# OCEAN & COASTAL ECOSYSTEMS

CLIMATE & BIODIVERSITY INITIATIVE

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

PRESS KIT

BNP PARIBAS FOUNDATION

Philanthropy for change

# CONTENTS



# FOREWORD
# ISABELLE GIORDANO

GENERAL DELEGATE OF THE BNP PARIBAS FOUNDATION

“Early on, we made the choice to support research into the interactions between climate and biodiversity at a time when such an approach was still rare. It was a pioneering, almost visionary choice, in a context where philanthropy for the environment accounts for less than 5% of global giving.

Today more than ever, scientists need robust support to carry out their work, as public funding is not always sufficient. This is the key goal of our Climate & Biodiversity Initiative: since its launch, we have allocated €31 million to more than 500 researchers and over 41 research teams.

The projects are selected in a rigorous process in three-yearly calls for projects that attract applications from universities and research centres based in Europe but with global partners. The 2025 call for projects received more than 160 applications from some 20 countries. After an initial pre-selection process carried out by our team and external experts, the Scientific Committee – made up of internationally renowned researchers – selects around ten projects, which are then submitted for final approval to the Foundation’s Executive Committee.

This latest call for projects, officially endorsed by the UN Ocean Decade, focuses on the ocean, vital to the planet’s ecosystems and an essential regulator of the climate. From the many European applications received, eleven research projects were chosen that will receive funding totalling €7 million. These will explore urgent issues from the ocean depths to the coasts, from coral reefs to oyster farms – a range of scientific investigations into the diversity and fragility of the marine world.

Through its engagement, the BNP Paribas Foundation aims to send a clear dual message: yes, we support the scientific community; and yes, businesses have a major role to play in developing philanthropy for the environment. Together, we can advance knowledge as a powerful tool to understand, protect and transform our planet.”

## THE INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (IOC)

The BNP Paribas Foundation’s Climate & Biodiversity Initiative demonstrates how philanthropy can strategically accelerate science and the deployment of solutions needed to protect ocean and coastal ecosystems.

By strengthening the capacities of research teams and promoting collaboration between sectors, this call for projects will help to transform ambition into action and to generate real impact on communities and the planet. We are proud to be associated with this initiative, which advances the goals of the Ocean Decade and reinforces the collective commitment to a sustainable future for the ocean.

**VIDAR HELGESEN, Executive Secretary of the UNESCO Intergovernmental Oceanographic Commission**

**WEBSITE : IOC.UNESCO.ORG**

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unesco
CLIMATE & BIODIVERSITY INITIATIVE

# KEY FIGURES SINCE THE INITIATIVE BEGAN IN 2010

## LAUNCHED IN 2010, THE CLIMATE & BIODIVERSITY INITIATIVE IS A PIONEERING PROGRAMME TO SUPPORT SCIENCE & OUTREACH ON THE ENVIRONMENT

**46**
Research teams supported since 2010

**+ €31M**
Cumulative budget since 2010

**+ 1,000,000**
People made aware of environmental issues through conferences and exhibitions

## A TRIENNIAL CALL FOR SCIENTIFIC RESEARCH PROJECTS ON CLIMATE & BIODIVERSITY

The figures above include the 2025 call for projects that will provide funding 2026–2028



# 2026 SIXTH CALL FOR PROJECTS: CLIMATE & BIODIVERSITY INITIATIVE

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Endorsed by the United Nations **Ocean Decade**

A budget of **€7 million** donated to the initiative for the period 2026–2028, an **increase of €1 million**

An international scientific committee made up of **9 researchers**

**168**
Applications received

**21**
Countries represented

France: **53** projects received, including 4 from overseas territories

**+ 120**
Internal evaluators

**489**
Evaluations carried out

# THE 9 MEMBERS OF THE SCIENTIFIC COMMITTEE

### Yunne-Jai SHIN

**Research director, French National Research Institute for Sustainable Development** (IRD), Marine Biodiversity, Exploitation and Conservation (MARBEC) research unit, Honorary Research Associate at the University of Cape Town

### Cécile FAUVELOT

**Research director, Entropie research unit** – evolutionary biology, molecular ecology, marine ecology, population genetics and conservation biology

### Franck COURCHAMP

**Research director, French National Centre for Scientific Research** (CNRS), Systematic Ecology and Evolution Laboratory (ESE CNRS/Paris-Sud University); 2014 Climate & Biodiversity Initiative project winner

### Dr Frauke FISCHER

**Director of the Department of Animal Ecology and Tropical Biology** at the University of Würzburg in Germany

### Bruno DAVID

**Palaeontologist and biologist**, former president of the French National Museum of Natural History (2015–2023), former researcher at the French National Centre for Scientific Research (CNRS)

### Jean-Pascal VAN YPERSELE

**PhD in physics, climatologist, professor and co-director of the environmental management Master's programme** at the Catholic University of Louvain; member of the Earth and Climate Research Centre

