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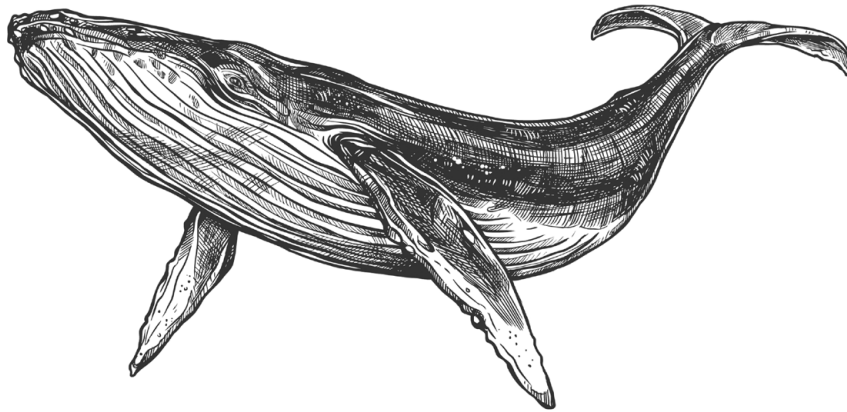


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TACKLING MARINE POLLUTION - A MAJOR CHALLENGE FOR THE OCEAN AND THE PLANET

Gaëlle Bailly, Operations Officer at **CEPPOL (Centre of Practical Expertise in Pollution Response)**

THE CHALLENGE OF POLLUTION IN THE MARINE ENVIRONMENT, WHETHER FROM CHEMICALS, PLASTICS OR NOISE, RESULTING FROM HYDROCARBON SPILLS OR SHIPPING CONTAINERS LOST AT SEA, PROMPTS MANY BODIES AND INSTITUTIONS TO RESPOND, PARTICULARLY IN BRITANNY. **GAËLLE BAILLY** SETS THE SCENE: "ACCIDENT RESEARCH AND ANALYSIS WAS A BIG THING IN BRITANNY IN THE 1970S AND 1980S, WITH TRAGIC EVENTS LIKE THE AMOCO CADIZ DISASTER COMPELLING NUMEROUS ORGANISATIONS HERE TO DEVELOP RELEVANT KNOWLEDGE AND SKILLS AND THE MEANS TO RESPOND TO SUCH HAZARDS. YOU ALWAYS HAVE TO BE AT THE CUTTING EDGE OF INNOVATION TO BE READY TO TACKLE ANY KIND OF POLLUTION"

CEPPOL - A MAJOR PLAYER IN COMBATING POLLUTION

Established in 1979 by ministerial order following the Amoco Cadiz oil spill, **CEPPOL**, a unit of the French Navy based in Brest, is expert in dealing with accidental marine pollution, whether in mainland France or overseas. Its mission is threefold: to prepare the Navy regarding its responsibility to tackle accidental marine pollution, to advise and provide expertise to the maritime authorities before and during an intervention, and to take action at sea as well as part of crisis management teams in response to marine pollution.

INTERNATIONAL MOBILISATION

Combating marine pollution often leads to the establishment of partnerships between regional and international actors. **CEPPOL** and **Cedre** are thus part of numerous research programmes. One of these is the European **IMAROS** project on new fuel oils where they are collaborating with their Norwegian counterparts. **Gaëlle Bailly** explains: "A regulation from the International Maritime Organization to reduce atmospheric pollution from ships has led a number of organisations to take action, especially through experimental and research projects. During the One Ocean Summit in Brest, 22 European ship owners joined the Green Marine Europe certification scheme, which aims to achieve significant reductions in atmospheric emissions from shipping and any oil-based effluent resulting from normal shipping operations."

FORECASTING FOR RESPONSE PREPAREDNESS

Another major challenge in tackling accidental pollution is to prepare a response to potential chemical pollution. "In this case

too we are involved in multi-partner experimental programmes to prepare for such an event", **Gaëlle Bailly** confirms. Similarly, there is a focus on predicting oil slick drift. "For the last three years **CEPPOL** and **Cedre** have been leading a comparative study of different drift prediction models, working with and for the members of the Drift Committee set up by **Cedre** and bringing together **Météo France**, **Shom** and **Ifremer**."



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NEWS IN BRIEF

DAMISIA FOR CLEANER BOATS

JEAN-FRANÇOIS DOUARD, A FORMER CHIEF ENGINEER IN THE MERCHANT NAVY, WAS ALWAYS FASCINATED BY OILY WATER SEPARATORS, ALTHOUGH THEY HAVE RARELY BEEN EFFECTIVE AT DECONTAMINATING EFFLUENT. YET SEAFARERS ARE BEING HELD CRIMINALLY RESPONSIBLE FOR THESE FAILURES. AS **JEAN-FRANÇOIS DOUARD** NOTES, "OF 1,146 BOATS INSPECTED IN EUROPE IN 2021, AROUND A HUNDRED WERE PREVENTED FROM LEAVING PORT BECAUSE THEIR WASTE WATER SEPARATOR DIDN'T COMPLY WITH THE REGULATIONS."

