of Sargassum in the making, into scientific, technical, economic and political opportunities.

Scientific opportunities to understand this phenomenon and its causes (impact of climate change and eutrophication processes with massive deforestation of the American continent); **technical and economic opportunities** to highlight our ingenuity and talent to create and innovate new tools or processes to collect, store and recycle this seaweed; **political opportunities** to establish trans-regional cooperation that extends far beyond the Caribbean basin.

We are working with international bodies to ensure that the Caribbean basin becomes a testing ground for assessing and combating the impacts of climate change. Our small islands are sentinel islands that must monitor the environment for our entire planet.

Sylvie GUSTAVE DIT DUFLO

8th Vice-President of the Region

President of the Guadeloupe Water and Biodiversity Committee

President of the Regional Commission on Environment, Water and Living Environment

THE INTERNATIONAL CONFERENCE ON SARGASSUM

A strategic event with international ambitions....

The International Sargassum Conference, to be held at the World Trade Center Complex in Guadeloupe, will bring together all those involved in the fight against Sargassum on October 24, 25 and 26, 2019.

The conference is divided into two parts:

The first part will better disseminate the knowledge of the phenomenon by taking stock of the means implemented in each partner and participating State or territory to mitigate the adverse effects of mass strandings on exposed coasts. The various strategies implemented by public authorities to limit economic, health and environmental impacts of the phenomenon will be identified as part of a benchmarking process of good practices.

The second part, «cooperation», in conjunction with regional multilateral organizations, aims to strengthen collaboration between Caribbean actors in this particular field. It will thus contribute to the definition of a common political strategy of the actors on this theme with a view to organizing concerted international actions.

In addition, it is expected that at the end of the Conference a joint declaration will be signed between the parties, thus announcing support of the signatories to carry the problem of Sargassum strandings to the agenda of the next Cartagena conference and its emblematic protocol. A common timetable and work objectives will be defined by the signatories.

... and an integral part of the INTERREG CARIBBEAN SARG'COOP program

SARG'COOP, the first Caribbean program to combat Sargassum seaweed, is the creation of a true «win-win» partnership. This cooperation program makes it possible to deal with all the issues related to this problem: forecasting and prevention of strandings, collection, treatment, recycling and impact prevention. It aims to strengthen cooperation on environmental issues and the protection of natural environments between Caribbean states and territories.

On the other hand, the project aims to strengthen cooperation at the Caribbean level on the theme of Sargassum in order to allow greater sharing and dissemination of the state of the art in science, but also methods and tools in all dimensions in consideration of the problem (forecasting, detection, collection, recycling, etc.). It is also a question of strengthening warning and communication mechanisms with regard to this phenomenon.

The ultimate objective of the project is to increase knowledge of the phenomenon and achieve better prevention and preparedness for the risks it presents.

The program, which lasts a total of 38 months, is organized into several activities and means.

Launching the «Caribbean Cooperation Program to Combat Sargassum Seaweed» through the International Sargassum Conference.

The Conference will bring together all actors in the fight against Sargassum and will be the basis for strong collaboration and partnership, sustainable between Caribbean States in the fight against Sargassum. The objective of the Conference is to improve the level of knowledge about the phenomenon of Sargassum seaweed.

The Caribbean Sargassum Forum

This activity is structured around two deliverables:

- the setting up and sustaining of a multidisciplinary network of actors of the quadruple helix in the prediction, detection, collection, treatment, recycling of Sargassum seaweed
- the creation of a collaborative virtual database fed by the network in order to identify: actors (public and private), state of the art in science, companies, solutions implemented (successes and failures), public policies to mitigate effects (e.g. Sargassum national plan). This tool, which makes it possible to centralize knowledge and practices, will facilitate their dissemination throughout the Caribbean.

The creation of a Caribbean monitoring and warning center

The mission of the center is to anticipate the appearance of Sargassum seaweed based on remote sensing meteorological tools, identify Sargassum seaweed blooms and disseminate information at the level of territories and populations in real time. It also includes the organization of awareness-raising workshops, expertise transfer and the production of educational documents for public authorities to set up information and warning tools for the population, civil society, communities and businesses.

