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**From the European Nitrates Directive to Brittany's
Green Algae Plans: INRAE scientists' contributions**

In this dossier

compiled by Giovanna Pinaud and Gisèle Parfait (DAPP),
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Acknowledgements

We would like to thank everyone involved with this dossier:

Françoise Vertès, Patrick Durand, Luc Delaby, Alix Levain, Daniel Hanocq, Sylvain Ballu and Paul Divanac'h.



In Brittany, scientific knowledge of nitrate flows has helped local stakeholders in the fight against the proliferation of green algae.

Cover photo: © Adobe Stock

From the European Nitrates Directive to Brittany's Green Algae Plans: INRAE scientists' contributions

Since the 1970s, researchers from the Institute have been studying nitrate flows caused by agriculture from the plot to the drainage basin, and their impact on the biological balance of aquatic environments. The agrohydrological models developed have provided a better understanding of nitrate flows, and help stakeholders in the area to implement local policies. With the rollout of Green Algae Plans (PLAV), scientists have gradually shifted from being experts giving advice to mediators supporting the various stakeholders by sharing scientific knowledge on the subject. These years of experience have led to the creation of a training course for newly elected officials involved in the PLAV, capitalising on the knowledge of former elected officials, and scientific findings.

The post-war intensification of agriculture and livestock farming led to a profound change in French and European farming. From the late 1960s, before the first regulations on the issue, scientists pointed out the massive mineral surpluses from agriculture.¹ These surpluses, from inputs such as chemical fertilisers and nitrogen concentrates as well as animal effluents applied to the soil either directly or after treatment, result in the increased nitrate pollution of aquatic ecosystems and phosphorus accumulation in the soil. While several regions in France have suffered from this phenomenon,

Brittany has been particularly badly affected. In this area, traditionally given over to extensive livestock farming, intensification manifested itself as a significant increase in intensive farming, with more than a third of its 'finished' animals being produced in this way.² Furthermore, its surface water system is characterised by numerous small drainage basins that facilitate and accelerate the flow of water from the source of pollution to a multitude of outlets, causing the significant and widespread pollution of coastal waters flowing into the sea. Thus, in the 1970s, the first green tides appeared in Brittany, combined with a

sharp increase in nitrate concentrations in Brittany's rivers, a phenomenon that would continue to grow until the end of the 20th century: from 5 mg/l in 1960, the average nitrates level rose to 53 mg/l in 1994.

At national level, in 1991, this nitrate pollution led to the enactment of a European Nitrates Framework Directive, whose enforcement measures were translated into a series of plans and programmes in Brittany. For more than 40 years, INRAE teams have been working in Brittany to understand the processes governing nitrate flows, from plot scale to drainage-basin scale, and supporting stakeholders in the field.



Luc Delaby
INRAE Research
Engineer

I've been working on ruminant feed systems for 35 years and when INRAE set up in Rennes in the 1980s, I focused on the fodder systems of dairy cows in pasture. This research led to tools to assist with pasture management that are in line with production cost optimisation objectives. The 1990s saw the emergence of environmental concerns, driven by the Nitrates Directive and manifested in Brittany by green algae. We had to quantify nitrogen emissions from dairy cows, particularly on pasture. When we take a step back from the animal and evaluate them in an overall system, grazed grasslands become an asset in regulating nitrogen flows. Made up of grasses and legumes, grasslands remain the only active vegetation cover in autumn that limits nitrate leaching. Grassland systems are environmentally beneficial and inexpensive production methods. However, they remain difficult for farmers to manage, hence the importance of tools to assist with pasture management. Today, reintroducing long-term grasslands into the landscape is a challenge that requires making them profitable.

➤ Reducing nitrate flows: European regulations applied at local level

In the 1970s, nitrate concentrations in waters in areas of intensive agricultural activity increased significantly, leading Europe to introduce water quality directives. At first, the regulations focused on the issue of water potability for human consumption. As nitrates can be potentially toxic to humans in high concentrations, among other things, the regulations set the maximum nitrate level in water at 50 mg/l.