The system developed by **Damsia** with support from **Technopôle Brest-Iroise** uses optical sensors to detect any opacity (not just hydrocarbons) in waste water. All the pollutants are then removed from the water by means of a vacuum distillation process using the cooling water from the engines, in other words the vessel's own waste heat. "Instead of removing pollutants from the water, the system removes the water from the pollutants", its designer explains.

Patented and Veritas-certified in June 2021, the system produces water at purity levels of less than five parts per million (ppm), although the legal requirement is for less than 15ppm. **Damsia** has just equipped three vessels and has been approached by numerous interested ship-owners and builders.



©Damsia



MÉGO!: RECYCLING CIGARETTE BUTTS INTO STREET FURNITURE

IN 2011 **BASTIEN LUCAS** SET UP **ECO ACTION PLUS** IN BOURG-BLANC, NEAR BREST, TO COLLECT WASTE FROM BUSINESSES AND COMMUNITIES. HE SOON REALISED THAT THERE WAS A REAL ISSUE WITH CIGARETTE BUTTS, WHICH HAD NEVER BEEN ADDRESSED.

After two years of R&D, Lucas developed a unique closed-loop solution and, with support from **Technopôle Brest-Iroise**, he launched **MéGO!** (mégot being French for cigarette butt). A real industry was established, from the ashtray (which can be provided by the company) or other collection point to the cigarette butt collection itself and transfer to the recycling plant. These services are provided by around ten partners from all over France which supply **MéGO!** with sufficient flows of material for processing.

The recycling process aims not to release any pollutants into the environment. Once they have been cleaned, the cigarette butts are soaked, dried and then crushed. "The resulting material undergoes thermal compression to make sheets one centimetre thick which can be used to make NF-certified (a French standard) street furniture", explains **Bastien**. These sheets are recorded so they can be taken back at the end of their lives to be reincorporated into the recycling process.

The company also works regularly with organisations to run collection campaigns along the shoreline. Awareness-raising thus takes place at different levels to encourage changes in behaviour and to communicate the idea that, for every cigarette butt (a tiny yet harmful item of waste) there is a solution.



©Simon Cohen-MéGO!





©Cedre



TANGIBLE CONTRIBUTIONS TO TACKLE **MARINE POLLUTION**

SINCE THEY WERE ESTABLISHED, **CEDRE** AND THE **INTERNATIONAL MARITIME ORGANIZATION (IMO)** HAVE BEEN WORKING TO TACKLE MARINE POLLUTION. **CHRISTOPHE LOGETTE**, DIRECTOR OF **CEDRE**, AND **NATASHA BROWN**, **IMO**'S HEAD OF PUBLIC INFORMATION SERVICES, TALKED TO US ABOUT WHAT THE WORK INVOLVES.

COULD YOU TELL US A BIT ABOUT CEDRE?

CHRISTOPHE LOGETTE: It was set up in 1979 following the oil spill from the Amoco Cadiz with the aim of further developing technical solutions and methods for dealing with accidental pollution of the sea. Its remit also includes providing advice to the relevant authorities and disseminating information from its members. Its scope has expanded over the years to include accidental pollution of freshwater and pollution from chemical products and other hazardous substances, as well as macrowaste and plastic pollution. **Cedre** operates both in France and internationally.

WHEN DID THE IMO FIRST BECOME CONCERNED ABOUT MARINE POLLUTION?

NATASHA BROWN: It was back in the 1970s, with the adoption in 1972 of the London Convention on the Prevention of Marine Pollution by the Dumping of Waste, which the **IMO** has administered since 1977. The **London Convention** was followed in 1973 by the **MARPOL Convention** which seeks to prevent marine pollution from ships. Since then the **IMO** has developed a range of other measures in this field, including the International Code for Ships Operating in Polar Waters.

WHAT ARE THE GREATEST CHALLENGES AT THE NATIONAL AND INTERNATIONAL LEVELS?

CL: There's a range of issues to consider, such as the scale of

container shipping traffic, vessel size and new methods of ship propulsion. We also need to explore the way low-sulphur hydrocarbons behave, as well as looking at the issue of macrowaste and microplastics. We need to enhance our knowledge in response to these new challenges, while keeping up to date with our skills and expertise on more conventional types of pollution.

NB: One of our challenges is with the worldwide implementation of the international maritime laws that have been adopted. This is something the **IMO** can assist States with. It can also help with capacity-building to prepare for marine pollution incidents through the Integrated Technical Cooperation Programme (ITCP) and a range of other projects and initiatives.

