

INFORMATION LEAFLET ON THE 'GREEN SEAWEED PROBLEM'

For those engaged in the tourist industry

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Preamble

The phenomenon of green seaweed proliferation drew rather unwelcome attention to Brittany in 2009. The media really got its teeth into the subject last year, thereby helping to transform public perception of the problem. And so, today, we have to recognise that the general public no longer sees this phenomenon as an annoyance but as a danger. Consequently it seems more necessary than ever to speak with one voice in order to reassure the public.

Therefore, the aim of this document is not only to provide you with a source of information that will help you to be as effective as possible when answering the kind of questions that the general public is likely to put to you, but also to help you feel more at ease when you are called upon to deal with this matter.

In order to achieve this, the leaflet has been divided into two parts:

- A general message enabling you to give any questioner an overall view of the subject in a few minutes;
- A set of questions and answers that includes the main questions that you may have to deal with and a suitable reply to each of them.

Even though it contains no confidential information, this information leaflet should not be handed out in its present form to the general public.

And finally, this should not be regarded as a definitive statement. The document is intended to be added to or amended depending on the ways in which the situation develops over coming weeks. CRT Bretagne will send you updates as these become available.

GENERAL MESSAGE

Green seaweed (or 'green algae') is part of Brittany's marine ecosystem. The common name for it is 'sea lettuce' because it looks like a large lettuce and because it is edible.

However, over about the last thirty years, an abnormal increase in the quantity of this seaweed has been noted (in certain bays, mainly in the north of Brittany). This phenomenon is linked with the presence of excessive levels of nutrients in the water, mainly originating from agricultural fertilisers (nitrogen and phosphorus) washed down by the rivers.

As long as it remains in the sea, this seaweed presents no dangers to human beings. However, once it is washed ashore in large quantities, the process of decomposition can be dangerous because it then gives off a gas which, in certain concentrations, becomes very toxic.

This is why, in 2010, the authorities are taking measures to make collection of seaweed on public beaches more effective.

In those bays where past experience has shown that large deposits of green seaweed occur, a system of enhanced surveillance has been put in place, involving almost daily checks, so that the green seaweed can be collected as soon as it arrives on the beach, thereby avoiding any possibility of decomposition and any risk to holidaymakers.

In addition, in 2010, in order to strengthen measures to protect the public, gathering the seaweed at sea will be trialled in the Lannion and Saint Brieuc bays to limit the growth of seaweed at sea and to avoid it being washed ashore on the beaches.

If a beach were to become covered with a very large quantity of seaweed brought in by the tide then the mayor of the affected municipality would, in collaboration with the Prefect, proceed to close off access to the beach, as a precaution, until cleaning had been carried out. Holidaymakers could then consult local tourist offices, which would be able to suggest a list of other beaches that were accessible in the area or ideas for excursions other than going to the beach.

Over and above these immediate measures, in order to close off this problem at source, local authorities and farmers in Brittany are working towards making major changes to the use of fertilisers and manures that are the root cause of green seaweed proliferation.

TERMINOLOGY NEEDED TO ANSWER TOURISTS' QUESTIONS

ON GREEN SEAWEED

What is green seaweed?

There are various types of green seaweed but the 'green tides' occurring on the shores of Brittany involve 'ulva' (*ulva armoricana* and *ulva rotundata*), popularly known as sea lettuce, because it looks like a large lettuce and is edible.

This type of seaweed grows in suspension in seawater in gently-sloping, sandy bays where three physical and geographical conditions are present and enable them to grow:

- Shallow water, because green seaweed needs a lot of light;
- Water with a high nitrogen and phosphorus content;
- Water that is sufficiently calm to keep the seaweed and its nutrients in the same place.

In addition, this seaweed mainly develops in spring and summer because the greater warmth and light helps it to grow. Another aggravating factor is if there is higher rainfall in spring: this leaches nitrates out of the soil so that they flow first into the rivers and then into the sea.

This is therefore a complex phenomenon the outcome of which cannot be foreseen with any certainty: whilst another proliferation this summer is very likely, it is not possible at present to predict how extensive it will be.

Why is there more and more green seaweed in Brittany?

Green seaweed grows in spring and during the summer. Until recently its growth slowed from May onwards when it had to share the available phosphorus and nitrogen with phytoplankton, which begins to consume them at this time of year. Also, since river flows were reduced at this time, conditions were not generally suitable for proliferation of sea lettuces.

