



## Joint call, « Research, development and innovation », SARGASSUM

### 1. General context of the call

Before 2010, brown algae only bloomed in the tropical North Atlantic, the Sargasso Sea. However, they have recently been observed off the Brazilian coast and those of Western Africa, from Sierra Leone to Ghana. The reasons for the increasing incidence of blooms need further elucidation, but in the case of those affecting the Caribbean and American coastlines, Amazon nutrients in relation with deforestation and agricultural intensification have been implicated, along with shifts in hydrodynamic and wind drift patterns associated with climate change.

The ongoing large influxes of Sargassum seaweed currently impacting the Caribbean and American coastlines are the worst since 2011. Their economic impact can be counted in millions of euros, especially in the tourism industry and the associated emissions of hydrogen sulphide (H<sub>2</sub>S) and ammonia (NH<sub>3</sub>) have a significant effect on the health of coastal residents. Marine ecological impacts have not yet been evaluated.

In order to improve the management of Sargassum influxes, there is compelling need to increase our knowledge of bloom ecology as a basis for developing reliable forecasts and alert systems, and for finding operational and economically reliable solutions for the collection, use and valorization of Sargassum. These requirements are central to the present joint call.

The aim of the joint call is to support collaborative research, development and innovation projects that will:

- improve knowledge of Sargassum ecology as a basis for environmental decision making;
- foster the design of both short and long-term management strategies, and;
- provide innovative, cost-effective solutions capable of mitigating the impact of Sargassum strandings.

Joint initiatives from different countries and regional authorities from Caribbean islands and American regions are expected through this joint call. They are designed to create and support international research teams with the aim of gaining a better understanding of the phenomenon and find effective solutions for managing these harmful events.

The French National Research Agency, and regional and international structures such as ADEME, local authorities of Guadeloupe, Martinique and French Guiana, Brazilian funding agencies (FAPESP and FACEPE) are mobilizing to launch a call "research, development and innovation" on seaweed strandings Sargassum.

A total expected amount of around 13M€ has been blocked by the funding partners from the French National Research Agency, and regional and international structures such as ADEME, regional authorities of Guadeloupe, Martinique and French Guiana and Brazilian funding agencies (FAPESP and FACEPE) mobilized to launch a call "research, development and innovation" on

seaweed strandings Sargassum. The funding partners aim at funding as many top-ranked proposals as possible.

## 2. Scientific Framework of the call

The main goal of the call is to provide research and innovation grants for projects led by consortia of scientists and companies from the Caribbean region in conjunction with research teams from mainland France, Brazil and other countries (USA, Mexico...). The results are expected to increase our knowledge of bloom events, explain their causes and origin, and provide insight into effective techniques for dealing with them over different time scales, including the development of innovative technologies for reducing the impact of strandings, and where practicable, their use as a resource for industrial processes.

The call focusses on 4 interrelated thematic areas. Proposals will need to identify their main themes and, it is recommended, submit transversal projects covering several items. Ideally, outputs from themes 1 and 2 will fuel reflections and works for themes 3 and 4. Funders are expecting concrete results, ready and easy to use tools to optimize the use of the different operational solutions and technologies which will come out from theme 3, in order to deploy pragmatic strategies to cope with these Sargassum issues, as expected in theme 4.

### Theme 1. Characterization of Sargassum

This theme will focus on identifying the different species and determining their origin, behavioural traits, reproductive and demographic patterns and the associated ecological interactions. This process should involve modelling growth rate and population dynamics in relation to relevant biotic and abiotic factors using the appropriate physiological, genetic, biochemical, morphological, demographic techniques. Bloom-increasing factors, such as the influence of Amazon and African rivers will also need to be identified together with the associated chemical input, including that of contaminants such as cadmium, arsenic and chlordecon etc. Against this background, consortia will also be required to:

- provide results capable of supporting Call themes dealing with the forecasting of Sargassum events (theme 2), the impacts of Sargassum blooms on the environment and human health (theme 4) and ways of valorising the associated strandings (theme 3);
- propose or develop ecological patterns that could predictively link volume of influxes with key and easy to evaluate indicators (Theme 2).

### Theme 2. Forecasting Sargassum events

This theme will examine the accumulation of Sargassum banks, their trajectory in the open seas and options for the development of operational alert systems for algae stranding and their likely site effects. These models and operational systems must be based on hydrodynamic and remote sensing observations and be capable of being integrated into mechanistic models informed by input from theme 1.