WHAT IS YOUR ROLE IN TACKLING MARINE POLLUTION?

CL: **Cedre** has a role at different stages in the process. We provide support in advance of pollution incidents by offering our partners training, auditing and help with developing intervention plans and mechanisms, as well as data archiving during and after incidents. We also produce intervention guides and operate a full-time expertise and advice service. Our laboratory and other facilities can provide information about a substance, its toxicity and behaviour, and can support efforts to tackle spills at sea or on the shoreline.



©Cedre

NB: Since it was established, the *IMO* has adopted a range of measures which seek to prevent and manage pollution from ships and to mitigate the impact of any damage that may be caused by maritime activities and accidents. The *IMO* also helps States to implement these measures. As a result, pollution from ships has been reduced - which is testament to the commitment of the *IMO* and the maritime transport sector to protect the environment. The **Marine Environment Protection Committee (MEPC)** is the *IMO*'s main technical body dealing with marine pollution issues. The Committee's work is supported by a number of *IMO* sub-committees.

WHAT PROJECTS ARE CURRENTLY UNDER WAY?

CL: We have a number of projects at the moment, which include developing a bio-based dispersant, studying the way certain chemical products behave in the sea (in collaboration with the **French Navy**), and research to find out more about hydrocarbons in tropical and polar environments. We also have a coast and estuary networks project developing knowledge about waste and microplastics, which has an international dimension.

NB: The *IMO* is looking at the guidelines on the management of

biofouling, intended to help protect biodiversity. It has also initiated studies to review the guidelines on reducing underwater noise from shipping. We also need to do more to tackle plastic waste.

ARE THERE NEW REGULATIONS IN THE PIPELINE?

NB: We are expecting new guidelines on reducing greenhouse gas emissions from maritime transport. The *IMO*'s revised strategy on this is likely to be adopted in 2023.

CEDRE IS PART OF THE CAMPUS MONDIAL DE LA MER COMMUNITY. HOW DO YOU VIEW THIS NETWORK OF STAKEHOLDERS?

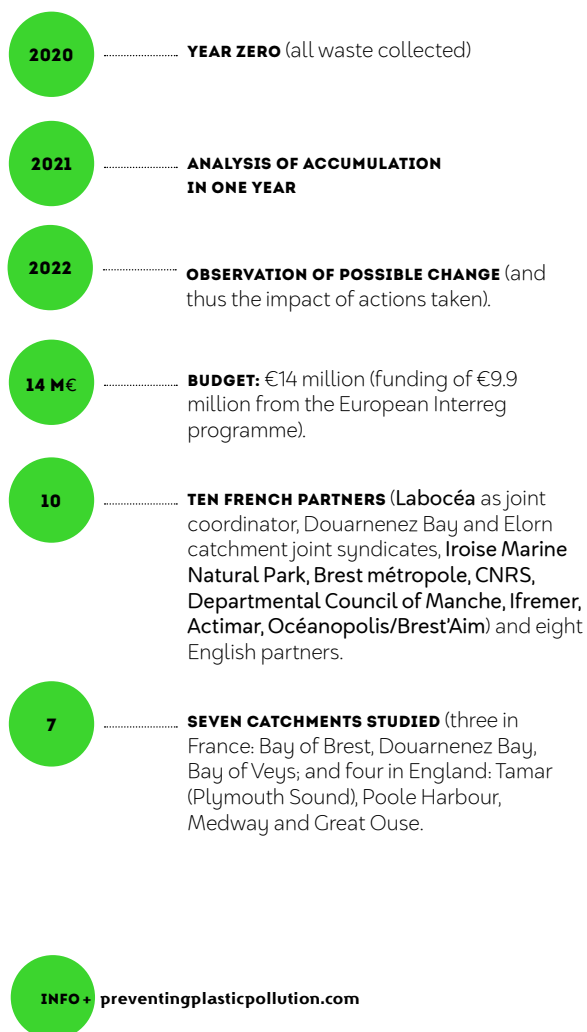
CL: The work of *Campus mondial de la mer* helps to strengthen the professional networks in Finistère while maintaining links internationally. It functions simultaneously as an accelerator and a facilitator.



PREVENTING PLASTIC POLLUTION: “REDUCE, RE-USE, RECOVER, RECYCLE”

PPP IN DATES AND FIGURES

Project start: 26/09/2019; anticipated end: 30/06/2023.



THE PREVENTING PLASTIC POLLUTION (PPP) PROJECT HAS THREE MAIN AIMS: TO UNDERSTAND PLASTIC POLLUTION FROM SOURCE TO SEA, TO REDUCE THIS POLLUTION AND TO RAISE AWARENESS AMONG COMMUNITIES AND BUSINESSES IN THE CATCHMENTS.