Gradually, however, water pollution with nitrates from agriculture became an environmental problem, with the high concentration of nutrients in water, in particular nitrates, causing aquatic ecosystems to dysfunction. This gave rise to the uncontrolled development of different plant species, including green algae.

In 1991, Europe adopted the Nitrates Directive (91/676/CEE) with the dual objective of 'reducing water pollution from nitrates and eutrophication resulting from agricultural activities' but also to 'prevent the spread of such pollution'. To this end, it required Member States to implement a series of action and monitoring measures. The crux of this regulation was the implementation of action programmes focused on 'vulnerable areas' that feed into water

sources and are susceptible to nitrate pollution. It also regulated agricultural practices, setting limits on spreading periods and capping the amount of nitrogen from livestock manure applied annually at 170 kg/ha.

This directive was translated into French law with a National Action Programme (NAP) that set the common baseline applicable to all 'vulnerable areas', as well as regional action programmes (RAPs), which specify or reinforce the measures to be applied depending on the regional context.

A few years later, the Nitrates Directive was incorporated into the Water Framework Directive (2000/60/EC), which encompasses it, requiring EU Member States to achieve good status for coastal water bodies by 2027 at the latest.

In Brittany, a region particularly badly affected by water pollution from nitrates and eutrophication, this European policy was translated into French law in 2010 with Green Algae Plans (PLAVs). PLAV 1 (2010-2016) followed by PLAV 2 (2017-2021) targeted 8 bays exceptionally hard hit by the green algae phenomenon, along with their drainage basins. These eight areas represent 7.3% of utilised agricultural land, 10.5% of farms and 6% of Brittany's population.³ Coordinated and co-led by the State and the Regional Council, these plans were developed and implemented in collaboration with scientists, farmers' representatives and environmental associations. They aimed to improve public health and coastal safety by developing two components: firstly, by improving the collection and removal of green algae, and secondly, by preventing and limiting agricultural nitrogen leaks.

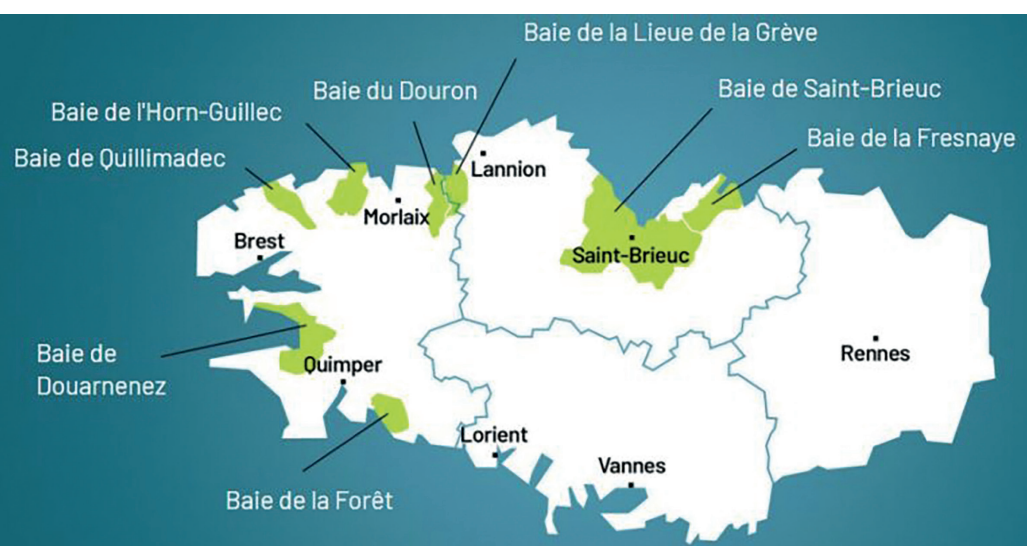
From the Nitrates Directive to the PLAVs, plans and programmes have given rise to the evolution of farming practices. In Brittany, INRAE scientists along with researchers from the Ifremer,



CNRS, CEVA, etc. have accompanied and monitored this evolution on both local level with collaborative research projects and national level with expert

assessments. The land-based component, developed by INRAE, is focused on modelling nitrogen flows from farmland, and adapting practices.