### Marina LEVY

**PhD in oceanography, meteorology and environment** from Sorbonne University; research director, French National Centre for Scientific Research (CNRS)

### Philippe CURY

**Research director** in marine ecology and fisheries, French National Research Institute for Sustainable Development (IRD)

### Laura PEREIRA

**Professor of sustainable transformations and prospective studies** at the Global Change Institute at Wits University in South Africa; researcher at the Stockholm Resilience Centre, Stockholm University



# THE WINNERS OF THE 2025 CALL FOR PROJECTS

**PROJECTS WILL BE SUPPORTED FROM 2026 TO 2028**

# LOCATION OF THE 11 SELECTED PROJECTS


## RESEARCH TOPICS

### MARINE ECOSYSTEMS

Global marine ecosystems
The seabed | The open sea and coastal ecosystems | The deep sea
Estuarine ecosystems

### FLORA AND FAUNA

Phytoplankton | Pelagic megafauna (elasmobranchs) | Oysters | Corals
Sea cucumbers | Small-spotted catshark | Microbial biodiversity

**1 GULF OF GUINEA**
**Oceanpath:** migration of pelagic marine megafauna

**2 NORTHEAST PACIFIC**
**Abyscapes:** resilience of sea cucumbers in deep-sea ecosystems

**3 MEDITERRANEAN SEA**
**Med-Guard:** microbial biodiversity in coastal groundwater

**4 WORLD**
**FishMIP-OSP:** global marine biodiversity and fisheries

**5 SENEGAL**
**Yokhoss:** sustainable oyster farming

**6 CORAL TRIANGLE**
**Coralresist:** coral reef resilience and adaptation

**7 ARCTIC OCEAN, NORTHERN GREENLAND, SVALBARD**
**Micro-Arctic:** adaptation of microorganisms

**8 NORTH ATLANTIC & EUROPEAN COASTS**
**Phytoscope:** phytoplankton biodiversity

**9 MEDITERRANEAN, ATLANTIC COAST OF SPAIN**
**Show-It:** temperature effects on the development of the small-spotted catshark

**10 MEDITERRANEAN & NEW CALEDONIA**
**Marine Microswimmers:** marine microorganisms and benthic organisms

**11 REUNION ISLAND**
**Supercor-AI:** coral resilience

# 1 OCEANPATH

**PROJECT MANAGER:** Nuno Queiroz, PhD in biological sciences
**LEAD ORGANISATION:** BIOPOLIS Association
**PARTNER INSTITUTIONS:** St Helena National Trust / São Tomé OTS / Equatorial Guinea OTS / Ivory Coast Eburo

## PORTUGAL: SAFEGUARDING THE MIGRATION ROUTES OF MARINE MEGAFAUNA IN THE GULF OF GUINEA

### GENERAL CONTEXT

Global warming is predicted to cause ocean temperatures to rise between 1° and 6°C by 2100, causing major shifts in the movements of marine species. These species migrate horizontally towards the poles and vertically towards the depths to find suitable habitats. Tropical species, with low thermal tolerance, are particularly vulnerable. In parallel, ocean deoxygenation is decreasing dissolved oxygen levels, especially in tropical and subpolar regions. These changes are reducing viable habitats and increasing risks to marine megafauna. The Gulf of Guinea, an area of intensive illegal, unreported and unregulated fishing, accounts for around 25% of African maritime traffic, with approximately 1,500 vessels traversing it per day, increasing the risk of collisions with or accidental capture of large marine fauna.

### Project objective

The project aims to define and establish an Atlantic Marine Migration Corridor (AMMC), a vast protected area on the high seas stretching from Cape Verde to the Gulf of Guinea and St Helena. It seeks to identify the 3D habitat use and migration routes of whale sharks, mako sharks and blue sharks and assess the impact of climate change and human pressures on these species. The project will analyse anthropogenic risks such as fishing and collisions with ships, and plans to model future habitat connectivity under different climate scenarios. A key objective is to strengthen cross-border marine governance, while collaborating with local communities and partner organisations in sustainable marine conservation initiatives. The project is aligned with the UN Biodiversity Beyond National Jurisdiction (BBNJ) agreement and the 30×30 global biodiversity target.

### Scientific interest

This project will fill a gap in our understanding of how pelagic species under climate stress use 3D space. It will make use of innovative biologging tools to collect underwater data on temperature and oxygen. By integrating comprehensive habitat models and assessing human impacts, the project aims to improve predictions of species movements and inform climate-resilient conservation strategies for key pelagic predators. To this end, predictive maps of habitat and migration corridors will be generated. The impact of warming and deoxygenation on species vulnerability will also be quantified. The Gulf of Guinea, with its expanding oxygen minimum zone, will serve as a model region. The results will guide adaptive conservation strategies for migratory marine megafauna.