The PPP project brings together a large number of participants working in seven pilot catchments (three in France and four in England – see box). The **Labocéa** public laboratory is coordinating the project jointly with **Queen Mary University of London (QMUL)** and is working to develop a standardised approach for identifying and measuring plastic pollution. Labocéa Engineer **Valérie Yeuc'h** explains what this involves: *“We are harmonising the collection and identification of macroplastics. The process is based on the OSPAR* international reference grid which has been adapted for the project. We are collecting and analysing samples of microplastics from rivers and the sea as well as from sand and mud”*. Aided by a range of project partners, **Labocéa** is organising the collection of samples in two pilot catchments (the Bay of Brest and the Bay of Veys) to identify and quantify the sources of pollution. Field and laboratory tests are conducted to analyse the environmental impacts on organisms in freshwater (**QMUL**) and seawater (**Ifremer**). Research director **Gaël Durand** summarises the work: *“Based on these samples and analysis of the activities that take place in the catchments, Actimar, will be able to model the catchments and link the activities there with what is happening in the marine environment. It will thus be possible to identify and map the greatest risks posed by plastic pollution and the most effective ways to counter them.”*

Better understanding of pollution and its origins can be used to help identify levers for action to reduce it, working in partnership with tourism and leisure, business and agriculture. **Gaël Durand** continues, *“Plenty of actions and proposals are being put forward by project partners such as Brest métropole, which is setting up activities and communication tools, the organisations hosting the Douarnenez and Elorn catchment initiatives and the Iroise Marine Natural Park.”*

Awareness-raising with a long-term impact is a key part of the work with communities and businesses in the catchments. This includes engaging with schools and encouraging behavioural changes through training for catering businesses and staff (who have signed a pledge committing them to reduce plastic use).

“The strength of the project also comes from having a wide range of partners involved,” concludes **Gaël Durand**. One benefit of this diversity is that it can produce results that influence decisions. *“The aim is that the project will generate increased momentum.”*

* The **OSPAR** Convention conducts periodic assessments of the status of the marine environment in the North-East Atlantic. Apart from its monitoring role, its priority is to protect marine biodiversity.



BREST MÉTROPOLE: VALUABLE EXPERIMENTS FOR LONG-TERM ACTION

TRISTAN FOVEAU, VICE-PRESIDENT FOR SUSTAINABLE WASTE MANAGEMENT, SETS OUT BREST MÉTROPOLE'S INVOLVEMENT AND VISION FOR THE **PREVENTING PLASTIC POLLUTION (PPP)** PROJECT.

With co-funding of around €10 million from the **European Regional Development Fund (ERDF)**, the European PPP project has allowed **Brest métropole** to conduct a range of experiments and evaluate their effectiveness. As **Tristan Foveau** explains, "*Communicating the recycling message that all packaging waste should go in one yellow bin required a huge awareness campaign, which we were able to run thanks partly to PPP.*"

Some 420 lockable bins were placed on an experimental basis at the port and in areas near the seafront. "*These sealed containers - which*

stay sealed in high winds - help us reduce plastic waste pollution on the beaches and in the sea," says **Tristan Foveau**, "*We can use them in areas that are a bit further from the shore, but that have been identified as places where bins can sometimes fall over.*"

Participation in PPP has given organisations a chance to raise awareness more widely. Sports clubs and business owners have signed a pledge to cut the use of single-use plastic, alongside several other initiatives such as zero-waste picnics. "*A zero-plastic label has even been introduced to encourage restaurants to adopt good practices,"* **Tristan Foveau** adds.

ACTIMAR: DYNAMIC MAPPING TO REDUCE PLASTIC POLLUTION

ACTIMAR FOCUSES ON HYDRODYNAMIC MODELLING, CALCULATING PLASTIC DRIFT AT SEA AND DEVELOPING A WEB DEMONSTRATOR SERVICE.

Actimar is a branch of **Suez Consulting** specialising in operational oceanography. This means studying the marine environment, primarily through modelling using features such as currents, waves and temperature.

Actimar is involved in the PPP project, the aim of which is to gain greater understanding of plastic pollution in the sea. The company's specific role is to seek to identify whether there are parts of the sea where pollution is more likely to accumulate.

"*Our work consists of modelling the currents to calculate plastic drift, based on identified sources,"* explains R&D manager, **Marc Pavéc**. **Actimar** has studied four locations (the Bay of Brest, Douarnenez

Bay, the Bay of Veys and Plymouth Sound) and has produced maps of plastics trajectories, with areas of accumulation in coastal zones (tidal currents mean there is little accumulation at sea in the locations studied).