Green Algae Plans (PLAVs) targeting eight bays particularly affected by green algae



Source: Creseb

1994-2013: Key programmes in the fight against eutrophication in Brittany

Programme Bretagne Eau Pure (1994-2006): programme to restore water quality, involving the European Agricultural Guidance and Guarantee Fund, the Ministry for the Environment, the Loire-Bretagne Water Agency, the Regional Council of Brittany and Brittany's four departments. It consisted of implementing contractual action programmes in river systems most affected by water pollution.

Programme Prolittoral (2000-2006): regional and interdepartmental programme to combat green tides coordinated by CEVA with scientific support from Ifremer. Maintaining the same partnership as Bretagne Eau Pure, Prolittoral consisted of three components: preventive, curative and cross-functional.

Grand Projet 5 (2007-2013): State-Brittany Region project contract coordinated by the State (DREAL) and the Loire-Brittany Water Agency, which took over from the Bretagne Eau Pure and Prolittoral programmes.

➤ Spotlight - Drainage Basins: understanding and modelling nitrate flows

In the early 1980s, the 'Agricultural Activities and Water Quality' (*Activités agricoles et qualité des eaux*) report coordinated by INRAE agronomist Stéphane Hénin formally established the link between intensive agriculture and diffuse pollution as one of the causes of degraded aquatic environments. The phenomenon of green algae in particular is largely the result of the spread of nutrients, particularly phosphorus and nitrates, a soluble mineral form of nitrogen, towards drainage basin outlets. 90 to 95% of these nitrates are of agricultural origin and come from mineral fertilisers used to fertilise crops, and

animal waste from livestock farming. The nitrogen that is not absorbed by plants diffuses into the soil and then into surface waters. Nitrates follow the path of the water: some initially migrate to groundwater, but most reach rivers more quickly. In Brittany, nitrates remain in the soil and subsoil for anywhere from a few weeks to more than 30 years before reaching rivers. In short, high nitrogen concentrations reach marine ecosystems. Microscopic (phytoplankton) and macroscopic (macroalgae) algae, which use nitrogen for their growth, proliferate, a phenomenon known as eutrophication.⁴

INRAE teams then became involved in understanding the dynamics between agriculture and water pollution from farmland plots to drainage basins. INRAE scientists' studies on nitrate flows in Brittany and the associated green algae phenomenon led to the development of several research programmes and decision-making tools. They provide support for local actors, local authorities, farmers, water agencies, etc. to implement local action plans and programmes. In 2014, the impacts of these studies were the subject of a socio-economic analysis of the impacts of public agronomic research (ASIRPA).



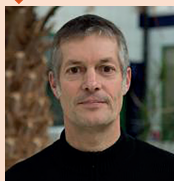
These results proved to public authorities that a collective effort was necessary, leading the region to collaborate with the Institute to implement and assess green algae action plans.

After the 2002 evaluation of the Bretagne Eau Pure programme by the Court of Auditors and Brittany's Economic, Social and Environmental Council (CESER), the Regional Council of Brittany contacted INRAE researchers from the UMR SAS. The TNT2 model was then adapted to help managers better understand annual fluctuations in concentrations as well as the effectiveness and viability of action plans.

A TRANSFER TOOL FOR ACTION PLANS: TERRIT'EAU

Following the diagnostic work in regional programmes and to better support public action, INRAE was involved in the 'Spatial management of agricultural activities, land-use planning and water quality' project to design Territ'eau, a web-based decision-making tool. Integrated into the SIG (scientific interest group) Agro-transfert, this partnership project brings together INRAE scientists and technicians from the Brittany Regional Chamber of Agriculture.