Applicants must develop research strategies that can improve the reliability and precision of existing Sargassum forecast tools. This will involve the extension of databases, analytical techniques, the exploration of new image sources, as well as ground truthing investigations that cross-check forecasts with real stranding and local knowledge. It will also involve considering the work of ongoing modelling projects (such as CaribCoast) that examine possible influences of climate change and the impact on hydrodynamics and wind conditions on the banking and drift of algae blooms.

The results from the models are expected to help the design of the strategies of mitigation in theme 4 and improve the use of the innovative solutions of theme 3. In order to accomplish this, the models will need to:

- be tested for several months in order to fine tune the process and ensure the delivery of adequate services.
- provide accurate information on expected quantity, location and time of sargassum stranding and possible site effects.
- be supported by reliability indexes and indicators in order to express the reliability of the system, and;
- made available as effective, ready to use open sourced web-based tools.

### Theme 3. Collection and valorisation of Sargassum strandings

#### 1. Collection

This element of theme 3 will involve both industrial research and experimental development. Its aim will be to propose innovative low-cost methods and technologies for protecting the beaches from massive inputs of algae by collect them at sea close to the shore, from coastal sediment as well as from beaches. Added value will be attached to proposals that balance the costs of collection (1) with the revenues of valorization (2).

In pursuing theme aims, applicants should:

- review the latest experiments<sup>1</sup> to avoid duplication and to capitalise on developing ideas
- adopt an agile and creative approach to the development, adaptation and testing of innovative solutions.
- Ensure that proposed collection methods are cost effective, efficient and comply with current environmental and health and safety regulations.
- Provide technical drawings along with data on methods and technologies and simulations. Novel solutions, like mobile dams to improve algae collection at sea, among others, will be welcomed.

Tests will need to be conducted on real strandings and evaluated in the field across the key operations. In order to reduce transport costs, they should also assess the practicability of cost-cutting measures (pre-treatment) such as drying, compaction.

#### 2. Valorisation

This element of theme 3 will use fundamental and applied research to explore ways of Sargassum valorisation. Potential options include its use in energy production, agriculture (excluding direct spreading), the development of biomaterials and the extraction of high-value bioactive molecules (including phyto-pharmaceutical). In presenting options, applicants must mention other potential raw materials included in the process.

Proposals must take into account of stranding-irregularity as well as results from theme 1, contamination in particular. And since one solution is unlikely to fit all circumstances, funders will expect a range of solutions that could be used depending on the volume of influxes and the expected stranding sites.

Proposed methods must also be adapted to local conditions and show a viable business model. Moreover, territorial feasibility studies will be needed to prepare technology transfers (market,

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<sup>1</sup> Data of experiments will be accessible (in French only)

source and co-products availability...). In support of this aim, the participation of private partners is highly recommended.

#### Theme 4. Impacts of strandings and coping strategies

The focus of theme 4 is to precise the impacts of Sargassum and define solutions and coping strategies that can mitigate adverse effects. In this context, impacts studies will be required in relation to:

- Human healthcare, diseases (exposure to H<sub>2</sub>S, NH<sub>3</sub>, sensor strategies and warning thresholds), kinetic of Sargassum degradation and gas released, epidemiological issues
- Environmental health, with a focus on coral reefs, mangroves, wetlands, seagrass beds, emblematic species, turtles and fishing species;
- Socio-economic influences, including tourism, fisheries and economic consequences on businesses due to illnesses of the workforce. (*i.e.* Chikungunia in Reunion islands)<sup>2</sup> and the concomitant impacts on the insurance industry.

Based on the results of theme 2 and solutions arising from theme 3, applicants are invited to submit tools and methods to mitigate the adverse effects of Sargassum strandings on the population, the environment and the economy. These should have a territory planning approach as existing planning maps which not only record land uses but also identify critical locations where environmental issues may arise, including landslides.

In attempting to mitigate the impact of Sargassum blooms, theme 4 actions will need to draw on a wide range of stakeholder interests, including government, non-government, sectoral, business and academic organisations. Many of these have decision-making capabilities and the potential to resource initiatives, and some have experience in dealing with Sargassum crises and the implementation of Sargassum action plans. The project should use this stakeholder resource to access local knowledge, avoid duplication, promote engagement, and, at a broader scale, use the network to adapt the policy framework and the associated regulations at local, Caribbean and international level. Operational tools are expected from applicants.

### 3. Procedures and criteria

Details on guidance for applicants are described in the annex Instructions for Proposals including the scientific content and the administrative forms to fill on line on the **ANR submission site**.