An online platform with a calculation tool is being developed using the results of the plastic drift calculations. "*Our **Seamafor** application allows you to anticipate need and target a collection operation, for example. Our tool can monitor plastics and take account of the effects of waves and currents, updating the results on the basis of these parameters.*"

LEMAR: ASSESSING AND MONITORING FLOATING MICROPLASTICS

THE LABORATORY OF ENVIRONMENTAL MARINE SCIENCES, OR **LEMAR**, IS AN INTERDISCIPLINARY RESEARCH UNIT FOCUSING ON MARINE ECOSYSTEM FUNCTION AND POTENTIAL DISRUPTIONS TO THE EQUILIBRIUM OF THE MARINE ENVIRONMENT. THE LAB HAS BEEN CARRYING OUT WORK ON PLASTICS FOR 10 YEARS.

As part of the **Preventing Plastic Pollution project (PPP)**, LEMAR has pursued three lines of work in cooperation with **CNRS** and **Ifremer**: "We are monitoring floating microplastics in the marine environment in three pilot zones: Douarnenez Bay, the Bay of Brest and the Bay of Veys," notes **Ika Paul-Pont**, a research ecotoxicologist with **CNRS**, "and we are also active in the Iroise Sea. With 23 strategically placed sampling points, we can determine the origin of plastics contamination and monitor how it spreads."

As part of its contribution to PPP, LEMAR has drawn up a hierarchy of toxicity for microplastics, depending on the source (textile fibres,

tyre fragments, etc.), using an iconic, model marine species, the Pacific oyster (*Crassostrea gigas*): "As well as bringing us fundamental knowledge," **Ika Paul-Pont** continues, "the evaluation allows us to identify which microplastics have the most problematic impacts. This applied vision will help with decision making and will underpin the measures taken on these plastics."

In addition to the scientific work, LEMAR is acting to reduce plastic waste through the Brest Ifremer centre and the **European Institute for Marine Studies (IUEM)**. It also participates in public awareness-raising campaigns and outreach in schools, and in events such as **European Researchers' Night** in September 2022 and **France's Science Festival** in October 2022.

INFO + www.iuem.univ-brest.fr/lemar

A SOLID LEGAL FRAMEWORK AND JURISDICTION FOR TACKLING ENVIRONMENTAL DAMAGE

THE LAW OF 24 DECEMBER 2020 ON THE EUROPEAN PUBLIC PROSECUTOR'S OFFICE, ENVIRONMENTAL JUSTICE AND SPECIALIST CRIMINAL JUSTICE CREATED SPECIALIST REGIONAL HUBS TO DEAL WITH ENVIRONMENTAL DAMAGE, THE AIM BEING TO STEP UP THE FIGHT AGAINST ENVIRONMENTAL CRIME.

Rennes Court of Appeal decided to base the new hub for Brittany, which can handle both civil and criminal cases, at Brest Court of Justice. This was "a coherent decision" according to Brest's public prosecutor, **Camille Miansoni**, given the city's geographical position and the fact that several relevant institutions and judicial bodies are already located there. They include Julis, a specialist court with jurisdiction over hydrocarbon pollution in the Atlantic, and the maritime court, which has jurisdiction over maritime offences.

"The regional environmental hub has concurrent jurisdiction within the court," **Mr Miansoni** explained, "and it can deal with the more complex, technical cases, depending on the monetary damages, the number of victims, and so on."

The considerable task of setting up this hub has involved establishing judicial circuits, building up systems for collaboration between institutions and the prosecutor's office, and the allocation of resources. "The idea," noted **Mr Miansoni**, "is to centralise the competences of judges and magistrates specialising in cases involving environmental damage in the wider sense."

Allegans is a legal consultancy specialising in marine environmental protection. Established in 2003 by **Yann Rabuteau**, the Allegans network is making its own contribution to this judicial hub. As well as the significant work that has been done on accessing data on maritime law, Allegans also delivers training, in collaboration with the **Centre of Documentation, Research and Experimentation on Accidental Water Pollution (Cedre)**, in particular for Navy and Customs pilots carrying out aerial surveys of pollution at sea.

INFO + www.allegans.com





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BREST IN TUNE WITH THE SEA - OR HOW TO LIMIT THE IMPACT OF NOISE ON MARINE MAMMALS

MARINE NOISE HAS BEEN RECOGNISED SINCE 2008 AS ONE OF THE MAIN FORMS OF MARINE POLLUTION. TO ENSURE THE PROTECTION OF MARINE ANIMALS, THIS NOISE POLLUTION MUST BE MONITORED AND REDUCED OR PREVENTED. TWO BREST-BASED COMPANIES, **QUIET-OCEANS** AND **SERCEL**, OFFER CUTTING-EDGE SOLUTIONS IN THIS FIELD.

"Brest has an ideal ecosystem for underwater acoustics. We provide public bodies, research institutions and industry throughout the world with marine noise modelling and forecasting services and real-time monitoring of noise and of the presence of different species", explains **Carl Bois**, Sales Director at **Quiet-Oceans**.