As time went by, these conditions changed because of several factors. The input of nutrients became sufficient to enable the seaweed to continue growing, even during some summers. Development of agriculture played an important role in this change, with the spreading of nitrate fertilisers that get into the rivers and so end up in Brittany's bays. This is not, however, the only factor behind the phenomenon: phosphate discharges from urban water supply networks also played a part.

Other factors have also been involved in the appearance of 'green tides' where light and temperature conditions are favourable, namely the shape of the bays, which have to be shallow and more or less sheltered from the open sea, the presence of river mouths, the nature of the sea currents and swells: all of these play a part in the growth of seaweed.

ON THE TOXICITY OF GREEN SEAWEED

Is green seaweed toxic?

Out at sea, when it is floating between two tides and when it is green and alive, green seaweed is not toxic. You can even cook it.

But when it has been washed up for several days on a beach or among rocks, when it has piled up and begun to ferment beneath the crust that forms on its surface, it begins to decompose and produce ammonia and another very toxic gas, hydrogen sulphide.

Walking on this seaweed and breaking the crust that forms on its surface causes the gases to be suddenly released into the atmosphere and they present a real risk to health because of their concentration. It should be pointed out that in the open air, like all gases, they disperse very rapidly. The risk is reduced the further you move away from the source of the toxic fumes.

Can green seaweed cause death?

No tourist in Brittany has ever died because of green seaweed.

Nevertheless, in summer 2009, after breathing air contaminated with a high concentration of hydrogen sulphide, a horse died of a pulmonary oedema on the coast of the Côtes d'Armor department.

It is also true, as an enquiry recently revealed, that a driver carrying a load of green seaweed died following a heart problem.

ONLY IF PRESSED ON THE MATTER:

The publicly-funded National Institute for the Industrial Environment and Health Risks (INERIS) carried out a series of atmospheric measurements on 13th August 2009 at St-Michel-en-Grève to attempt to identify the types and concentrations of gases emitted by decomposing seaweed.

The main component present at this site was sulphuretted hydrogen (hydrogen sulphide), a gas that is toxic when inhaled. In its investigative report of 19th August 2009, INERIS noted that the maximum concentration observed in certain places "might prove lethal within a few minutes".

However, if individuals could be removed from the affected area and properly treated, recovery would be rapid in most cases.

Is it dangerous to walk on beaches in Brittany?

To begin with, we should not generalise about the green seaweed phenomenon: not all beaches in Brittany are affected by this problem.

In bays that are subject to growth of green seaweed the beaches are checked almost daily and are cleaned in such a way as to avoid any danger. In addition, in 2010, in order to strengthen measures to protect the public, gathering seaweed at sea will be trialled in the Lannion and Saint Brieuc bays to limit the growth of seaweed at sea and to avoid it being washed ashore on the beaches.

However, you are advised to keep away from any areas where large quantities of seaweed are likely to accumulate, such as inlets that are only accessible from the sea and river mouths that are generally muddy where the equipment needed for collecting the seaweed cannot easily reach, and this may include public beaches too.

If a beach were to become covered with a very large quantity of seaweed brought in by the tide then the mayor of the affected municipality would, in collaboration with the Prefect, proceed to close off access to the beach as a precaution until cleaning had been carried out. In this scenario, holidaymakers could consult local tourist offices, which would be able to suggest a list of other beaches that were accessible in the area or ideas for excursions other than going to the beach.

Is it dangerous to bathe where green seaweed is found?

No, not at all, when it is fully in the water green seaweed is not toxic – indeed, it is even edible.

When can I visit a beach in Brittany with my children without risk?

Every day of the year! In autumn and winter there is no proliferation of green seaweed and during spring and summer public beaches will be systematically cleaned.

How would I know if dangerous gases were present?

Before worrying about gases being present you should check to see whether a large quantity of seaweed has been washed up. If this is the case, we would advise you to take the precaution of going somewhere else until the machines have carried out an urgent clean of the public beach.

If you have noted the presence of an abnormal quantity of seaweed washed up on an unsupervised beach and/or when you are walking along the shore, we would likewise recommend that you do not go near it and that, on your return, you alert the tourist office or the town hall of the place where you are staying, if you possibly can.

Under no circumstances should you cross an area where there is decomposing green seaweed. This is because when it has been washed up for several days on a beach or among rocks, when it has piled up and begun to ferment beneath the crust that forms on its surface, it begins to decompose and produce ammonia and another very toxic gas, hydrogen sulphide.