[https://aap.agencerecherche.fr/\\_layouts/15/SIM/Pages/SIMNouveauProjet.aspx?idAAP=1348](https://aap.agencerecherche.fr/_layouts/15/SIM/Pages/SIMNouveauProjet.aspx?idAAP=1348)

Remember that proposals will ultimately be assessed by an interdisciplinary panel of reviewers, accordingly applications should be prepared in that context. External reviewers and Expert panel members will be chosen so that there is sufficient expertise to cover the breadth of the call topic, but not all panel members will have specific expertise relevant to all proposals. Applications should be prepared with these two audiences in mind and demonstrate how the project will increase synergy between teams across territories and how such a collaboration adds a particular value.

Each partner of a proposal has to select the requested funder with a maximum of 2 (regional and national) and verify its eligibility in relation with the guidelines in Annex

Proposals should address at least one of the four themes in the call text.

#### 3.1. Eligibility

The call is open to proposals that meet the following criteria:

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<sup>2</sup> Some populations as well as schools have been relocated (town of Goyave in Guadeloupe)

## 1. Global requirements

### A. For theme 1, 2 and 4:

Each collaborative proposal must involve applicants from at least one French overseas territory, 2 different territories and 2 different countries if a Brazilian partner is involved,

Co-applicants from the same laboratory, research unit or university cannot be considered as different partners, even if they are located in different territories

Strategical priority to transnational projects will be given (*i.e.*, this means that collaboration with Caribbean territories (Great Caribbean) is highly recommended).

### B. For theme 3:

Each collaborative proposal must involve applicants from 2 different territories including at least one French overseas territory.

Co-applicants from the same laboratory, research unit or university cannot be considered as different partners, even if they are located in different territories.

All applicants must fulfil their respective regional and/or national eligibility rules for their research project proposals. There are specified in the National/regional regulations in annex.

All applications requesting funding must base their research or their development & innovation in a territory/country represented by one of the Funding partners (except for other countries situated in the Caribbean area. In that case, the Call Board will examine the project as a whole relevance and will consider it for eventual funding).

Applications may include some applicants from a country not represented by any of the Funding partners<sup>3</sup>, if required for the coherence of the project (to be analyzed by the Interreg program leader on a case by case basis and restricted to the territories and funding partners covered by Interreg cooperation program). Then, such an outside applicant may request funding from the Interreg cooperation program and must declare to own and must have all the necessary resources for carrying out the project.

## 2 Coordination

The lead PI (LPI) is the PI that coordinates the project. A person is allowed to be LPI in up to 2 proposals. Each participant can be only involved in two proposals.

Provide detailed information on each Leading and Partner PI, including institution and contact details. Add as many team member as needed.

If you want to apply to the “**Caribbean Interreg**” funding instrument, please check that you have also an Administrative coordinator (AI). The administrative coordinator is the contact of the consortium and represents the consortium in each follow-up meeting of the Interreg. The lead PI can be different from the administrative coordinator. The administrative coordinator must be a research team funded by an organisation participating in the call or a company located in France (it might be the case for theme 2 and 3).The administrative coordinator is the contact point of the consortium and represents the consortium

Each consortium submitting a proposal shall specify the selected topic(s) and the requested funding shall not exceed the indicative budgets of the funding partners guidelines.

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<sup>3</sup> ANR may finance partners that have their primary establishment in France and/or partners established in the EU and that can prove that they have a secondary establishment in France.

### 3.2. Requirements for collaborative projects

A one stage procedure for joint applications will be followed.

The language of the Call and the applications is English

Each individual applicant can be involved in maximum two proposals submitted in the Sargassum call .

Funding in kind of other countries such as USA, Mexico and other Caribbean countries will be welcome. Research teams (public or private) who are willing to collaborate and contribute to the proposed project may do so, either as part of a consortium if their contribution is needed for the project and will be requested to sign the project consortium agreement, in which case they can be simply mentioned in the proposal and possibly provide a letter of support.

