SEAWEED INDUSTRY IN EUROPE: A GUIDE TO BETTER PRACTICE

AN OUTPUT OF THE NETALGAE PROJECT

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PREFACE

The NETALGAE project (INTERREG IVb ; 2010-2012) consists of 6 partner countries from the North Atlantic area (Ireland, France, Spain, Portugal, UK and Norway) and tackles issues relating to the European marine seaweed industry.

The main aims of the NETALGAE Project are twofold: to create a network of relevant stakeholders in the European seaweed industry to encourage cooperation and exchange of ideas across the project area and to propose, based on experience across the project area, a set of best practise guidelines to support the management of seaweed as a sustainable resource.

The guidelines for the wild seaweed harvesting are presented herein. These address, not only the biological and ecological aspects of the natural resource, but also the economic and social issues which are specific to each of the countries.

These guidelines are for administrative and professional organizations responsible for the development of regulation. They may also assist harvesters and industries using seaweed as a raw material.

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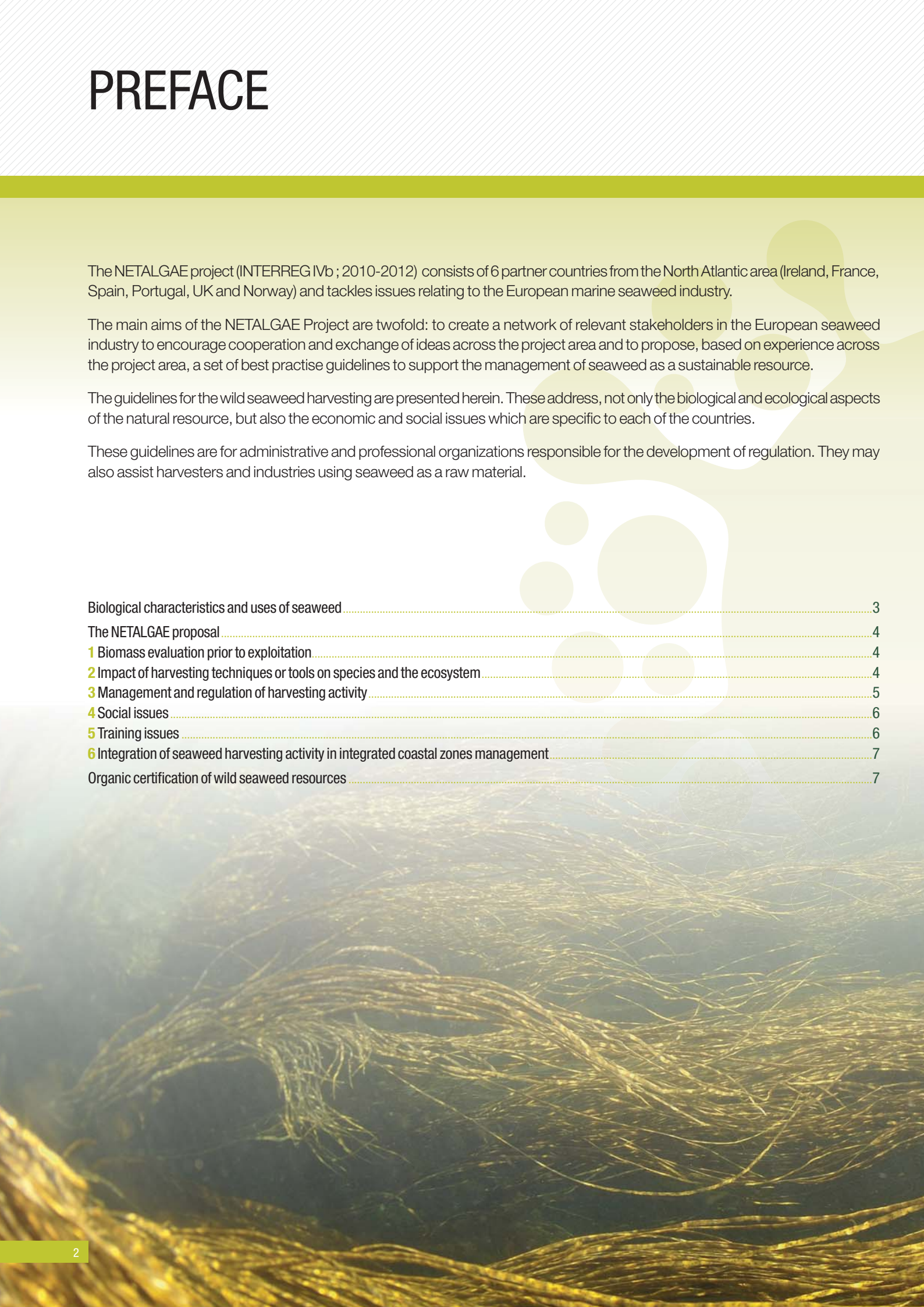