### Outreach

The project will include educational workshops and citizen science programmes with local communities in West Africa. It aims to promote ocean awareness and community engagement, particularly among young people and women. The materials will be disseminated via open-access platforms and social media.

> “By opening new avenues for cross-border protection of marine areas, we will safeguard the migration routes of large marine animals, creating a legacy of cooperation and hope for the oceans and the communities that depend on them.”



# 2 ABYSCAPES

**PROJECT MANAGER:** Erik Simón-Lledó, senior researcher, Functioning and Vulnerability of Marine Ecosystems research unit
**LEAD ORGANISATION:** State Agency Superior Council for Scientific Investigations (CSIC) – Institute of Marine Sciences (ICM)
**PARTNER INSTITUTIONS:** Senckenberg Society for Nature Research (SGN) / National Oceanographic Centre / BCL / GEOMAR

## SPAIN: RESILIENCE TO CLIMATE CHANGE OF BIODIVERSITY IN DEEP-SEA ENVIRONMENTS

### GENERAL CONTEXT

Deep-sea environments, the largest and least-known ecosystems, are threatened by both climate change and seabed mining. AbyScapes aims to increase knowledge about biodiversity in the depths, combining imaging, genomics and predictive modelling to understand the mechanisms that shape life in the deep sea in order to better determine conservation strategies.

### Project objective

By identifying large-scale deep-sea biodiversity patterns, AbyScapes will determine how these relationships evolve in a context of climate change and human impacts. To this end, the project aims to create the first integrated database with environmental, taxonomic, genetic and functional data on deep-sea biodiversity in the northeast Pacific. This will allow distinguishing between biotic and abiotic factors and predicting how these patterns will evolve under future climate and anthropogenic scenarios. AbyScapes will also launch an online database on the characteristics of sea cucumbers, predominantly benthic animals.

### Scientific interest

AbyScapes will apply joint species modelling to deep-sea environments. It aims to establish links between environmental gradients, biological traits, phylogeny and connectivity. This project will fill data gaps and lay the scientific foundations necessary for informed conservation of abyssal ecosystems.

### Outreach

AbyScapes plans to make the project data freely available, participate in podcasts, issue press releases and take part in exhibitions.

> “It is imperative that we acquire fundamental knowledge about how deep-sea communities respond to environmental change. The AbyScapes project will achieve this by combining ecology, genetics and modelling with the aim of preserving deep-sea biodiversity.”

# 3 MED-GUARD

**PROJECT MANAGER:** Virginie Sanial, senior lecturer in biological sciences at the University of Toulon and the Mediterranean Institute of Oceanography
**LEAD ORGANISATION:** University of Toulon
**PARTNER INSTITUTIONS:** Spanish National Research Council / National Research Council of Italy / Autonomous University of Barcelona / Laboratory of Microbial Biodiversity and Biotechnology

## FRANCE: ADAPTATION AND RESILIENCE OF MEDITERRANEAN GROUNDWATER TO CLIMATE DISRUPTIONS

### GENERAL CONTEXT

The Mediterranean Sea is warming 20% faster than the global average and is particularly vulnerable to climate change. Coastal groundwater, which is essential for the supply of fresh water and nutrients, is threatened by sea level rise and salinisation. These changes are likely to alter the input of nutrients and contaminants into marine ecosystems via underground discharges, with major consequences for biodiversity and water quality.

### Project objective

MED-GUARD aims to assess the impact of climate change on subterranean estuaries, their microbial biodiversity and their ecological functions. This project will quantify groundwater flows to the ocean, assess the effects of climate change on these flows, and determine how microbial communities contribute to filtration and bioremediation functions in these environments. The project will combine fieldwork in the Mediterranean, laboratory experiments and molecular tools to explore scenarios related to salinisation and climate change.

### Scientific interest

The project will highlight the role of subterranean estuaries as biogeochemical filters and investigate how microbial communities transform nutrients and contaminants. It will identify key microbial taxa and genes involved in carbon and nitrogen cycles and in pollutant degradation. These results will feed into predictive models and reveal potential microbial resources for environmental biotechnology solutions.

### Outreach

MED-GUARD plans a strong awareness-raising component, including workshops with stakeholders, educational materials, and participatory science and public events. This project will enlist coastal stakeholders, policymakers and local businesses with the aim of increasing understanding of the ecological importance of subterranean estuaries and promoting sustainable coastal zone management. The results will be disseminated in several languages and aligned with the biodiversity objectives of the EU and the UN.

> “To protect the future of our coasts, we need to understand the hidden currents that flow through them and the microbial life that silently protects marine ecosystems.”