The strong point of this tool is the implementation of technical and financial support measures for governments and local authorities to acquire air quality measurement sensors. In addition, a Caribbean warning guide and a grading system will be published, triggering administrative procedures adapted to each territory.

The populations of the States concerned, the main beneficiaries of the project, will see their situation improve insofar as the sharing of scientific art, the tools and activities developed within this cooperation will enable States to improve their capacity to anticipate, prevent and manage massive Sargassum strandings.

In addition, these strandings will now be a source of wealth thanks to the development of recycling and processing techniques.

The Guadeloupe Region and OECS will play a major role in the project to generate, support and institutionalize ownership of activities by partner structures and governments in the Caribbean basin.

THE GUADELOUPE REGION: A KEY PLAYER IN THE FIGHT AGAINST SARGASSUM

The Region has no direct authority ¹ for the collection and processing of Sargassum. The inter-ministerial mission carried out in 2016 ² on this subject in the West Indies specifies that the appropriate authority is that of the agglomérations. However, for several years now, the Region has been supporting local authorities in their Sargassum collection activities.

Support for local authorities and economic actors since 2017

The Guadeloupe Region has made a significant contribution to the management of Sargassum strandings on several axes:

- implementation of two Sargassumseaweed collection sites (Capesterre in Marie-Galante and Saint-François) for a total amount of €85,000;
- Aid for the purchase of collection equipment for the affected municipalities for a total amount of €328,584 in 2018 and €353,917 in 2019;
- aid to finance collection projects in the affected municipalities for a total amount of €369,000 between 2018 and 2019;
- Aid in financing a position of Sargassum project manager for the Syndicat Intercommunal for the Development of Beaches and Sites (SIPS) of Guadeloupe for a total yearly amount of €39,000.
- Aid to companies for a total amount of €500,000 between 2018 and 2019.

In addition, the Guadeloupe Region has set up an exceptional support system for economic activities in Marie-Galante and Terre de Bas. Businesses in the trade, craft and service sectors each benefited from €15,000 of aid, for a total of €500,000.

Since 2017, the Guadeloupe Region has therefore committed nearly €1,300,000 to support local authorities and economic actors.

Support for the creation of an air quality measurement network

24 sites have been identified (8 in the territory of the Riviera du Levant, 3 in the Nord-Grande-Terre, 1 Cap Excellence, 6 Nord-Basse-Terre, 5 Grand Sud Caraïbes, and 1 station in Marie-Galante). The Region supported the creation of this network with €95,000.

Development of a large-scale pumping solution

Field expertise has shown that three large-scale collection solutions for Sargassumseaweed could effectively combat their proliferation throughout the archipelago. They would include at least a system with a minimum pumping capacity of 500 m³/h per site (seawater and Sargassum) making it possible to collect seaweed in the southern islands (Marie-Galante, les Saintes, la Désirade), in Basse-Terre and Grande-Terre.

To this end, the partners have designated the Region as the operational contracting authority for this system. Consequently, on 16 August 2018, the Guadeloupe Region launched a call for applications for the execution of a general performance contract relating to the design, construction, maintenance and operation of the system. This procedure is currently underway.

¹ In a notice issued on 15 October 1985, the maintenance of the natural public maritime domain was shared between the State and the municipalities. The municipal police powers conferred on the mayor by articles L2212-1 et seq. of the CGCT (General Code of Territorial Collectivities) to ensure public order, safety, security and health are exercised throughout the municipal territory and in particular on the DPM (Maritime Public Domain) up to

Supporting communities

In 2019, the Guadeloupe Region continues to support local authorities and economic stakeholders in addition to State aid. It provides a grant of :

- 20% of the costs of acquiring collection materials,
- 20% of the costs of collecting seaweed during massive strandings

A budget of €360,000 (€100,000 in operating funds and €260,000 in investments) is already planned for 2019.