Since it was established in 2010, the company has specialised in the impact of underwater noise on marine biodiversity. Its **Quonops** modelling platform is recognised as one of the most effective of its kind and as such was selected as a tool for mapping European sea basins. It is also widely used by public bodies and industry for impact assessments of maritime activities such as port expansions and the development of marine renewable energy. **Quiet-Oceans** assists with the construction of offshore wind farms in France and Northern Europe, providing real-time monitoring of noise and the presence of

marine mammals when foundations are being installed. Alongside **Quiet-Oceans**, another company with a presence in Brest is **Sercel**. It specialises in developing underwater acoustic communication solutions, acoustic positioning systems and passive acoustic monitoring. The company has developed **QuietSea™**, a system for the automatic detection and location of marine mammals.

Christophe L'Her, Director of **Sercel's** Brest site, describes the system's evolution: *"It was originally designed to protect cetaceans during marine seismic operations that use acoustic impulse sources, but nowadays it's used for all noise-producing maritime activities".* **Jean-Louis Etienne** and **Ifremer** have chosen the **QuietSea™** system for the planned three-month Antarctic exploration by the **Polar Pod**, during which it will conduct a survey of the cetacean population. Meanwhile, **Sercel** has recently developed a new generation of seismic sources called **BluePulse** and **TPS™**, which significantly reduce the level of acoustic emission perceptible by many cetacean species.

INFO +

www.quiet-oceans.com
www.sercel.com

CEDRE - A MAJOR PROVIDER OF POLLUTION RESPONSE TRAINING

BASED IN BREST, THE CEDRE PROVIDES STANDARD AND BESPOKE TRAINING FOR POLLUTION RESPONSE EXPERTS. TRAINING CAN BE DELIVERED ONSITE AT **CEDRE**, AT AN EXTERNAL LOCATION OR REMOTELY.

On average, **Cedre** trains 1,300 people every year, with 60% of participants drawn from government bodies, local authorities and companies in France and the remaining 40% from abroad. The training is delivered by internal and external experts selected for their skills and experience in specific fields. A range of teaching methods are used which are compliant with international standards. These include in-person and online theory courses, practical sessions, tutorials, serious games, tabletop exercises, case studies looking at past spills and quizzes using interactive voting systems. The courses and accompanying materials are made available on an e-learning platform.

Natalie Monvoisin, Head of Research and Training at **Cedre**, explains how the centre's training has evolved: *"Since it was first established*

and in response to accidents at sea and in inland waters, Cedre's scope in terms of pollution has expanded from hydrocarbons to cover chemicals, macrowaste and microplastics."

UNIQUE FACILITIES

Cedre's 2.5-hectare technical site is the only one of its kind in the world. It is specially designed to allow the release of hydrocarbons in realistic conditions, facilitating practical training sessions on accidental pollution response. The site includes a showroom, a 2,500m² artificial beach, two bodies of water with a total surface area of 5,500m² and a port area with a marine fuel station.

INFO +

www.cedre.fr



STEFAN LALONDE - FROM CANADA TO BRITTANY

AFTER STUDYING IN CANADA, IN 2011 **STEFAN LALONDE** JOINED THE TEAM OF **OLIVIER ROUXEL**, RESEARCHER AT **IFREMER** AND HOLDER OF THE INTERNATIONAL CHAIR IN DEEP SEA ENVIRONMENTS. STEFAN LALONDE IS AN EARLY EARTH EXPERT AND A **CNRS** RESEARCHER AT THE OCEAN **GEOSCIENCES** LABORATORY IN BREST. WE MET HIM TO FIND OUT MORE ABOUT HIS WORK.

TELL US HOW YOUR JOURNEY BEGAN

I graduated with a degree in Cellular Biology from **McGill University** in Montreal. Alongside my studies I was a semi-professional skateboarder and also took courses in Geology and Astrobiology. I came to realise how little we know about the origins and evolution of life on Earth. I worked with **Kurt Konhauser**, Professor of Geochemistry and Geomicrobiology, who had just arrived at the **University of Alberta** in Edmonton. Seven years after, a Masters in Geomicrobiology and a PhD in Geochemistry later, we had published a dozen articles together.

SO WHAT BROUGHT YOU TO BREST?

I wanted to focus on isotope geochemistry and applied for funding from the **Natural Sciences and Engineering Research Council of Canada (NSERC)** for a post-doctoral research project with **Olivier Rouxel**. At that time he was working in the United States at the prestigious **Woods Hole Oceanographic Institution (WHOI)**. My application was approved but by the time I'd finished my PhD **Olivier** had been selected by the **Europole Mer** for the International Chair in Deep Sea Environments in Brest. I'd never heard of the city and I actually thought it was the Brest in Belarus (laughter). After working with **Olivier** for three years, I joined the **CNRS** in 2013.