# 4 FISHMIP-OSP

**PROJECT MANAGER:** Olivier Maury, research director, French National Research Institute for Sustainable Development (IRD), Marine Biodiversity, Exploitation and Conservation (MARBEC)
**LEAD ORGANISATION:** IRD (Region of Occitanie) / MARBEC Laboratory
**PARTNER INSTITUTIONS:** Foundation for Biodiversity Research (FRB) – Centre for the Synthesis and Analysis of Biodiversity (CESAB) / QUEEN MARY UNIVERSITY / AZTI

## FRANCE: OCEAN SYSTEM PATHWAYS: A NEW FRAMEWORK OF SCENARIOS AND SIMULATIONS TO STUDY THE FUTURE OF MARINE ECOSYSTEMS AND GLOBAL FISHERIES

### GENERAL CONTEXT

Marine biodiversity is under increasing pressure from climate change and overfishing. Projections predict a 15–25% decline in global fish biomass by 2100, and up to 50% in tropical regions. These changes threaten food security, particularly in the global south, where fish are an essential source of protein. Climate change risks exacerbating existing inequalities in terms of access to marine resources.

### Project objective

After 10 years of studying the impact of climate change on marine life, the FishMIP-OSP project aims to simulate the future of marine ecosystems and fisheries by integrating climate and socioeconomic scenarios. It will produce ensemble projections using the Ocean System Pathways (OSP) framework, which extends IPCC scenarios by taking into account the socioeconomic factors of fishing. The project will assess the impacts on biodiversity, food security and equity and seek to contribute to global policy processes (IPCC, IPBES, FAO).

### Scientific interest

The project will develop databases, simulation protocols and integrated models to assess fisheries dynamics, from a national to global scale, under climatic and socioeconomic pressures. It will identify tipping points and quantify losses and damage. Key scientific questions will be addressed concerning the interdependent socioecological dynamics of the ocean, such as the impact of potentially dangerous and abrupt changes on biodiversity conservation, North–South equity, climate justice and food security. FishMIP-OSP will explore sustainable futures in line with the IPBES Nature Futures Framework. Simulations will be shared in open access for further scientific analysis.

### Outreach

FishMIP-OSP will incorporate an ambitious outreach strategy targeting scientists, decision-makers and the general public. It will produce policy briefs, organise events alongside the FAO’s Committee on Fisheries, publish in prestigious journals and create accessible tools such as a web application and video content. The project will also contribute to the Future Earth and UN Ocean Decade initiatives.

> “FishMIP-OSP will forecast the future of ecosystems and fisheries to define the narrow path to sustainability that we must take to avoid what we cannot control and to manage what is inevitable.”

# 5 YOKHOSS

**PROJECT MANAGER:** Maria Darias, research director, French National Research Institute for Sustainable Development (IRD)
**LEAD ORGANISATION:** IRD
**PARTNER INSTITUTIONS:** Université Gaston Berger (UGB) in Senegal

## FRANCE: TOWARDS SUSTAINABLE OYSTER FARMING AND AQUACULTURE IN SENEGAL – DIVERSITY, CLIMATE RESILIENCE, NUTRITIONAL VALUE AND HEALTH

### GENERAL CONTEXT

Senegal's coastal ecosystems, particularly the Sine-Saloum and Casamance estuaries, face increasing environmental pressures: salinisation, temperature fluctuations, pollution, overfishing and global warming. Oysters such as Crassostrea tulipa play a vital role in food security, livelihoods and ecosystem services. However, their genetic diversity, stress tolerance and nutritional value remain poorly studied.

### Project objective

Transdisciplinary and interdisciplinary, with the close involvement of local communities, YOKHOSS aims to generate scientific knowledge to support the harvesting and sustainable aquaculture of climate-resilient oysters with nutritional value in Senegal. The project will make use of taxonomy, genomics, reproductive ecology, aquaculture trials, nutritional analyses and health-risk assessments. Its objectives are in line with the urgent need to conserve biodiversity, improve food security and strengthen livelihoods in a context of environmental change.

### Scientific interest

The project will generate new, unprecedented data on diverse oyster species and strains, as well as their genetic structure, salinity tolerance, nutritional value and vulnerability to pathogens. It will develop a genotyping tool for rapid strain identification, which will be useful for stock management and selection in aquaculture. The project combines biodiversity science, nutrition science and a 'One Health' approach.

### Outreach

YOKHOSS plans to organise participatory workshops, training tailored to local communities (particularly women harvesters), multilingual materials, and events to share the work and get public feedback. A bilingual website, infographics, technical datasheets and policy briefs will be produced to ensure the dissemination of the results at local, national and international level.

> "YOKHOSS seeks to bring together local knowledge and science to jointly develop sustainable oyster farming and aquaculture in Senegal, integrating biodiversity, nutrition and health to strengthen community resilience."