SARGASSUM Call for Projects: Research, Development and Innovation

Launched in February 2019 by the Regional Council of Guadeloupe, the Territorial Collectivity of Martinique, the Territorial Collectivity of Guiana, ANR, ADEME and the international structures FACEPE and FAPESP, this joint initiative is a first, both in terms of its ability to mobilize stakeholders in the geographical basin and its desire to create a transversal dynamic in the scientific and economic communities. This «SARGASSUM» call addresses 4 themes:

1. Characterization of Sargassum, at the genetic, biochemical, morphological, developmental and demographic levels,
2. Forecasting the formation of Sargassum blooms and their trajectories, offshore and on the near shoreline,
3. Techniques for collection at sea, ground collection, as well as Sargassum treatment and recycling processes,
4. Economic, health and environmental impacts resulting from the Sargassum influx.

The winners of the call for projects will be announced on the first day of the International Sargassum Conference.

SARG'COOP: First Caribbean cooperation program against Sargassum seaweed

The project aims to strengthen the Caribbean territories' preparedness and resilience to natural disasters and in this case the invasion of Sargassum seaweed. The objective of the program is to: increase Caribbean cooperation by creating forums and tools to facilitate the sharing of knowledge and expertise on the management of Sargassum strandings faced by the countries of the basin and the stakeholders of the quadruple helix: politics, science and academia, civil society and private sector; develop an observation, monitoring and warning center and a multidisciplinary network of professionals.



FACING A SIGNIFICANT PROBLEM, THE FRENCH GOVERNMENT IS COMMITTED

The national plan for the prevention and fight against Sargassum seaweed

The management model for the Sargassum plan was presented during the President of the Republic's visit to Guadeloupe in September 2018. The Head of State referred to the major axes of observation, anticipation, information, conservation, collective action and announced the forthcoming preparation of the plan for natural risks in the overseas territories.

In addition, the 10 million euro national plan against Sargassum seaweed announced in October 2018 describes the organization that allows a rational approach involving State and local authorities. The State will provide nearly 50% of the financing for this plan over two years (until 2019). The rest will be financed by the European Union and local authorities, whose investment will be adapted according to needs.

The national plan for the prevention and control of Sargassum seaweed is divided into a departmental plan with three main objectives:

- Better preparing for strandings and manage collection more effectively. We are now in sustainable management of the crisis, so we must anticipate future strandings;
- Placing all actors at the same level of information to share experiences, skills and pool them;
- Ensuring the widest possible information for citizens and the media. Indeed, the population is very affected by strandings and the media play an important role in forwarding opinions.

Faced with the diversity of tools and situations, the Sargassum plan establishes a logical continuum, combining anticipation and alert, planning, collection, transport, treatment, recycling, reporting, updating and sharing of communal Sargassum safeguard plans (PCSS), and the supplying of the Sargassum kit.

Air quality monitoring device

Following the updating of the health recommendations and management measures of the High Council of Public Health (HCSP), the Regional Health Agency (ARS) and Gwad'air (Authorized Association for the Monitoring of the Quality of Air) have deployed a network for measuring hydrogen sulfide (H₂S) and ammonia (NH₃). This network aims to continuously monitor the emanations of these gases from the decomposition of Sargassum seaweed.

Real-time concentrations are reported daily to the public at the Environment, Planning and Housing Branch (DEAL) and Gwad'air sites. The measuring stations transmit the information through the GPRS network, Gwad'air processes the data and makes a technical validation before sending by email to its partners a mapping of the concentrations measured at the 24 sites. Then, depending on the concentrations measured, information and recommendation messages are sent to the partners. This mapping is also available on the Gwad'air and ARS websites.

Device for monitoring Sargassum seaweed by remote sensing

The DEAL of Guadeloupe mandated the I-SEA design office, which added the expertise of the HydrocôteCompany. This contract aims to detect Sargassum rafts and cross-reference their presence with current science in order to quantify the risk of this seaweed stranding on the coasts of Guadeloupe, its dependencies and the northern islands. Based on the analysis of various satellite images, I-SEA systematically produces a weekly summary and, when the seaweed is near the coast, an alert bulletin detailing the predicted trajectories of the most dangerous rafts. These follow-ups make it possible to predict Sargassum strandings while contributing to a better knowledge of this phenomenon.