WHAT DOES YOUR RESEARCH INVOLVE?

It focuses on early Earth, that's the first three billion years of the planet's history - when it was just a world of microbes. I'm

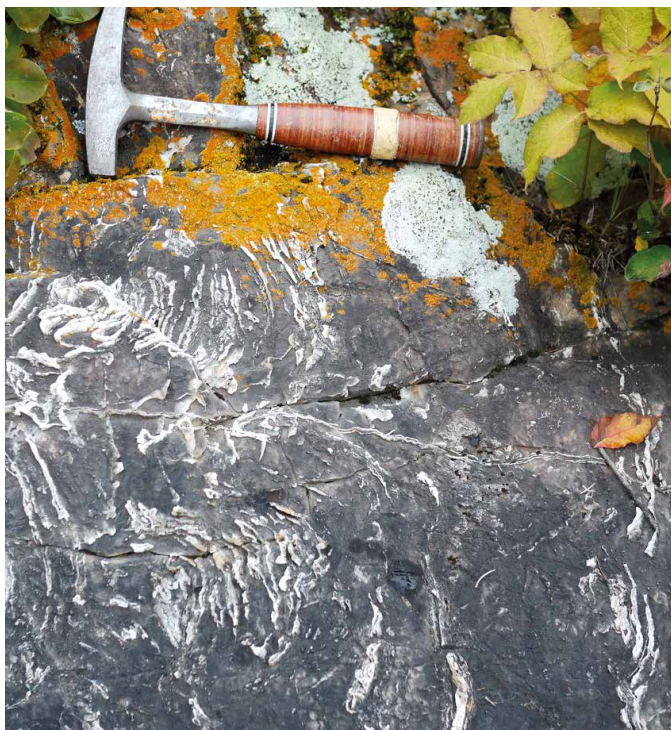
particularly interested in the key stages in the evolution of the major biogeochemical cycles that made our planet habitable. My work involves analysing ancient sediments and analogous modern systems to understand the evolution of the microbial biosphere.

At the moment I have a €1.8 million ERC Starting Grant from the **European Commission** for a project called **EARTHBLOOM**. These grants are some of the most competitive research grants in Europe and aim to expand the boundaries of knowledge through ambitious projects. At the heart of the **EARTHBLOOM** project are the early stages of the carbon cycle on Earth. Understanding the capacity of the biosphere to facilitate carbonate mineral precipitation and the reintegration of carbonate sediments into the mantle is a major challenge.

Since 2019 I have also held a patent to measure concentrations of dissolved CO_2 in different fluids in real time. I was supported in obtaining the licence by **Ouest Valorisation**, a technology transfer acceleration company.

WHAT PROJECTS DO YOU HAVE LINED UP?

I am currently working on putting together another major European project which will look at the preservation of the earliest traces of life on Earth on different continents. This will involve a chemical and isotope comparison of different traces of life and rocks from different paleo-environments of early Earth.





Carl Bois, Honorary Norwegian Consul, Ludovic Caubet, Director of the CCFN, and Philippe Monbet, Pôle Mer Bretagne Atlantique Deputy Director.



STRENGTHENING LINKS BETWEEN NORWAY AND BRITTANY

WITH A STRONG FOCUS ON THE SEA AND MARITIME ACTIVITY, NORWAY IS SEEKING TO STRENGTHEN ITS LINKS WITH FRANCE IN THIS SECTOR. HERE'S AN OVERVIEW WITH **LUDOVIC CAUBET**, DIRECTOR OF **THE FRENCH-NORWEGIAN CHAMBER OF COMMERCE (CCFN)**.

HOW IS THE MARITIME SECTOR POSITIONED IN NORWAY?

The shipbuilding industry is well known in Norway, in particular for its passenger, defence and fishing vessels. In terms of its contribution to GDP, the maritime sector ranks second after hydrocarbons. Norway has the fifth largest commercial fleet in the world and the second largest offshore fleet.

WHAT IS NORWAY'S STRATEGY FOR TACKLING POLLUTION?

In 2019, the country launched its **Blue Opportunities plan**, a new strategy for the oceans with the goal of reducing CO₂ emissions by 50% by 2030 and 80-95% by 2050. To achieve this, the maritime sector is ploughing major investment into 'green' solutions and corresponding regulation is being developed. From 2026, only zero-emission vessels will be granted access to Norway's fjords. Over the last two years hydrogen projects have flourished, with a range of applications including port infrastructure and ferries, electric container ships and vessels powered by biodiesel or ammonia.

IN 2018, NORWAY WAS THE FEATURED COUNTRY AT SEA TECH WEEK®. HOW ARE RELATIONS BETWEEN NORWAY AND BRITTANY TODAY?