Aimed at stakeholders involved in action plans to improve water quality, farmers' associations, local authorities, water authorities and water development and management plans (SAGE), Territ'eau was devised and co-designed to make a multi-criteria local diagnosis (nitrates, phosphorus, plant



Sylvain Ballu

Agricultural Engineer, Project Manager – Green Algae Monitoring, Algae Technology and Innovation Centre (CEVA)



I joined the CEVA in 2001, assessing green tides by obtaining and processing aerial images. Brittany's local authorities were designing a programme to combat green tides on drainage-basin level and CEVA coordinated the programme until 2007. We supported the local authorities by facilitating experience sharing, together with basin managers and research, especially INRAE and Ifremer. To take adapted measures, the scientific perspective is crucial and we turned to INRAE for guidance on agricultural issues. We managed to model the continuum of nitrate flows from the field to the coast by using INRAE's TNT2 model for the land-based component.

Today, water quality measurements show a decrease in nitrate levels at all outlets. Nevertheless, the winter carryover of seaweed stocks from one year to the next and the increase in flow rates in certain areas (eastern Côtes-d'Armor) due to intense storms in recent years increase algae growth in some years. Their proliferation is multifactorial, and the challenge is to better understand the role of each parameter and the levels of action to be taken to achieve the objectives of restoring coastal environments over the long term.

A LOCAL RESEARCH PROGRAMME TO CHARACTERISE DIFFUSE AGRICULTURAL POLLUTION

Since 1991, INRAE has been involved in the local programme CORMORAN (Characterisation, ObseRvation and MOdelling of tRansfers in Intensive Agricultural environments). Soil and hydrological studies were conducted across the Naizin drainage basin, providing an opportunity to invest in instrumenting the drainage basin. Using the data collected, researchers at the UMR SAS implemented the TNT2 model, a diagnostic and simulation model for agrohydrological systems. This model links agricultural practices at plot level to nitrate concentrations found in rivers. It has made it possible to account for the complexity of the link between these two systems, as the effect of changes in agricultural practices on water concentrations is, indeed, real, but deferred and reduced.

Disputes with Europe: INRAE scientists offer guidance with modelling

In 2007, the European Commission gave France an ultimatum with regard to nine of Brittany's basins' non-compliance with the Nitrates Directive. The General Secretariat for European Affairs then tasked INRAE and the Bureau de Recherches Géologiques et Minières (BRGM) with evaluating the action plan proposed by France. The TNT2 model was used to study the drainage basins involved in the 'raw water nitrates' dispute. Although its conclusions were somewhat unfavourable, it led to the lifting of sanctions. Modelling showed that the basins' sluggish response time to changes in agricultural practices was due, among other things, to a very degraded initial situation coupled with the functioning of the aquifers. This collaboration with regional government departments demonstrated the value of this type of study to implement their regional public policies.

2012, INRAE coordinates a study and collective scientific expert assessment of nitrate flows

In 2012, the Ministries for Ecology and Agriculture asked Inra to conduct both a study on reducing nitrate leaching through intermediate crops and a collective scientific expert assessment (ESCo) of nitrogen flows linked to livestock farming.

The main objective of the study was to establish the state of knowledge on nitrogen management during the intercropping period for different French soil and climate conditions in arable farming systems, and the conditions for intermediate crops' effectiveness to reduce nitrate leaching. The general objective of the ESCo was to establish an overview of the state of scientific knowledge on nitrogen flows in livestock farming and their fate, in order to better understand the role of livestock farming in nitrogen-related pollution and to identify drivers to reduce nitrogen pressures on the environment.

protection products, etc.) of diffuse pollution. In seven years, the website has been consulted 31,000 times with an application of the entire approach to eight drainage basins and one catchment area and, for some of the modules, a generalised application to the whole of Brittany. It also includes a section on landscape planning and the spatial management of agricultural activities with a view to improving water quality control.