Sargassum mission: Senator Dominique THÉOPHILE's report

In July 2018, Prime Minister Edouard PHILIPPE entrusted Senator Dominique THÉOPHILE with a mission as part of the national plan to prevent and combat Sargassum.

The report resulting from the mission describes the public policies and private initiatives implemented in the Caribbean States and suggests potential areas for regional cooperation in both fundamental research and the development of innovative tools to predict strandings, organize collection and recycle Sargassum seaweed.

Among Senator Dominique THÉOPHILE's recommendations: the organization of an international conference in Guadeloupe to share advances in research, the implementation of Sargassum control plans and promising initiatives in the prevention, management and recycling of seaweed. It also stresses the need to set up an international Sargassum observatory to build a network of actors in the fight against this scourge that affects the entire Caribbean.

It is also proposed that the French State address the problems posed by Sargassum seaweed in international diplomatic bodies, in particular through the creation of a dedicated working group within the Cartagena Convention, which could be set up on the occasion of the next Conference of the Parties (COP).



FIGHTING SARGASSUM SEAWEED IN THE CARIBBEAN

Key dates

2011

● First influx of massive Sargassum strandings on the beaches of Caribbean countries. Sargassum seaweed blooms reach a peak in the Caribbean region. Scientists record a rate 200 times higher than those recorded over the last 8 years. For the first time, Sargassum blooms are detected off the African coast.

2012

● Sargassum events affect the 2012 Barbados fishing season drastically, recording lowest seasonal catch since 2004.

2014

● Johanan Dujon creates Algas Organics, the first Aboriginal manufactured products company using biotechnology and natural processes, as well as seaweed-based biostimulants. The company, with the help of the Saint Lucia Fisher Folk Cooperative Society Ltd. has collected more than 298 tons of Sargassum seaweed from the beaches of the east coast of Saint Lucia since the beginning of their partnership in 2015.

2015

● June - Publication of «Sargassum: A Guide to Caribbean Resources» by the Caribbean Hotel and Tourism Association

● Largest Sargassum bloom on record invades the Caribbean.

● ACS organizes regional symposium on the impact of Sargassum: Challenges, Dialogue & Cooperation towards Sustainability of the Caribbean Sea.

2016

● March - Regional Conference on Sargassum organized by the Government of the British Virgin Islands and the Organization of Eastern Caribbean States on Mosquito Island. The aim was to describe scientific art in the field, management and collection methods as well as possible viable commercial and economic uses of Sargassum.



FIGHTING SARGASSUM SEAWEED IN THE CARIBBEAN

Key dates

2018

- July 2018: The 5th Council of Ministers of Environment and Sustainable Development (COMES5) issues a joint statement on the challenges and opportunities presented by Sargassum seaweed. Among the points selected were the desire to develop partnerships with universities and scientific institutions in order to increase the state of the art in science; determine the best solutions on land and at sea for the collection and management of Sargassum seaweed as well as common approaches for the implementation of operational responses; and the request that the response to the problem of Sargassum seaweed be a priority action at the 15th meeting of the Conference of the Parties (COP) and the Cartagena Protocol as well as at the 18th intergovernmental meeting of the Caribbean Action Plan.
- June: Barbados government describes Sargassum problem as “a national emergency”. French Environment Minister presents US \$10M plan to combat Sargassum in Guadeloupe.
- September: Saint Lucia begins to produce organic bio-fertilizer from Sargassum for international export.
- October: XIV Regional Conference of the Antilles-Guiana, organization of a Sargassum seminar on the acquisition and debating of knowledge on the subject, management (or governance) of the phenomenon, responses to be provided.