# 6 CORALRESIST

**PROJECT MANAGER:** Serge Planes, research director, French National Centre for Scientific Research (CNRS), Centre for Island Research and Environmental Observatory (CRIOBE)
**LEAD ORGANISATION:** CRIOBE
**PARTNER INSTITUTIONS:** Institute for Research on Cancer and Ageing, Nice (IRCAN) – Symbiosis Team / Tara Ocean Foundation / Department of Biology, University of Konstanz / Blue Alliance Philippines

## FRANCE: UNDERSTANDING THE UNDERLYING FACTORS IN CORAL REEF RESISTANCE TO GLOBAL WARMING

### GENERAL CONTEXT

While global warming is causing massive coral bleaching events worldwide, the reefs of the Coral Triangle in East Asia are showing remarkable resilience. The CORALRESIST project aims to understand the biological, ecological and evolutionary mechanisms behind this resistance, building on the findings of the Tara Pacific expedition (2016–2018).

### Project objective

The main objective is to elucidate the factors that make corals in the Coral Triangle resistant to heat. The project combines multi-omic approaches (genomics, transcriptomics, metabolomics), in-situ heat stress tests, microbiome analyses and palaeoclimate reconstructions. The aim is to understand how corals adapt to high temperatures and to identify markers of resilience to guide coral reef conservation strategies on a global scale.

### Scientific interest

CORALRESIST will provide novel data on the heat tolerance of corals, genetic signatures of local adaptation, transcriptomic and metabolic responses to stress, and microbiome dynamics. It will also explore epigenetic mechanisms related to ageing and resilience. Palaeoclimate reconstructions will enable the linking of past environmental conditions to the current resilience of corals.

This project aims to revolutionise coral reef conservation by identifying key mechanisms of resilience and developing innovative methods for sampling and testing resistance to stressors.

### Outreach

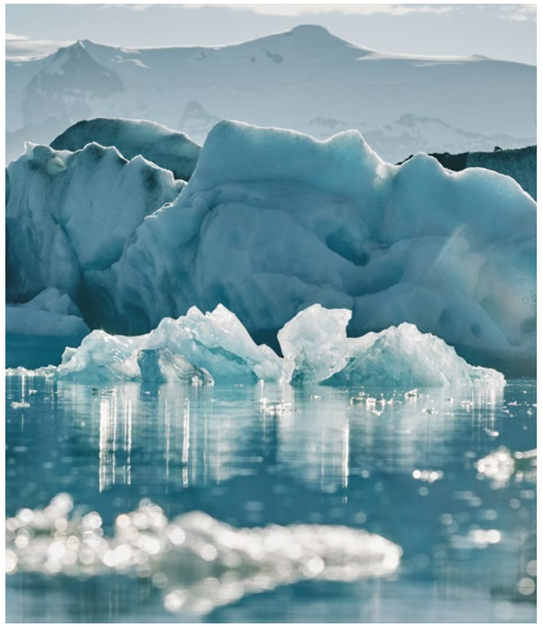
The project will include awareness-raising activities through the Tara Ocean Foundation, public exhibitions, educational programmes and media campaigns. Policy briefs will be co-developed with local partners to integrate the results into conservation strategies for the Coral Triangle. The data will be accessible on open science platforms.

> "While coral reefs are gradually disappearing due to climate change, the Coral Triangle is an exception to this trend. Our mission is to understand the reasons for this, convinced that we can contribute in this way to preserving the future of coral reefs."

# 7 MICRO-ARCTIC

**PROJECT MANAGER:** Pierre Galand, research director, French National Centre for Scientific Research, Benthic Ecogeochemistry Laboratory (LECOB), Banyuls Oceanographic Observatory
**LEAD ORGANISATION:** Sorbonne University
**PARTNER INSTITUTIONS:** Spanish National Research Council / French Alternative Energies and Atomic Energy Commission / École Polytechnique Fédérale de Lausanne / Cell & Plant Physiology Laboratory (LPCV) / Tara Ocean Foundation

## FRANCE: MICROBIAL LIFE IN A CHANGING ARCTIC OCEAN



### GENERAL CONTEXT

The Arctic is warming four times faster than the global average, leading to rapid sea ice loss and major disruptions to ocean and atmospheric conditions. These changes threaten the Arctic microbiome – microorganisms that regulate nutrient cycles and climate feedbacks – whose resilience and connectivity between the ocean, the ice and the atmosphere remain poorly understood.

### Project objective

MICRO-ARCTIC aims to explore the diversity, connectivity and adaptation mechanisms of the Arctic Ocean microbiome in the ocean, sea ice and atmosphere. Using the drifting Tara Polar Station, the project will collect data throughout the year to understand how the microbiome responds to extreme seasonal changes and climate stress. It will establish a baseline for monitoring ecosystem changes and improving climate models and conservation strategies.

### Scientific interest

The project seeks to fill major gaps in our understanding of microbial life during the harsh Arctic seasons, particularly winter. It will reveal how the microbiome adapts to cold, darkness and variations in salinity, and how it disperses between biomes. By linking microbial traits to climate feedbacks – such as cloud formation and radiation balance – MICRO-ARCTIC will improve predictive climate models and shed light on the role of the microbiome in regulating the global climate. This project also aims to contribute to conservation strategies in the Arctic.