Walking on this seaweed and breaking the crust that forms on its surface causes the gases to be suddenly released into the atmosphere and they present a real risk to health because of their concentration. It should be

pointed out that in the open air, like all gases, they disperse very rapidly. The risk is reduced the further you move away from the source of the toxic fumes.

What precautionary measures should be taken if you notice these smells?

Before you notice any smell at all you would see an unusually large accumulation of seaweed.

In such an eventuality we would ask you not to take any risks and either to turn back or to give the area in question a wide berth.

Under no circumstances should you cross the area. When it has been washed up for several days on a beach or among rocks, when it has piled up and begun to ferment beneath the crust that forms on its surface, it begins to decompose and produce ammonia and another very toxic gas, hydrogen sulphide.

Walking on this seaweed and breaking the crust that forms on its surface causes the gases to be suddenly released into the atmosphere and they present a real risk to health because of their concentration.

It should be pointed out that in the open air, like all gases, they disperse very rapidly. The risk is reduced the further you move away from the source of the toxic fumes.

What should I do if I discover some green seaweed on a beach?

The best thing to do is not to take any risks and either to turn back or to give the area in question a wide berth. If you possibly can, inform the tourist office or town hall of the place where you are staying.

How can I tell whether green seaweed washed up on a beach is still fresh and therefore safe or decomposing and therefore dangerous?

The odour is the easiest way to tell you how fresh washed-up green seaweed might be. This is because when it is decomposing it produces certain gases that are potentially very toxic, in particular, hydrogen sulphide, which has a strong smell of bad eggs that should provide an immediate warning.

In any case, if you notice the presence of an unusually large quantity of seaweed washed up on a public beach, we would advise you, as a precaution, to go somewhere else while the machines carry out a clean-up operation. If you notice a 'green tide' or large amounts of green seaweed on an unsupervised beach or while you are walking along the shoreline, we would recommend that you keep away from it and, when you get back, alert the tourist office or the town hall of the place where you are staying.

ONLY IF PRESSED ON THE MATTER:

It is impossible to give a general response to this question because it all depends on the conditions in which the green seaweed is washed up (amount, location, topography of the bay etc.). There are a number of criteria that are likely to speed up the decomposition rate:

- Summer temperatures;

- The presence of fresh water
- The upper layer of the deposit drying out, meaning that it will change from green to grey and form an airtight crust depriving the seaweed of oxygen and allowing the gas given off by decomposition to become concentrated. Under no circumstances should you walk on or break through this layer of seaweed because you would release the trapped gas and expose yourself to fatal risks;
- The thickness of the deposits, because only a thin film of seaweed is washed up on the sand it will dry out instead of rotting. However, if a deposit several centimetres thick forms, this will set off the decomposition process;
- The composition of the sediment can play an important role, in particular in terms of whether it stores moisture, as this encourages decomposition.

ON THE PLACES AFFECTED

Where do you find green seaweed?

On coasts where conditions for proliferation are favourable, anywhere in the world. This could be in China and in Italy as well as in France.

In Brittany, the problem has been evident since the 1970s. Our region has certain characteristics that encourage green seaweed. In spite of strong tides, seawater renewal is relatively limited in some coastal areas in Brittany. This restricts the dispersal of nutrients and favours the retention and tidal deposit of green seaweed.

How many of Brittany's beaches are affected?

Proliferation of seaweed has a variety of causes which, because of natural, very local factors, vary considerably from one year to the next. For example, a mild winter and a wet spring will be more likely to cause green tides.

At any rate, the phenomenon is very localised. Whilst it is true that, over the whole of Brittany, there are eight bays where the conditions particularly encourage the development of green seaweed, the same beach may be affected one year and yet spared in the season that follows because there has been a change in the tides and contours of the sea bed in that area due to winter storms and tidal action.

IF THE QUESTION IS PURSUED FURTHER:

Over the last 12 years, 7 bays have been affected by green seaweed: the bays of Saint-Brieuc (including Binic Cove), Lannion (including the shore of Saint-Michel and Locquirec Cove), Goulven, Horn-Guillec Cove, Guisseny Cove, Douarnenez and Concarneau.

In these bays, an enhanced system of daily surveillance has been put in place so that the green seaweed can be collected as soon as it arrives on the beach, thereby avoiding any possibility of decomposition and any risk to holidaymakers.

In addition, in 2010, in order to strengthen measures to protect the public, gathering the seaweed at sea will be trialled in the Lannion and Saint Brieuc bays to limit the growth of seaweed at sea and to avoid it washing up on the beaches.