2019

- June - «High-Level Meeting on the Sargassum Problem in the Caribbean» in Cancun - The Association of Caribbean States (ACS) is recognized and appointed as the coordinator of the Sargassum seaweed problem in the Caribbean Region.
- The Government of the State of Quintana Roo declares a state of emergency due to the massive stranding of Sargassum seaweed, referring to «an imminent natural disaster». Mexico spends a total of \$17 million to remove over half a million tons of Sargassum from 1000kms on its beaches.
- Caribbean fishermen report drastic decrease in Flying Fish stock. Sargassum beds prevent them from spreading their wings over the sea surface

GOVERNEMENTAL AND INTERGOVERNMENTAL OPERATIONAL INITIATIVES ³

● Bilateral cooperation

The declaration of intent by France and Mexico on the Franco-Mexican initiative for adaptation and resilience to climate change in the Caribbean follows the decisions taken at the One Planet Summit. This agreement reaffirms the mutual commitments to fight for the preservation of the planet and against global warming through the irreversible implementation of the Paris Agreement.

● Intergovernmental arrangements

At the meeting of the Contracting Parties to the SPAW Protocol (Cartagena, Colombia, December 2014), the signatory countries requested that regional cooperation actions be put in place to help them better understand the phenomenon of massive Sargassum arrivals and improve their management.

The secretariat of the United Nations Environment Program (UNEP) organized a meeting of the Advisory, Scientific and Technical Committee (STAC) of the Protocol on Specially Protected Areas and Wildlife (SPAW) in Panama from 3 to 7 December last. Proposed by France, the principle of setting up a working group on Sargassum was the subject of a recommendation for the COP in March 2019 and has generated a great deal of interest.



3 Ministry of Ecological and Solidarity Transition; Ministry of Overseas Territories, The Fight Against Sargassum Seaweed in the Greater Caribbean: Strategies for Prevention and Regional Cooperation presented by Senator and Special Rapporteur Dominique Théophile, 2018.

SARGASSUM SEAWEED : STATE OF THE ART IN SCIENCE

This is a new phenomenon: since 2011, two species of Sargassum have been proliferating in the North Atlantic and periodically stranded on the Caribbean coast on a massive scale. While this brown seaweed has always existed, the significant strandings recorded in recent years on the Atlantic coast, from the Caribbean to South America, are completely new. The identification of their origin and their quantification are complex and still very insufficient: this requires an international approach to the phenomenon.

In this context, and in consultation with the State services, the National Research Agency and several regional and international structures, such as ADEME, the local authorities of Guadeloupe, Martinique and Guiana, as well as the Brazilian agencies FAPESP and FACEPE, have mobilized to launch a call for «research, development and innovation» projects on the problem of Sargassum seaweed strandings. The objective of this call for projects is to provide pragmatic solutions to the stranding of Sargassum and to increase knowledge on this phenomenon, which particularly affects the islands of the Caribbean basin.

This joint initiative, the first of its kind in terms of the scope of the scientific and economic community it targets, should make it possible to create a community of knowledge and reference expertise on the subject of Sargassum. The call for projects, launched in February 2019 and closed since June, will be announced and presented on the first day of the Conference.

Scientific research is currently focused on four themes related to the issue of the fight against Sargassum :

Sargassum characterization : physiology, genetics, biochemistry, morphology, demography. Concerning the species that strand, 2 species have been identified: Sargassum fluitans and Sargassum natans. It also appears that these Sargassum arrivals are not linked to the Sargasso Sea. Studies have illustrated a difference in the distribution of forms and species between the Sargasso Sea and the arrivals that wash up on the Caribbean coast.

Sargassum blooms have long been known as nurseries and habitats for many organisms. Sea expeditions have reminded us how rich the mobile organism community associated with Sargassum is. This mobile community of organisms attracts seabirds, fish and turtles. Some changes observed in the distribution of the different forms of Sargassum have potential impacts on the trophic chain associated with this community.

Remote sensing: prediction of Sargassumbloom formation and trajectories at sea and near shore. A key step in the development of strategies is the prediction of strandings and therefore the reading of trajectories, the anticipation of the evolution of the shape of the blooms, whether as a function of currents, winds or site effects. The potential volume that will strand is also to be predicted.

Forecast bulletins are already being issued based on the analysis of satellite images and bloom drift modeling algorithms. However, cloud cover is an obstacle to the use of satellite images. In addition, depending on the resolution scale, the forecast loses relevance.