Applications must be submitted timely, complete and following all the requirements set under point i)

### 3.3. Evaluation criteria

Project Proposals found eligible will be evaluated by scientific and technical experts according to the following scientific and technical criteria:

#### A. Regarding themes 1, 2 and 4

##### **Scientific and technical quality of the project proposal :**

- Scientific excellence in terms of progress of knowledge with respect to the state of the art, conceptual breakthrough including methodology.
- Innovation level of the project and methods, and multi- and interdisciplinary approach
- Integration of the different disciplinary fields.
- Inclusion of relevant societal and ethical aspects

##### **Quality of the consortium & project feasibility :**

- Quality and international competitiveness of participants in the field(s) of the project proposal (previous work in the field, expertise of the participants).
- Quality and efficiency of the project management (coordination of work packages and tasks management).
- Quality of the consortium and collaboration (well balanced partnership; integrated partnership in work packages; broadness of consortium compared with geographical relevance; previous level of collaborative interaction between the participants,)
- Feasibility of the project – human, technical and financial resources: adequate work package structure and work plan (tasks, milestones, deliverables, matching events, calendar); adequate equipment and manpower resources; quality of the coordination plan.
- Cost-efficiency of the project plan compared with the budget. Appropriateness and justification of the requested funding (justification of the permanent personnel resources, appropriateness of the coordination costs, justification of the temporary personnel resources (trainees, PhD students, post-doctoral researchers), evaluation of the sum for investments and equipment purchases, evaluation of the other financial items (travel, subcontracting, consumables, etc.).
- Probability of success of the project based on description of risks and the contingency plan.

##### **Impact :**

- Scientific impact
  - o Dissemination activities and expected impact for end users:
  - o Strategy for knowledge transfer and for exploiting the potential of the project results.

- Potential for utilisation or integration of the project results by the scientific or industrial community or society, and impact of the project in terms of knowledge acquisition.
- Openness to stakeholders
- Expected impacts in terms of capacity building
  - Mobility/training actions
  - Education initiatives/courses on new identified skills/to fill an educational gap
  - Specific initiatives (e.g. on-field training) linking human capacities and research infrastructures
  - Actions supporting jobs, including non-academic, in concerned sectors

B. Regarding theme 3:

**Scientific and technical quality of the project proposal:**

- Technical feasibility in terms of progress of techniques with respect to the state of the art, existing processes in other countries, first results of valuation studies.
- Innovation level of the project, techniques and methods, and multi- and interdisciplinary approach.
- Integration of the different disciplinary fields and low cost approaches.
- Inclusion of relevant societal and ethical aspects

**Quality of the consortium & project feasibility:**

- Quality and international competitiveness of participants in the field(s) of the project proposal (previous work in the field, expertise of the participants).
- Quality and efficiency of the project management (coordination of work packages and tasks management).
- Quality of the consortium and collaboration (well balanced partnership; integrated partnership in work packages; broadness of consortium compared with geographical relevance; previous level of collaborative interaction between the participants).
- Feasibility of the project – human, technical and financial resources: adequate work package structure and work plan (tasks, milestones, deliverables, matching events, calendar); adequate equipment and manpower resources; quality of the coordination plan.
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- Probability of success of the project based on description of risks and the contingency plan.

**Proposed technic feasibility**

- Quality of implementation and follow up (description of milestones needed to validate the process);
- Quality of the yields, estimated tonnage concerned potentially by the type of valorization studied, and the quality of the necessary algae (clean without sand, decomposed or on the contrary not very selective process ...);
- Quality of the business model, which alternatives activities during years with few Sargassum stranding;
- Coherence with regulation (arsenic level, biodiversity, waste treatment, ...);
- Preservation of the environment (low impact on beaches, nourishing beaches,...);
- Robustness of the process.

## 4. National guidelines and National Contact point are in annexes

### 1. Indicative Timetable and announcement of Funding Decision

Action	Scheduled
Launch of the Call	February, 20th, 2019
Deadline for submitting project proposals	June, 1st, 2019
Eligibility check by Call Secretariat and NCPs	June, 15th, 2019
1st step scientific peer-review (meeting)	September, 2019
Funding decision (meeting)	September, 2019
Notification letters	September 2019
Contract negotiation	From June 2019 ongoing
Kick of meeting (publication of results)	October 2019
Start of projects	November, 2019

The Call will be announced on the websites of the different funding partners



### 2. List of annexes

**Annex 1: Sargassum Joint call: Instruction for Proposals 2019**

**Annex 2: Modalités de participation pour l'ANR (in French)**

**Annex 3: Intereg Caraibes**

**Annex 4: Modalités de participation pour Intereg Caraibes (in French)**

**Annex 5: Modalités de soumission pour ADEME (in French)**

**Annex 6 : Modalités de soumission pour FACEPE (in French)**

**Annex 7 : Modalités de soumission pour FAPESP (in French)**

**Les Annexes 5, 6, 7 seront soumises ultérieurement.**