BIOLOGICAL CHARACTERISTICS AND USES OF SEAWEED

The term “seaweed” includes macroscopic and multicellular marine red, green and brown algae. These communities demonstrate high interactions and inter-relationships with various other marine species and the surrounding environment. Seaweed communities can be found in several habitats: the intertidal zone, tropical reefs and to a lesser extent in salt marshes, seagrass… Environmental and biological factors limit the distribution of seaweed species. Dense beds of large brown seaweeds (*e.g. Fucales* and *Sargassum species*) may be found together with smaller species of red and green algae. The competition for space between species in these areas is strong and the removal of one species will impact on the structure of the community. Along the European Atlantic coast, large brown seaweed dominate and are divided in two types of communities : one asssociated with the Laminariales (*e.g. Laminaria spp., Undaria sp.*) and one with the Fucales (*e.g. Ascophyllum nodosum, Fucus spp*).

Seaweed populations influence many coastal areas and provide habitat and food for numerous species namely grazers like limpets, snails and sea urchins as well as small fish and crabs. Kelp forests, therefore are relatively important for fisheries dynamics.

As well as their ecological importance, seaweeds are also crucial for human populations. Seaweed harvesting has been carried out for centuries on the European Atlantic coast and it has been an important source of income for many coastal communities.

At present, the European seaweed industry is based mainly on natural stocks harvested either by boat or manually on shore or to a lesser extent by diving. In Europe, the main markets for this material are the food and chemical industries, which use fresh and dried biomass to extract hydrocolloids (mainly *alginate*, *carrageenan* and *agar-agar*). In addition seaweed is used for human food, animal feed, fertilizer, pharmaceutics, and cosmetics.

In Europe, seaweed production was approximately 390 000 tons in 2000 (source FAO) and has since declined. The industry persists in many countries of the Atlantic area and has been largely dependent on the harvest and processing of brown seaweeds. The development of new markets (e.g. biofuel, feed and food supplements, nutraceuticals) has led to increased demand for seaweed biomass. The long term socio-economic sustainability of the present European seaweed harvesting industry relies strongly on the stakeholders’ capabilities to manage the resource in a sustainable manner and to provide the social, economic and regulatory conditions to ensure a living income for participants.

THE NETALGAE PROPOSAL

After a review of the current practices in the 6 studied countries; the NETALGAE partners have proposed the following recommendations to promote a sustainable seaweed harvesting sector in Europe. These recommendations target the 3 dimensions of sustainable development: environmental, social and economic.

The analysis of these management practices underlined common issues to the six countries; however, some specific aspects like the history of allocation of property rights, harvesting techniques, harvesters' status, etc are quite different in the various territories. This guide, therefore, may require some regional or national adaptations to accommodate localised features of the industry.

N.B: Some recommendations set out in these guidelines have already been implemented in some countries. They are however, included in these proposals in order to promote them in the other countries.

1 Biomass evaluation prior to exploitation

Current status

In Norway, the exploitation of *Laminaria hyperborea* and *Ascophyllum nodosum* resources is based on a combination of regular stock assessments by the seaweed industry, consultation of previous landings data and expert scientific opinions.

On the Spanish Atlantic coast, the stock of seaweed is monitored and measured by regional or national research institutes through funding from seaweed processing industries. In France and Ireland, *Laminaria digitata* and *Ascophyllum nodosum* wild stocks are also assessed and monitored, albeit sporadically in some cases. Although the national research institute of Portugal (Ipimar) previously assessed stocks of *Gelidium spp.* such monitoring is no longer carried out.

Recommendations

- Prior to any seaweed exploitation, an assessment of the status of the stock and its biomass by appropriate research institutes or other recognised institutions unconnected to any harvesting and/or processing industries should be undertaken.
- It is important that such monitoring reflects the scale, scope and complexity of the harvesting and the cost should not be excessive compared to the estimate of income due from the harvesting activity.

2 Impact of harvesting techniques or tools on species and the ecosystem

Current status

Two harvesting techniques are currently used in Europe: *mechanical harvesting* by boat[1] and *manual gathering* on foot or by diving. The impact of harvesting, whether mechanical or manual, depends greatly on the composition and morphology of the seabed substrate, biology of species, gear used and operating methods of harvesters.