Moreover, current algorithms do not yet integrate site effects, in the near shore, as well as the influence of winds and currents. Finally, it is potentially important to take into account that Sargassum is a living organism whose dynamics are different from those of inert materials with distinct physical parameters.

To refine the modeling, in addition to improving algorithms, various initiatives are underway such as participatory science approaches. They are based on the mobilization of the maritime community in order to cross-reference sea observation data with algorithm predictions and satellite images. Other areas for improvement include the use of artificial intelligence, particularly deep learning.

Finally, it is important to digest this information and make it accessible and usable by decision-makers and users. This tool is necessary for authorities to take relevant actions to reduce the impacts of strandings. The possibility of automating the issuance of this type of bulletin is also raised. The deployment of technical solutions adapted to stranding areas and the mobilization of stakeholders depend in particular on the availability of a fine prediction model.



Collection techniques : at sea and on land and innovative treatment and recycling processes. The economic exploitation of Sargassum, for food, energy or pharmaceutical purposes or as biomaterials, could potentially offset the negative effects of strandings. However, the presence of undesirable elements, such as heavy metals or other pollutants, may outweigh the value of such solutions.

Préalablement, le travail sur les options de recyclage doit inclure la phase en amont, i.e. la collecte de Sargassum. L'irrégularité et la variabilité des arrivées sont toutes deux des obstacles à l'établissement de chaînes de recyclage économiquement viables. L'utilisation de méthodes à faible technologie, connues sous le nom de méthodes rustiques, pour collecter et pré-traiter le Sargassum est mentionnée afin de surmonter la discontinuité des arrivées, ainsi que l'utilisation de processus capables de traiter une variété d'intrants biologiques.

En amont, la collecte de Sargassum, que ce soit sur terre ou en mer, soulève également certains défis technologiques. Les diverses tentatives de collecte en mer ont jusqu'à présent été infructueuses et non durables. L'investissement réalisé par rapport à l'irrégularité des arrivées pénalise le modèle économique d'un projet axé sur la collecte. Sur terre, les risques de dégradation des plages sont connus. Différentes alternatives sont en cours pour utiliser le Sargassum afin de reconstituer les plages à haut risque d'érosion.

Le stockage terrestre soulève également des questions. Les impacts des lixiviats sur le terrain sélectionné pour recevoir ces arrivées de Sargassum en attendant des solutions de recyclage et/ou de traitement sont encore inconnus. Cependant, il est important de garantir que le site de stockage est maintenu dans son état actuel et qu'il peut être restitué à son état d'origine. Dans ce contexte, la connaissance du phénomène de dégradation du Sargassum contribuera à fournir des informations sur les développements à planifier, tant en termes d'émissions de gaz que de lixiviat.

Impacts : impacts économiques, sanitaires et environnementaux et stratégies de gestion et d'adaptation. En ce qui concerne la santé humaine, les seuils d'alerte d'exposition aux gaz ont été déterminés pour le H₂S et l'HN₃. Cependant, les conséquences à long terme d'une exposition à faible dose restent inconnues et peu étudiées à ce jour. Cependant, malgré les efforts pour limiter l'exposition de la population aux dérivés, tous les résidents côtiers sont plus ou moins exposés à ces gaz. Cela ouvre un vaste champ de recherche, tel que la cinétique de ces gaz, leur émission au cours de la journée et leur dispersion en fonction de la configuration du site et du climat.

Enfin, en termes économiques, le tourisme et la pêche sont les premières victimes. Quelles mécanismes d'assurance peuvent garantir ce nouveau phénomène ? Y a-t-il des effets potentiellement positifs ? En effet, les florissances de Sargassum sont accompagnées d'une riche flore et faune. Existe-t-il un effet similaire à celui du FAD qui pourrait être exploité par la pêche ?



Il sera sur la base de ces insights, en fonction des moyens et de la configuration, qu'il sera possible de concevoir des stratégies de gestion, d'imaginer des approches concertées au niveau du bassin, afin que les territoires affectés puissent transformer ce fléau en une opportunité économique.