The links are excellent and should continue to be developed. A cooperation agreement between Ifremer and its Norwegian counterpart was signed in 2019 in Paris to mark the CCFN's centenary. We regularly organise activities in partnership with the **Pôle Mer Bretagne Atlantique** to explore different topics related to the maritime sector and new energy sources. We can see great potential for commercial cooperation in the shipbuilding industry, working on joint innovation projects. There are also good prospects in the offshore wind sector, especially regarding maritime transport for installation

projects and for transporting work teams. French stakeholders are working in partnership on several Norwegian pilot projects.

HOW CAN THE CCFN SUPPORT COLLABORATION BETWEEN OUR TWO COUNTRIES?

Working with the two embassies, **Business France** (which represents us in Norway), the **Norwegian Consulate** in Brest and **Innovation Norway**, we regularly organise business expeditions and maritime forums in the two countries to forge connections between businesses, present financial support mechanisms and establish new partnerships. With **Innovation Norway** we will welcome a major Norwegian delegation to Brest in September for **Sea Tech Week® 2022**. Norway's **Blue Maritime Cluster**, the country's foremost maritime competitiveness hub, will join us for the first time with several of its members. It will be an excellent opportunity to strengthen the links between us.

AN ECONOMY WITH CLOSE LINKS TO THE SEA

Carl Bois, Honorary Norwegian Consul in Brest, outlines the importance of the maritime sector: *"Seventy per cent of the Norwegian economy is connected with the sea. Developing links with France in this area is a priority for the Norwegian Embassy - and Brest, 'capital of the oceans', is naturally the main gateway. The participation of Norwegian Prime Minister Jonas Gahr Støre in the One Ocean Summit was very significant in helping to consolidate this development."*

INFO + www.ccfn.no

ONE OCEAN SUMMIT ROUND-UP

THE **ONE OCEAN SUMMIT**, ORGANISED ON THE INITIATIVE OF PRESIDENT **EMMANUEL MACRON** UNDER THE AUSPICES OF THE FRENCH PRESIDENCY OF THE COUNCIL OF THE **EUROPEAN UNION**, WAS HELD IN BREST FROM 9 TO 11 FEBRUARY. WE TAKE A LOOK BACK AT THE SUMMIT.



WORLD FIRST

This very first **One Ocean Summit** had an ambitious goal – to raise the level of the international community’s aspirations on maritime issues and to take concrete steps to preserve and maintain a clean and sustainable ocean. The event addressed a range of questions, in particular marine ecosystem protection, marine pollution, sustainable fishing, wind-powered transport, the impact of climate change and governance of the ocean.

BREST - A NATURAL CHOICE

It was no coincidence that the **French government** chose the city of Brest to host this summit. **Michel Gourtay**, Vice President with responsibility for the Economy at **Brest métropole** and member of the **Campus mondial de la mer** Executive Committee, explained why: “Lots of national and international bodies have their headquarters here, and there is a high concentration of researchers, students, research infrastructures, startups and large corporations that comprise **Campus mondial de la mer**. This is the leading location for marine science and technology in France.”

CONCRETE COMMITMENTS

On 11 February, a meeting of heads of State and government, directors of multilateral institutions, business leaders and leading figures from civil society set ambitious targets which

were enshrined as the **Brest Commitments**. They involve taking action to protect marine ecosystems, promote sustainable fishing, tackle pollution – especially plastic pollution – and mitigate the effects of climate change.

“This first global summit has laid strong foundations for protecting the planet and the ocean, with a commitment beyond Brest to urge other countries to join the coalition and put our ocean firmly on the international political agenda”, commented **Michel Gourtay**. He went on to say that, during the summit, “**Campus mondial de la mer** presented a range of solutions developed by companies and laboratories from Brest and Brittany as a contribution by local stakeholders to protecting our world’s ocean.”

WHAT NEXT?

The next step in mobilising the international community is the **United Nations Ocean Conference** which will take place in Lisbon from 27 June to 1 July 2022. The conference will be attended by representatives of **Campus mondial de la mer**.



Plastics, change of course! - National Meetings

30 June - 1 July 2022 in Brest

The two days are aimed at professionals in order to develop partnerships and joint reflection. The aim is to raise public awareness of plastics issues.

More information on www.rencontres-plastiques.com



Sea Tech Week® 2022 - Maritime transport, towards smarter and greener solutions

26-30 September 2022 in Brest

Sea Tech Week® is a week-long international event dedicated to marine science and technology. Every two years, it brings together more than 1,000 leading international experts in various marine-related disciplines in Brest, France.

Sea Tech Week® includes a science and technology conference, a trade show, BtoB meetings, etc.

More information on www.seatechweek.eu

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