RESEARCH TAILORED TO FARMERS' NEEDS

In parallel to the agrohydrological modelling of nitrogen flows, INRAE researchers were involved in analysing production systems and supporting farmers - key players in the fight against green algae - on plot and farm levels. Carried out in collaboration with the Centre d'études

pour un développement agricole plus autonome (CEDAPA) and the Côtes-d'Armor General Council, the research-action programme Systèmes Terre et Eau was based on a network of around twenty of the CEDAPA's Breton mixed-crop and livestock farms. Between 1993 and 1997, the interdisciplinary programme analysed the viability of grassland production systems from an environmental, economic and social point of view. The experimental system set up in two small basins enabled scientists to assess the risks of water pollution linked to agricultural practices and to identify more virtuous practices. These farms, using a grass-based fodder system with 20% less maize and a strong connection to the soil, generated lower nitrogen loads than farms with a more conventional system. Furthermore, the permanent soil cover reduces nitrate emissions from the plot.



Daniel Hanocq
Experimental
and Research
Engineer
Brittany
Regional Chamber
of Agriculture (CRAB)

I've been working with INRAE scientists on the issue of nitrates and soils since 1990 when I arrived at the Finistère Chamber of Agriculture. Our collaboration with INRAE began in 1973 on soil and intensive pig-farming. In Brittany, this is one of the causes of the increase in nitrates, because of both their concentration and their excess. We had to manage intensive livestock farming effluents as fertilisers and to implement spreading plans with farmers. At the same time, regulations were being put in place for storage, and upgrading livestock buildings and specific facilities.

With the arrival of green algae, the plans negotiated between the State and the Chamber of Agriculture in 2010 raised questions within the agricultural community. Agricultural difficulties led the Regional Directorate for Farming and Forests to call on INRAE researchers, who duly produced and shared their knowledge with the farming world and designed technical proposals with us and the technical institute Arvalis. Now we need to go further on the marine side, in particular to understand the link between nitrates and green algae at bay level. Considerable progress has already been made: between 2002 and 2018, there was a downward trend of nearly 50% in nitrate flows in green algae bays from May to August. Elected officials act as mediators between the administrations, the prefect and the farming community, and it's crucial that knowledge is passed on to them.



2017, INRAE's expert assessment of French grasslands and their capacity to absorb nitrogen

Since the implementation of the Nitrates Directive, some northern European countries with grassland cattle farming systems have challenged the 170 kilogram per hectare per year limit on nitrogen spreading from livestock manure.

A collective assessment study bringing together scientists from various countries was therefore tasked with evaluating this standard and seeing how grassland systems allowed for exceptions to be made. In 2017, the Ministry of Agriculture, Agri-Food and Forestry addressed these issues by asking INRAE to lead a collective assessment of French grasslands: production, nitrogen export and leaching risks. This was mainly based on the PâtureSTICS model, which simulates nitrogen flows in permanent and sown grasslands that are mowed.

The aim of this expert assessment was to help decision-making about the request for exceptions to the limit of 170 units of organic nitrogen per hectare set by the Nitrates Directive. Among other things, it demonstrated the high nitrogen absorption capacities of grasslands in most livestock farming areas in France, thereby improving the reliability of the STICS grassland module.



ACASSYA - THE COLLABORATIVE OPERATIONAL RESEARCH PROJECT

Faced with the inability to reduce green tides despite 10 years of genuine efforts to improve practices, the Lieue de Grève drainage basin agricultural committee called upon INRAE. The aim was to work on scenarios for shifting to more grassland-based systems and to predict the consequences in terms of reducing nitrate leaching. With 13,500 inhabitants for around 200 farms, this drainage basin is particularly affected by green tides.