APPENDICES

SARG'NET NETWORK

Dr. Ligia Collado-Vides is a marine botanist working at Florida International University;



her research is on tropical marine macroseaweed on seagrass and reef ecosystems in South Florida and the Mexican Caribbean. Among other projects, her group is conducting a monitoring program estimating the influx and measuring metals and nutrient on of the pelagic Sargassum in Florida. Her group has developed a Citizen Science program for Sargassum landings in South Florida, and an international network of experts. Dr. Collado-Vides got her PhD from the Universidad Nacional Autónoma de México, where she became Associated Professor; in Florida, her position is Senior Lecturer-Researcher. She has more than 56 publication and devotes time to national and international education.

Dr. Tom Linton

is a professor in the Department of Marine Sciences at Texas A&M University. For the past 10 years, in association with a large number of students and fellow professionals, Tom Linton has been researching the “habits” of the brown seaweed – Sargassum. His team has developed a predictive model that allows to predict when it will arrive. The unanswered question that continues to seek answers is why it has become so massive in quantity and widespread in occurrence and what to do with it after arrival. The International Conference on Sargassum is bringing together the world experts to build the sound scientific knowledge needed to develop and then implement a Sargassum Management Plan that will serve to answer these unanswered questions and bring the much needed relief to the Caribbean from its Sargassum problems.



OTHER SCIENTIFIC STAKEHOLDERS:

Frédéric Ménard

is a research director at the Research Institute for Development. He conducts research on the functioning of marine ecosystems in the context of global change: ecology, predator-prey relationships, fisheries and biodiversity. He has worked in the Ivory Coast and has visited South Africa and Brazil to study large pelagic predatory fish in the tropical oceans and the vulnerability of coastal ecosystems. Between 2001 and 2014, he led three research teams and seven scientific projects. He was a visiting professor at the Federal University of Pernambuco (Brazil) between 2014 and 2017. He has been the director of the IRD's OCEANS scientific department since 2015, and is involved in the IRD's scientific strategy. Since 2016, he has been leading two projects of the Ministry of Ecology on Sargassum.



Hazel Oxenford is a Professor of Marine Ecology and Fisheries at the University of the West Indies (UWI). She originally joined UWI as a student, obtaining a PhD in fisheries science in 1986 for her work on the biology and management of dolphinfish in the eastern Caribbean. She is now well known regionally and internationally for her work in applied fisheries biology (especially flyingfish), coral reef ecology, and the impacts of climate change on marine ecosystems. Most recently she has been deeply involved in understanding and communicating the new origins and impacts of Sargassum, and developing best practice guidelines for coping and adapting to this new phenomenon. She was a recipient of the 'Zayed International Prize for the Environment' in 2006, and in 2012 received a Vice Chancellor's Award for Excellence in research and public service.