### Outreach

A comprehensive outreach programme will target teachers, students, the general public and decision-makers. It will include multilingual educational resources, public exhibitions, online conferences and policy briefs. The Tara Ocean Foundation will lead efforts to connect science with society and promote Arctic conservation as part of the United Nations Ocean Decade.

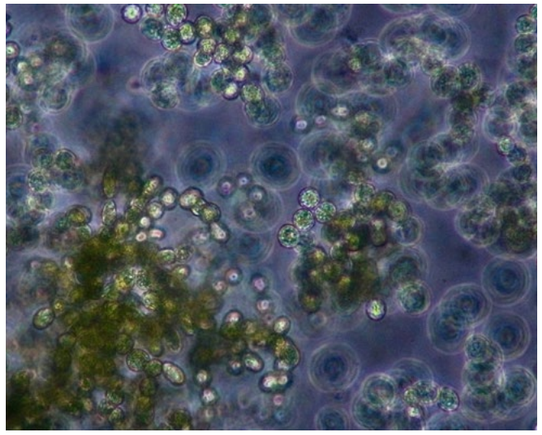
> “Understanding the diversity, functioning and resilience of the Arctic Ocean microbiome is essential to understanding its role in the context of climate change and to anticipating future transformations of Arctic ecosystems.”



# 8 PHYTOSCOPE

**PROJECT MANAGER:** Roy El Hourany, associate professor, Oceanography and Geosciences Laboratory
**LEAD ORGANISATION:** Université du Littoral Côte d’Opale
**PARTNER INSTITUTIONS:** Laboratory for Climate and Environmental Sciences (LSCE) / Secchi Disk Foundation / ACRI-ST

## FRANCE: PHYTOPLANKTON BIODIVERSITY IN AN OCEAN IN TRANSITION – INTEGRATING REMOTE SENSING, MODELLING AND THEORY TO PREDICT CLIMATE-RELATED CHANGES



### GENERAL CONTEXT

Phytoplankton, although microscopic, accounts for nearly 50% of terrestrial primary oxygen production and plays a central role in the carbon cycle. While climate change is altering phytoplankton diversity and distribution, with cascading effects on marine ecosystems, global biodiversity patterns and future responses remain poorly understood. PHYTOSCOPE seeks to fill this gap by integrating satellite and *in-situ* data, biogeochemical modelling and scientific theory to anticipate future changes in marine biodiversity.

### Project objective

PHYTOSCOPE aims to detect past and present changes in phytoplankton biodiversity and to forecast future changes under different climate scenarios. It will combine high-resolution remote sensing, in-situ validation, biogeochemical modelling (NEMO-PISCES models) and ecological theory (METAL framework). The project will define ecoregions, characterise environmental factors and assess biodiversity–environment relationships to guide conservation policy.

### Scientific interest

PHYTOSCOPE will provide the first multi-scale, multi-source, long-term assessment of phytoplankton biodiversity dynamics. It will establish new biodiversity indicators, detect critical transitions in ocean ecosystems, and improve understanding of phenological changes. The project’s nested approach – from global to coastal – will ensure robust knowledge about ecosystem functioning and resilience.

### Outreach

PHYTOSCOPE plans a range of public engagement tools such as graphic books, school activities and participatory science in collaboration with the Secchi Disk Foundation. It also aims to offer educational art–science collaborations during sailing expeditions organised by the Observatory for Child Protection (ODPE). The results will be shared with the French Biodiversity Agency (OFB) to contribute to conservation actions in Marine Protected Areas.

> “By combining satellite remote sensing, ecological theory and biogeochemical modelling, this project will make it possible to better understand how climate change can alter phytoplankton biodiversity.”

# 9 SHOW-IT

**PROJECT MANAGER:** Ana Verissimo, PhD in marine sciences, assistant researcher at BIOPOLIS
**LEAD ORGANISATION:** Association BIOPOLIS
**PARTNER INSTITUTIONS:** USC/ OOB

## PORTUGAL: ASSESSMENT OF THE EFFECTS OF CLIMATE CHANGE ON THE EARLY STAGES OF THE BIOLOGICAL CYCLE OF PREDATORS

### GENERAL CONTEXT

The oceans have absorbed 90% of recent global warming, causing rising sea temperatures and marine heatwaves that are threatening biodiversity. Elasmobranchs (sharks and rays), key predators in marine ecosystems, are particularly vulnerable. Their early life stages, particularly in oviparous species such as the small-spotted catshark, depend on stable thermal conditions in nurseries. Global warming could disrupt their embryonic development, immune system maturation, microbial colonisation, and brain structure, with cascading effects on their survival and behaviour.

### Project objective

This interdisciplinary project aims to assess how warming during development affects embryogenesis, immune and nervous system development, microbiome diversity, and juvenile behaviour in two genetically distinct populations of the small-spotted catshark (Scyliorhinus canicula). Through controlled aquarium experiments, histological and transcriptomic analyses, microbiome sequencing, and behavioural monitoring, the project will identify differences in thermal sensitivity between populations by conducting replicate experiments on populations living in the Atlantic and Mediterranean, in order to guide conservation strategies.