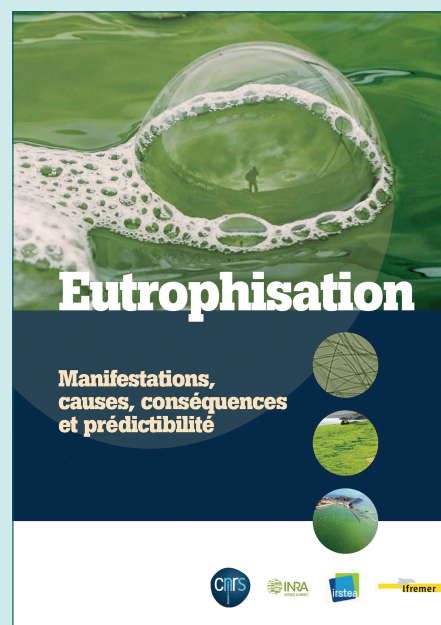
In 2009, this initial collaboration led to the creation of the collaborative project ANR ACASSYA, carried out in partnership with the Lannion-Trégor community of municipalities and

farmers to redevelop the drainage basins of the Lieue de Grève.

Firstly, this action-research project gave rise to the development of the CASIMOD'N model, which incorporates the 'livestock system' component and made it possible to model the nitrogen cascade in the drainage basin to test the effect of different scenarios. And secondly, the project became the basis of a close collaboration with actors in the field. To co-design a local project with very low nitrogen leaching, this project accompanied an association of voluntary farmers on nine pilot farms to implement system changes, and to model these changes on a larger scale. A combination of four simple and operational indicators was co-designed with local partners, farmers and advisers to guide and monitor changes in practices and systems.

A collective expert assessment of eutrophication: a CNRS, Ifremer and INRAE partnership

In 2017, the Ministries for Ecology and Agriculture and the OFB tasked CNRS in partnership with Ifremer and INRAE to conduct an ESCo on the manifestations, causes, consequences and predictability of eutrophication. Nearly 50 scientists rallied round to draw up an overview of the phenomena of eutrophication and identify possible ways to combat it: the rational use of inputs, continuous plant cover on the soil, landscape diversity, etc. This expert assessment also made it possible to identify gaps in knowledge and the observation and experimentation systems needed to better understand the processes involved in eutrophication.



➤ Scientific support tailored to local areas

Scientists discussed the best way to guide public policy and actors in the field in a supportive role to find the best response to public authorities' queries.

SCIENTISTS AS MEDIATORS: THE CREATION OF THE CRESEB

In 2011, a Scientific Interest Group (SIG) was set up in dialogue with the Region of Brittany: CRESEB, the Centre de ressources et d'expertise scientifique sur l'eau de Bretagne (Centre for resources and scientific expertise on water in Brittany). The Creseb is a forum that brings together stakeholders involved in integrated water management and scientists from numerous organisations: INRAE, Agrocampus, BRGM, Ifremer, CNRS and CEVA. Led by Brittany's Regional Council, its goal is to facilitate and organise knowledge sharing to develop a cross-sectorial approach to the 'water problem'. This scientific community also provides integrated and targeted support, responding with expert assessments to the demands of public policy and local stakeholders.

SCIENCE AND PROFESSIONALS: FROM ADVICE TO SUPPORT

The problem of green tides in Brittany returned to the spotlight in 2009. The State and local authorities began implementing action plans to combat the phenomenon of green algae.

When the first green algae plan was created, a scientific council was tasked with providing advice on regional projects. Its position in relation to the various stakeholders and its operating procedures proved to be ineffective and unsatisfactory for all partners. In 2016, during the second phase of the action plan, it was replaced by a support group bringing together experts from a wide range of disciplines, from anthropology to economics and coastal ecology.

Its role shifted from 'giving advice' to facilitating dialogue and supporting local stakeholders to implement public policies. This attitude of 'availability and attentiveness' advocated by scientists towards local stakeholders helped foster the emergence of shared discussions and the construction of collective intelligence. Drawing on its experience, Creseb intervenes via a coordination unit to organise this scientific support.