At what time of year are green tides most likely to happen?

Spring and summer are the periods of growth for these plants.

Can you guarantee that no beach will be closed in 2010 because of green seaweed pollution?

Any decision to close a beach will be exceptional in nature and aimed simply and solely at avoiding any risk to the public.

By increasing provision for collecting green seaweed washed up on the beach and by trialling collection at sea so as to contain the seaweed at source, we hope to avoid any unpleasant effects for tourists who have chosen to visit Brittany in 2010.

If, however, a tide were to cover a beach with large quantities of green seaweed, then it would be the duty of the mayor of the affected municipality, in collaboration with the Prefect, to close off access temporarily, as a precaution, for the time necessary to carry out a clean-up of the beach.

Holidaymakers could then consult local tourist offices, which would be able to suggest a list of other beaches that were accessible in the area or ideas for excursions other than going to the beach.

IT IS ESSENTIAL THAT YOU THEN MOVE ON TO THE ANSWERS ABOUT THE ACTION PLAN

ON ACTION TAKEN TO COMBAT THIS PHENOMENON

What are you doing to combat this phenomenon? What are local authorities doing? What is the government doing? What are the immediate safety measures being taken?

Local authorities in Brittany have, for a long time now, been organising systematic collection of ulvas on beaches and accessible rocky areas.

In summer 2009, the government announced its intention to “take over responsibility for cleaning the most seriously affected beaches where there might be a risk to public health”.

In addition, collection in the open sea will be trialled in 2010 in Saint Brieuc and Lannion bays to reduce summer deposits and to avoid any risk to tourists.

In the longer term, Breton farmers have undertaken to make major reductions in the quantities of nitrate fertilisers that they use. Only preventive measures of this kind, moving towards agricultural methods that are more environment-friendly, will make it possible to bring green seaweed proliferation to an end. In the absence of excessive levels of nitrate nutrients, the seaweed will return to a normal rate of development and its growth will be regulated naturally as it always was in Brittany.

What's happening to the green seaweed that has been collected?

In the short term, the French government's action plan for green seaweed provides for the setting up of four composting sites from summer 2010 onwards, to store and make use of the seaweed that has been deposited.

Other solutions are currently being looked into which might be used in the medium term: using seaweed as a fertiliser after composting, using its fibres in cardboard and paper production, turning it into fodder for shrimp farms, etc.

What are the provisions of the government's plan for combating the green tide phenomenon?

On 5th February 2010, the government put forward a three-stage 'Action Plan for Combating Green Seaweed':

- Enhance knowledge and risk management, in particular by involving the French Agency for Environmental and Occupational Health and Safety.
- Improve collection, both on beaches and at sea, and develop treatment processes for deposited seaweed.
- Limit flows of nitrogen towards coastal areas by improving treatment techniques for effluents and foul water generated by industrial or agricultural activities and local authorities, develop the area and make changes in agricultural practices.

Responsibility for the implementation of this plan lies with the regional Prefects who will pass on to the mayors of municipalities in coastal areas recommendations regarding action, in particular concerning access to beaches and public information.

What are the Regional Council and the Regional Committee for Tourism doing to manage this problem?

The phenomenon of green seaweed proliferation drew rather unwelcome attention to Brittany in 2009. Whilst the regional and local authorities have understood the scale of the problem and have been taking action for several years, we have to recognise that today the general public no longer sees this phenomenon as an annoyance but as a danger.

The Regional Council, the local authorities and the Regional Committee for Tourism, whilst being keen to keep visitors as well informed as possible and to ensure that all the conditions necessary for an enjoyable stay are in place, are also anxious to preserve the tourist economy. They therefore wish, mindful of the sensitive nature of the situation, to implement preventive measures for professionals in the sector without delay. Indeed, it seems more necessary than ever to speak with one voice in reassuring the public and to share good practice and the initiatives already implemented by professionals and/or in some countries that are tourist destinations.

You talk about taking action and that's all very well but because you aren't doing anything directly about the causes, it looks rather as if you're trying to disguise the problem rather than to solve it, doesn't it?

The regional and local authorities didn't just wait until last year to address the problem: they have actually been taking action for several years to manage this problem of green seaweed.

Develop this reply by stressing the initiatives implemented locally (by the Tourist Office at St-Michel-en-Grève and especially the SAGE water management scheme set up in St Brieuc).