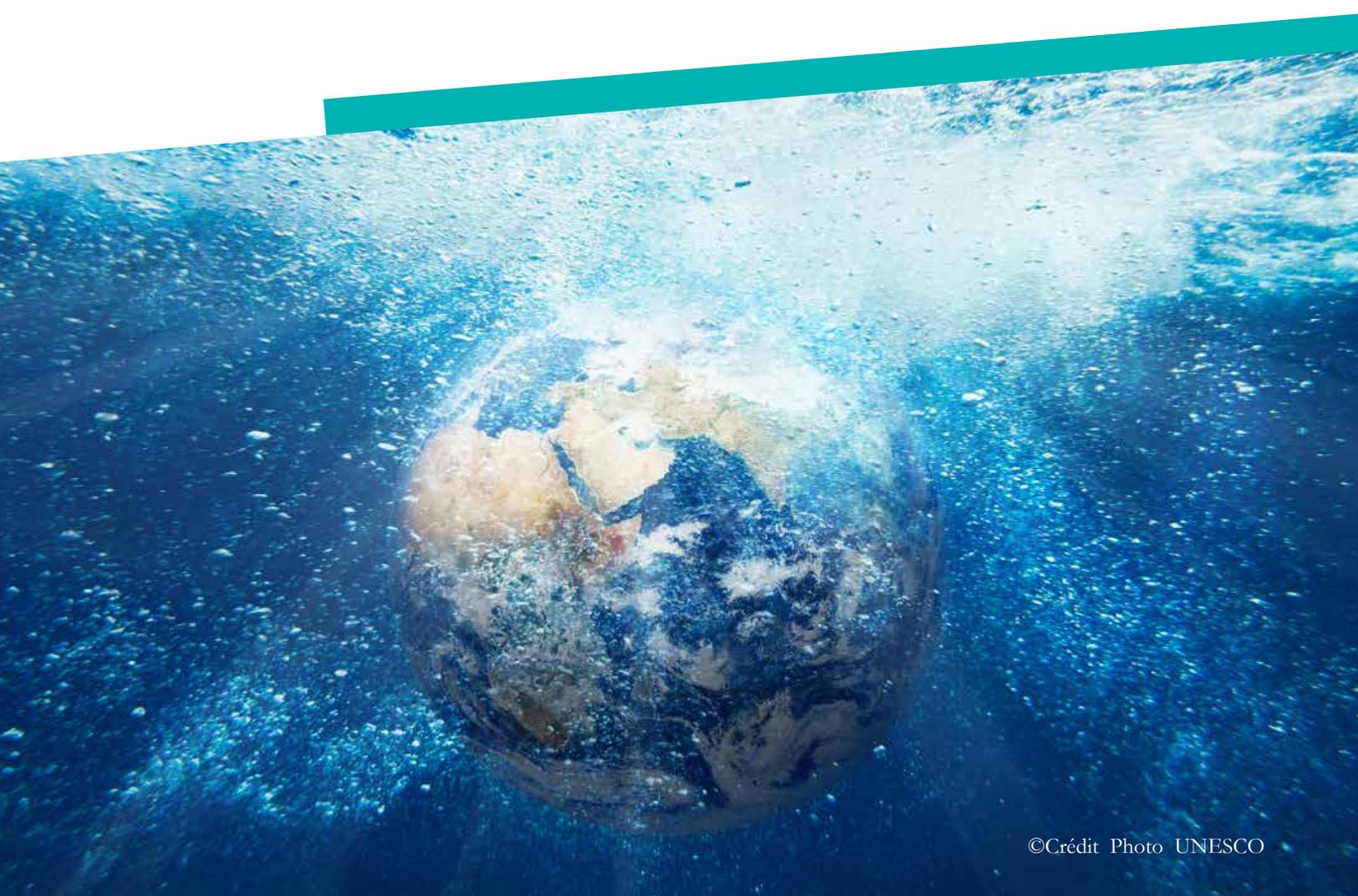
Chuanmin Hu received a PhD degree in physics (environmental optics) from the University of Miami in 1997. He is currently a professor of optical oceanography at the University of South Florida, who also directs the Optical Oceanography Lab of College of Marine Science. He uses laboratory, field, and remote sensing techniques to study marine algal blooms (e.g., red tides, blue-green seaweed, Sargassum, Ulva, etc), oil spills, coastal and inland water quality, and global changes. He has authored and co-authored >260 refereed articles, many of which have been highlighted on journal covers and by AGU and NASA. His research has led to the establishment of a SargassumWatch System and other systems to generate and distribute customized data products in near real-time. He has served as a topical editor of Applied Optics (2008 – 2014) and a chief editor of Remote Sensing of Environment (2015 – 2017).

UNESCO certification in a few words



On 5 December 2017, the United Nations proclaimed a United Nations Decade of Ocean Sciences for Sustainable Development, to be held from 2021 to 2030. This Decade will provide a common framework to ensure that marine science can fully support countries' actions to sustainably manage the oceans and in particular to achieve the Sustainable Development Agenda by 2030. The main objective of the Decade is to support efforts to reverse the cycle of declining ocean health and create better conditions for the sustainable development of the ocean, seas and coasts. The Decade will strengthen international cooperation and support the actions of ocean policy makers and managers.

The International Sargassum Conference, by obtaining this label, fully contributes to these objectives and in particular with the aim of consulting stakeholders, communicating on the Decade and identifying investment and resource mobilization opportunities.



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