Alix Levain
Doctor
in Environmental
Anthropology, CNRS



I had the opportunity to do my thesis dividing my time between INRAE and the Natural History Museum with funding from a panel of public bodies involved in the problem of nitrates in Brittany, so in 2010, I carried out participant observation with scientists from the action-research project Acassya, including Françoise Vertès and Patrick Durand. This programme stems from a long history of working with stakeholders who are highly motivated to bring about changes in practices in the Lieue de Grève drainage basin, changes whose effects on nitrates and green algae are being quantified and modelled by researchers. I was particularly interested in the role of knowledge and scientists in these dynamics and the ambivalence of the position attributed to them in the public debate about the management of diffuse pollution from agricultural sources.

Since then, I participated in the Eutrophication ESCo and later, in the PLAV 2 Scientific Support Group. As part of this, we set up a training course for newly elected officials, making use of the knowledge acquired by those who were leaving in the form of filmed testimonials. Today, this film is also used in conferences for the general public.



A TRAINING COURSE FOR ELECTED OFFICIALS INVOLVED IN PLAVS

An initial phase of scientific support for PLAV 2 made it possible to identify stakeholders' needs and to begin support proposals. In order to be more in touch with the regions, the support group organised meetings with local stakeholders, elected officials and technical teams in each of the bays to better understand and integrate concerns and obstacles to action. These meetings highlighted the importance

of capitalising on and passing on the experience of local elected officials. In 2019, the PLAV support group, in conjunction with Creseb and the Permanent Assembly of Local Water Commission Presidents of Brittany, developed educational training tools for elected officials in Brittany. This support, devised with the assistance of an educational engineer, takes the form of 'discussion meetings'. These debates are organised around interactions between peers and discussions with scientists. Filmed testimonials from local stakeholders

(The green algae experience: what elected officials say) and 'scientific and technical presentations' on various topics help to structure and enrich the support sessions for elected officials and PLAV stakeholders. These educational materials could ultimately be used as a driver for training, discussion meetings and support for public debate in green algae basins, but also more broadly for all stakeholders involved in water policies in Brittany. The idea is to continue promoting them in a discussion-support format rooted in local areas.



Paul Divanac'h

Mayor of Plonévez-Porzay

President of the Douarnenez Local Water Commission (CLE)

Permanent Assembly of Local Water Commission Presidents of Brittany (APPCB)

Mayor of Plonévez-Porzay, a municipality in the Bay of Douarnenez, since 2008, Paul Divanac'h is also President of the local water commission, the CLE, and President of the Permanent Assembly of Local Water Commission Presidents of Brittany (APPCB). He tells us about the path travelled to control algae, with regard to both organising water management and relations with scientists.

You were involved in the launch of the first PLAV – what role did scientists play in this?

In 2010, with the surge of the green algae problem and a backdrop of tension between nature conservation organisations and the farming community, the two Ministries of Agriculture and the Environment launched the first Green Algae Plan, the PLAV. Adapted for each of the eight bays concerned, these PLAVs were organised by communities of municipalities, the Brittany Region, the General Council and the Water Agency. I presented the PLAV for the Bay of Douarnenez to the Scientific Council created at the time and to the regional prefect. The scientific council recommended that the eight projects be more demanding in terms of objectives and deadlines, and proposed gradually reducing the nitrogen level at the outlet to 10mg/l between 2012 and 2027, a difficult target for stakeholders to achieve. Eventually, the plans were approved and, from July 2012, we began to implement measures in Douarnenez Bay.

How was public action organised in the bays?

In 2012, a public bay-management body was set up and a local water commission was established, as for the eight bays affected by algae. The CLEs prepared water management plans (SAGEs), which incorporated the PLAV's

objectives. Scientists accompanied the designing of the SAGEs on the one hand and local dynamics on the other. For the implementation of the 2nd PLAV, there's no longer a scientific council, but scientific support is provided in the piloting and monitoring committees; a resource and expertise centre is supported by Brittany's Regional Council and the Creseb, piloted by scientists. Since 2017, the eight bays have spoken with one voice in the Permanent Assembly of Presidents of Brittany's CLEs.