### Scientific interest

The project will provide the first genome-wide transcriptomic data on the effects of warming on gene expression in oviparous elasmobranchs. It will reveal how temperature influences the activation of immune genes, brain development and microbiome composition. By comparing populations in the Atlantic and the Mediterranean, it will highlight adaptive differences and identify the most vulnerable stages of development. This knowledge is essential for understanding species resilience and guiding the creation of Marine Protected Areas. The results will help determine critical heat thresholds for development and contribute to mapping areas at risk for the survival of eggs and the early stages of elasmobranch development.

### Outreach

The project will include an extensive awareness-raising programme targeting stakeholders, educators and the general public. It will produce a documentary, educational videos, infographics and a science report accessible to laypeople. Activities will be co-developed with the Feitoría Verde cooperative, including school programmes and community workshops in coastal towns. All materials will be translated and adapted for international use.

> “This project will provide new and essential knowledge on the developmental biology of oviparous elasmobranchs and will assess whether temperature influences normal embryonic development, focusing on neural/motor systems and the nervous and immune systems.”



# 10 MARINE MICROSWIMMERS

**PROJECT MANAGER:** Nicolas Garcia Seyda, postdoctoral researcher, the French National Research Institute for Sustainable Development (IRD), Entropie research unit
**LEAD ORGANISATION:** IRD, Entropie research unit
**PARTNER INSTITUTIONS:** Mediterranean Institute for Advanced Studies (IMEDEA) / French National Centre for Scientific Research (CNRS), Centre for Island Research and Environmental Observatory (CRIOBE)

## FRANCE: MARINE MICROSWIMMERS

### GENERAL CONTEXT

Benthic marine organisms such as corals, sponges and seagrass beds play a key role in ecosystem functioning, biodiversity and resilience to climate change. Fragilised by marine heatwaves, they may benefit from the support of mobile microorganisms (e.g. bacteria, microalgae) capable of improving their resistance. The project aims to study these interactions in order to develop nature-based solutions.

### Project objective

The MARINE MICROSWIMMERS project aims to understand how mobile marine microorganisms interact with benthic species (corals, sponges, gorgonians, seagrass beds) to reinforce their resilience to climate change. By combining field, laboratory and modelling approaches, it will identify the main microbial actors contributing to the resilience of benthic organisms, and key chemical signals that can be used to restore marine ecosystems.

### Scientific interest

MARINE MICROSWIMMERS offers an innovative approach combining microfluidics, long-read sequencing and chemical analyses to understand microbial motility in situ. It will allow the identification of microorganisms attracted to benthic species, their functional roles and the chemical signals involved, with direct applications in ecological restoration, in order to develop nature-based solutions for targeted restoration actions.

### Outreach

The project plans to disseminate its findings widely through open-access publications, international conferences, school workshops, videos, artistic collaborations, and an interactive dashboard. It will engage young audiences and local communities, including NGOs, to raise awareness of marine conservation and climate action.

> “The MARINE MICROSWIMMERS project will fill current knowledge gaps by studying the behaviour of marine microorganisms in situ, with the aim of finding natural solutions for the protection of benthic ecosystems.”

# 11 SUPERCOR-AI

**PROJECT MANAGER:** Emilie Boissin, postdoctoral researcher, Centre for Island Research and Environmental Observatory (CRIOBE)
**LEAD ORGANISATION:** CORECIF
**PARTNER INSTITUTIONS:** CRIOBE – TENAKA – REEF CHECK IO – REEF CHECK MY

## FRANCE: UNDERSTANDING CORAL RESILIENCE TO SUPPORT APPLIED REEF RESTORATION, MONITORED BY AI

### GENERAL CONTEXT

If current trends continue, 90% of the world's coral reefs could disappear by 2030. Reunion Island, where around 5% of corals are naturally resistant, offers an ideal environment for developing an innovative and sustainable method of active restoration that could be easily adapted on a large scale.

### Project objective

The SUPERCOR-AI project will use cutting-edge technology to analyse the urgent question of the resilience of reefs. By exploiting advances in genomics, scientists can better understand corals and their microbiome. This project plans to use genomic and microbiomic data to enable the assessment of coral resistance and resilience. The stability and viability of selected corals can then be evaluated through an AI-assisted monitoring system, an approach that could play a key role in safeguarding reefs on a global scale.

### Scientific interest

The SUPERCOR-AI project will use genomics and an AI-driven biodiversity monitoring system to select corals that are resistant to bleaching. This approach seeks to combine large-scale data analysis using machine learning and non-invasive data collection to reduce scientific bias. By linking scientific advances with conservation imperatives, this project aims to guide future adaptive restoration actions in the face of growing environmental threats.