Recommendations

- To ensure the sustainability of the algae resources and harvesting activities, the total amount of seaweed harvested should be set in accordance to the availability of wild seaweed resources.
- The harvesting techniques employed must be those that offer a low impact on the ecosystem and are adapted to the species biology (to encourage regeneration of resources post removal).
- In order to improve the likelihood of resource sustainability it is recommended that some species are cut at a certain size defined by scientists and according to species biology. For some species, the use of ripping as a means of harvesting may be authorized.
- The impact assessment of the harvesting activity should be made not only on the target species but also on the associated communities.

[1] A "seaweed trawl" is used in Norway and France to harvest *Laminaria hyperborea*; a "*scoubidou*" is a curved iron hook which is suspended from a hydraulic arm mounted on a boat which is used in France to harvest *Laminaria digitata*; vacuum-suckers and paddle-wheel cutters are used in Ireland and Norway to harvest *Ascophyllum nodosum*; a vacuum-sucker cutter is used in Spain for the harvesting of *Gelidium sesquipedale*.

3 Management and regulation of harvesting activity

Current status

Seaweed harvesting in Europe is currently regulated using various instruments: administrative authorization, licences, quotas set by the market, etc. These regulations are issued either by national or regional authorities or by local fishers' organisations with the agreement of public authorities. In all countries of the European Atlantic area, the total amount of landings is fixed on the basis of the availability of the stocks and the commercial needs of the processing industries.

General recommendations

- In order to define the most appropriate regulations concerning seaweed harvesting, public authorities should consult and cooperate with the industry stakeholders (harvesters, processing industries, scientists and other marine users) to consider all of the relevant environmental, economic and social issues specific to each exploited area.
- This consultation should lead to the development of practical guidelines for managing algae harvesting operations.
- Regulations should be species specific to reflect the biology of the species, the ecology of the environment and the impact of harvesting.
- These guidelines should take into account the best available scientific data and harvesters' knowledge.
- These guidelines should be developed within a framework which allows for periodic reviews to facilitate adaptation as the sector evolves over time.
- Public authorities and stakeholders in the seaweed industry should increase public knowledge about seaweed related activities in their regions.

SIZE OF SEAWEED

Current status

Current harvesting techniques, equipment and management regulation have evolved to minimize their impact on juvenile plants in order to encourage regeneration of exploited areas.

Recommendations

- Public authorities should introduce and enforce minimum harvesting size guidelines for specific seaweed species to ensure continued recruitment and re-growth of target species according to species morphology and life cycle.

TEMPORAL AND SPATIAL CLOSURES

Current status

Norway has followed a rotational system to control the harvesting of seaweed (specifically *Laminaria hyperborea* and *Ascophyllum nodosum*). Areas are open to harvesting for 1 year followed by closure for 4 to 5 years depending on the period required for stock recovery.

In France a rotational system and a seasonal closure system have been employed for some species (*e.g. Laminaria digitata, Laminaria hyperborea, Ascophyllum nodosum*). These systems are applied according to the target species. The other European countries involved in the Netalgae project do not appear to apply any system of temporal or spatial closure.

Recommendations

- Seasonal closures or spatial or temporal rotation systems may have to be implemented to ensure resource sustainability (re-growth and/or recruitment). For example, the conservation of some seaweed species such as *Laminaria spp.* requires an area rotation system according to the species re-growth and recruitment patterns. Accordingly, it has been proposed to allow a closed period post harvesting to facilitate seaweed recovery.

MAXIMUM AMOUNT OF LANDINGS

Current status

There have not been any maximum permissible harvesting limits set across the study area with the exception of France, which has introduced a limit for *Laminaria hyperborea.*

Recommendations

- The maximum quantities of algae landings per area harvested should be set according to the status of the wild stock and not only by the demands of the processing industries. These limits must be based on biomass estimates, scientific opinion, and previous landings data. A means of periodically reviewing or appealing maximum harvesting quantities should be put in place.

THE NETALGAE PROPOSAL

LICENSING AND REPORTING SYSTEM

Current status

Mechanical harvesting of seaweed using boats or machines etc. is generally subject to some type of licensing system in the participant countries.

Manual harvesters operating in France are required to obtain administrative authorization relating to a specific list of species and to complete a monthly harvesting form. This practise does not appear to be applied in every country where the harvesting on foot and by diving are widely conducted without any prior authorization, despite legal instruments being in place forbidding informal harvesting. As a result public bodies and industry representative organizations appear to have little reliable data on manual seaweed harvesting.