And what's the situation now?

Today, the situation has improved and the atmosphere is calmer. In 2010 in the Bay of Douarnenez, we gathered 12,000 tonnes of algae a year; now, the average has dropped to 3,000 tonnes. These improvements were made possible by adapting practices and the regulatory framework but they're also the result of a certain shift away from agriculture which has increased in recent years. We have at our disposal an arsenal of methods and a well-structured organisation. Relations between science and public decision-making are in place, even though, for the time being, numerous questions remain without answers on the specific role of wetlands, for example.

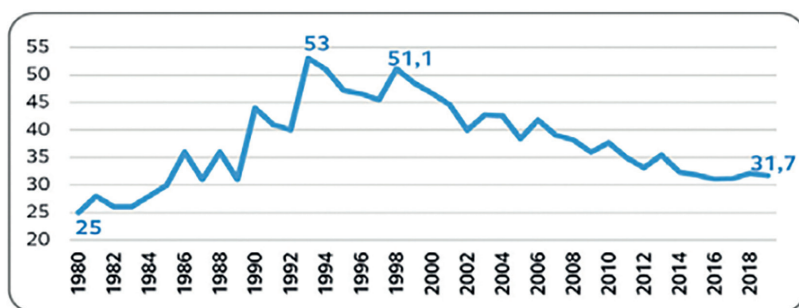


BETWEEN SCIENCE AND LOCAL STAKEHOLDERS: CONCERTED EFFORTS

For over 30 years, regional cooperation between stakeholders and research teams has made it possible to support the implementation of public policies in the fight against green algae. Since the first measures came into force, there has been a significant improvement in water quality. The average concentration in watercourses has decreased from over 50 mg/l in the early 1990s to around 30 mg/l today, making Brittany

the region with the greatest reduction in nitrate levels. Since 2017, the quality of watercourses has been stable, with concentrations below 50 mg/l for 85% of water collection facilities.⁵ However, much remains to be done to achieve thresholds of around 10 to 20 mg/L depending on the bay, which would considerably reduce the green algae problem in Brittany. In this context, scientific support based on accompanying local stakeholders is a key driver to improve the effectiveness of these regional policies. ■

The development of average nitrate concentrations
in Brittany's rivers since 1980 (mg/l)



Source : Dreal Bretagne – Percentile 90 moyen

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The Green Algae Experience: what elected officials say, a training film for elected officials

This 30-minute film directed by Alix Levain, social anthropology researcher at CNRS, and Mathurin Peschet, professional documentary-maker, gathers together the testimonials of four local elected officials who have taken on responsibilities in the field of water management. In the film, they recount their experience and engagement in the fight against green algae. The documentary focuses on the importance and role of elected officials, their difficulties, and drivers for action.

Quotes

"My biggest responsibility is as President of CLE; we have to listen and make room for education by popularising the latest scientific research."

"Associations on their own will never manage to beat this problem if we, as elected officials, don't take part in the debate."

"We were able to work in total confidence with the region's prefecture, we had very strong support from INRAE [...] especially with regard to changes in farming systems, in other words, shifting to grassland systems."

"The Lieue de Grève PLAV represents real co-construction with the farming world [...], we set out the objectives together, we work together to understand how to do this to ensure maximum support for the project."

"Sometimes we collect small amounts [...] which costs a lot but we do it [...] because we also get funding from the Government who recognise their responsibility in the phenomenon."

Public Policy Support Collection
Publication Director: Nicolas de Menthère
Collection Director: Gisèle Parfait
Design and Editorial:
Giovanna Pinaud, Gisèle Parfait
Mock-up and layout:
EliLoCom - www.elilocom.fr
Printers: Biprint



Direction de l'Appui aux Politiques publiques
Centre siège d'Antony
1, rue Pierre Gilles de Gennes
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