### Outreach

The project plans to reach a wide audience, targeting three groups: the general public, young people, and the scientific community. Press relations campaigns are also planned to present the project to various media outlets.

> "As we watch coral reefs bleach before our eyes, we know we can no longer wait: it is time to act collectively, with bold innovation, to protect what remains."



# A LOOK BACK AT WINNERS FROM THE 2022 CALL FOR PROJECTS

**PROJECTS SUPPORTED FROM 2023 TO 2025**

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## COAST-VOC

### THE INFLUENCE OF COASTAL ECOSYSTEMS ON THE CLIMATE

Coastal ecosystems, which play a vital role in the climate, emit volatile organic compounds (VOCs). The challenge for researchers is to determine whether, once in the atmosphere, these compounds aggregate into particles that can form clouds and thus have a cooling effect on our climate. **Project led by the University of Helsinki (Finland).**

## PHYTOPLANCTON

### WILL PHYTOPLANKTON ADAPT TO CLIMATE CHANGE?

This project focuses on the analysis of the DNA of diatoms, microalgae that constitute the largest group of phytoplankton in the Southern Ocean, to generate a forecast of phytoplankton evolution over the next hundred years. This will provide a better understanding of phytoplankton's impact on the carbon cycle, atmospheric $CO_2$ and the global climate, as well as the food chain. **Project led by the National Centre for Scientific Research (France).**

## DEEPLIFE

### "MARINE ANIMAL FORESTS"

DEEPLIFE is part of the "Under the Pole – Deeplife – 2021–2030" programme. Focusing on "marine animal forests" (dominated by organisms such as sponges, corals, etc. that provide a shelter for diverse biota), it aims to map these from the polar regions to the tropics. The objective is to understand the minimum density and structure required for each animal forest to protect both the species and their functions. **Project led by Sorbonne University (France).**

## FRUIT RESCUE

### HOW WILL FRUIT TREES WITHSTAND CLIMATE CHANGE?

The project aims to assess the adaptability of European fruit trees in temperate regions (apple, apricot, peach) and Mediterranean regions (olive, grapevines) to climate change. Which wild or cultivated populations, or which varieties, are at risk of disappearing or, on the contrary, will be able to survive locally or in other regions? **Project led by the National Centre for Scientific Research (France).**

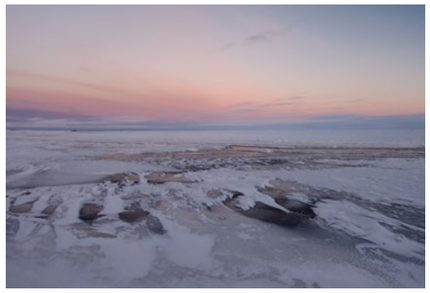


PROJECTS SUPPORTED FROM 2023 TO 2025

## FUTURE FEAR

### CLIMATE CHANGE, PREY AND PREDATORS IN THE AFRICAN SAVANNAH

This project analyses the behaviour of zebras, wildebeests and their predators – lions and hyenas – in Hluhluwe-iMfolozi Park (South Africa) to study how rising temperatures, changing wind patterns and grassland cover influence behaviour. **Project led by the National Centre for Scientific Research (France).**



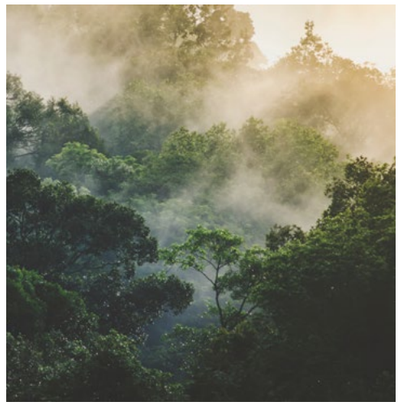
## FLO CHAR

### FROM LAND TO SEA: THE IMPACT OF GLOBAL WARMING IN THE ARCTIC

The project is studying the effects of carbon fluxes and organic matter releases between land and ocean on coastal ecosystems and biodiversity in the Beaufort Sea north of Canada. **Project led by the Alfred Wegener Institute (Germany).**

## NATURAL FORESTORE

### CARBON SEQUESTRATION AND STORAGE IN THAILAND'S TROPICAL FORESTS



The project has three key focuses: to perform DNA sequencing of soil bacteria and fungi involved in carbon recycling; to assess forest biomass; and to inform local residents about the forest's carbon capital so they can promote it on the carbon market. Additionally, it seeks to raise awareness about the major role of soil microorganisms, the importance of preserving forests, and the benefits that can be derived from them. **Project led by the National Research Institute for Sustainable Development (France).**

## REFUGE-ARCTIC

### STUDYING ONE OF THE LAST SEAS WHERE THE ICE NEVER MELTS

An expedition bringing together a wide range of scientists in order to characterise this exceptional environment, explore past climate processes and look ahead to the future. **Project led by the National Centre for Scientific Research (France).**

**BNP Paribas** – December 2025
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