Recommendations

- Public authorities should implement an authorization or licensing system for harvesting on foot or by diving in close collaboration with harvesters' representative organizations in countries where it is possible. This will enable the registration of harvesters and improved monitoring of harvesting at regional or national levels. This will allow the collection of information on quantities by species and harvesting area through a process of industry reporting. The granting and renewal of harvesting licenses should be dependent on regular reporting being satisfactorily completed.

MONITORING AND ENFORCEMENT

Current status

The quality and regularity of monitoring and enforcement of seaweed harvesting and other activities is highly variable throughout the project area.

Recommendations

- Public authorities should endeavour to provide a framework in which representatives of public authorities, seaweed harvesters and other stakeholders can meet to discuss and resolve issues concerning regulation, enforcement and resource conservation.
- The processing industry could also play a role in regulating the activities of the harvesters by only buying raw material from operators who demonstrate compliance with relevant legislation.
- In order to make compliance and enforcement more readily achievable, regulatory agency should strive to develop clear and consistent rules governing seaweed harvesting

4 Social issues

Current status

It has proven difficult to obtain information on the social status of seaweed harvesters in countries where the seaweed industry is, or has been, based on manual or dive harvesting. Seaweed gatherers may operate officially or unofficially in such areas, often without any affiliation to a social support system, this may be contributing to social exclusion and loss of contributions and access to social support systems. Harvesters working on seaweed harvesting vessels have a recognized legal status which enables them to access social support systems.

Recommendations

- In every country, the public authorities should recognise seaweed harvesting as an economic activity and facilitate the access of the harvesters to a social security system.
- All harvesters should be encouraged to join a social security system (fishers, self-employed, farmers, or other) in order to give them access to social benefits, such as health, pension, work accidents, social insurance, unemployment benefits, family, etc.
- Processing industries should be encouraged to monitor the legal status of their seaweed harvesters.

5 Training issues

To ensure the professionalization of harvesters, the provision of adequate initial or continual training should be encouraged.

Recommendations

- Training should cover the following issues: species biology, harvesting practices, European and national regulations, enterprise management, trading of seaweed, water and environment quality, product quality, health and safety etc.
- Educational programmes should be established in close collaboration with harvesters, authorities, scientific organizations, processing industries and training centres. Each country should create the most appropriate training.

6 Integration of seaweed harvesting activity in integrated coastal zones management

Recommendations

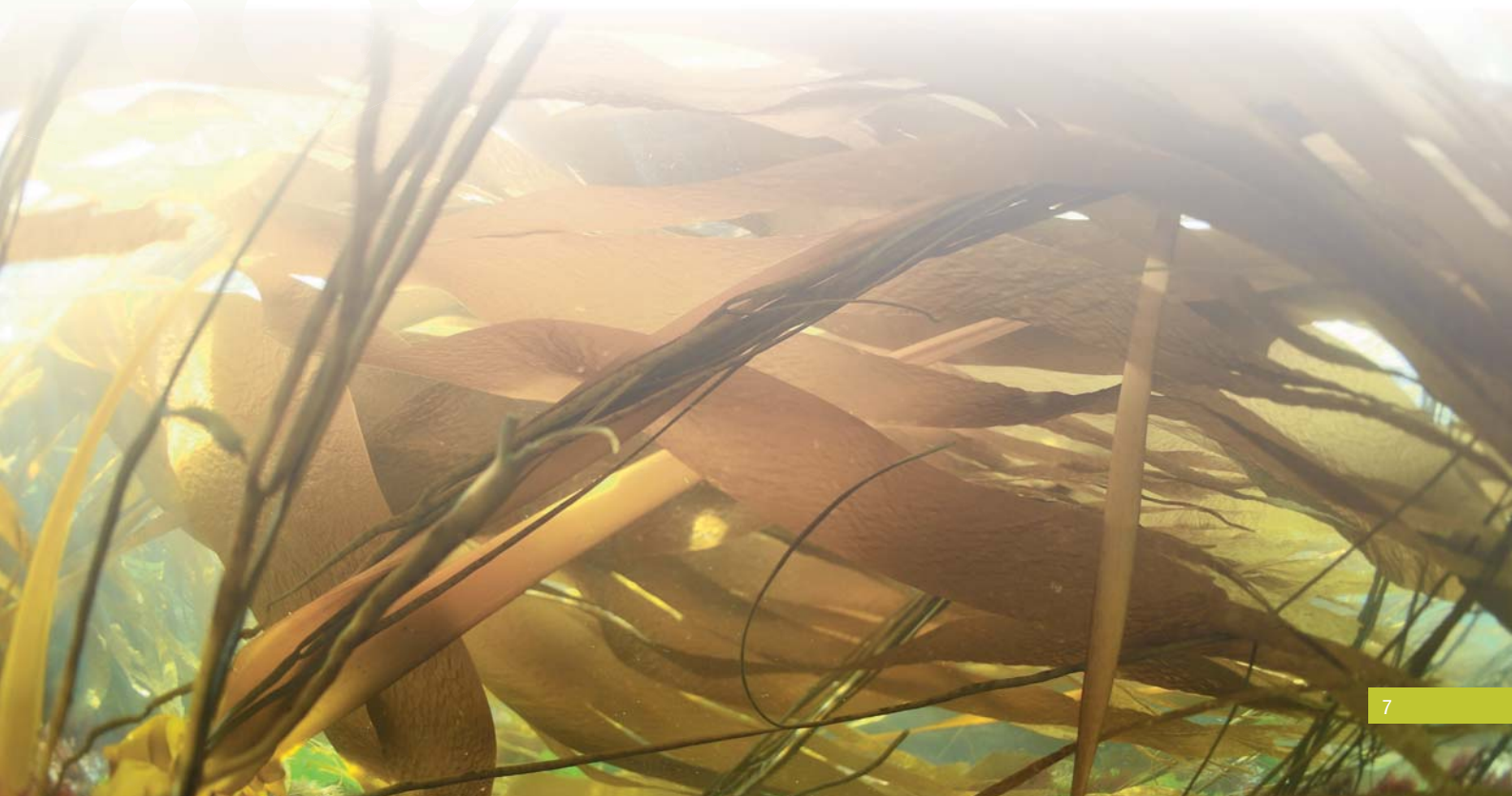
- Public authorities should recognize the importance of seaweed activities for the local communities (especially in rural areas where economic opportunities may be limited) and consider the social and economic impact when engaging in coastal management and planning.
- Equitable use of the coastline with regard to environmental, economic and social priorities should be guaranteed through close collaboration with the appropriate authorities and stakeholders.
- Seaweed resources should be integrated in Marine Spatial Planning strategies by the State or local authorities to guarantee the legitimacy of uses and to avoid conflicts with other activities.
- Mapping of harvesting zones, available to all stakeholders of a specific region, would allow better spatial management of the coastline by mapping the overlap and interaction of different activities.

Organic certification of wild seaweed resource

Organic certification of wild seaweed resource relies on the application of two European regulations:

- The EC regulation **n°834/2007 related to organic production and labelling of organic products** (repealing Regulation n° 2092/91) specifies that in order to achieve organic certification, wild harvested seaweed must have be taken from areas of high ecological quality (under the Water Framework Directive 2000/60/EC) and the waters must be of a quality equivalent to designated waters under EC Directive 2006/113/EC on the quality required for shellfish waters.
- The EC regulation **n°710/2009 on organic animal aquaculture and seaweed production** outlines resource management criteria (such as harvest technique, minimum sizes, ages, reproductive cycles or size of remaining seaweed) enabling the production to be certified as organic.

The recommendations formulated within these guidelines should be taken into account in the regulation and implementation of the organic certification of wild seaweed resources.



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NATIONAL CONTACTS

Contact: Tim Atack - Viking Fish Farms Ltd
Ardtoe Marine Laboratory
Email: tim.atack@vikingfish.com
Web: www.ardtoemarine.co.uk

Contact: Céline Rebours - Bioforsk
Email: celine.rebours@bioforsk.no
Web: www.bioforsk.no

Contact: Igotz Gallastegi - Mutriku BHI
Email: akua04@mutrikubhi.net

Contact: Hugo Barros
Universidade do Algarve - CRIA
email: hfbarros@ualg.pt
web: www.cria.pt

Contact: Julie Maguire PhD
Indigo Rock Marine Research Station
Email: Julie.maguire@dommrc.com
Web: www.indigorock.org
Máirtín Walsh - Bord Iascaigh Mhara (BIM)
Email: walshm@bim.ie
Web: http://www.bim.ie/

Contacts: Sébastien Pien
Synergie Mer et Littoral (SMEL)
Email: spien@smel.fr
Web: http://www.smel.fr/
Katia Frangoudes - UBO
Email: katia.frangoudes@univ-brest.fr
Web: http://www.umr-amure.fr/
Marie Lesueur - Agrocampus Ouest
Email: marie.lesueur@agrocampus-ouest.fr
Web: http://halieutique.agrocampus-ouest.fr/