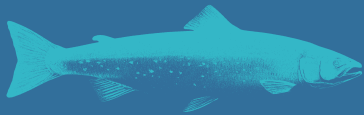


# Aquaculture Forum

BREMERHAVEN



## Bremerhaven Declaration on the Future of Global Open Ocean Aquaculture



### Part II

Recommendations on subject areas and justifications



Workshop I

March 26 – 27, 2012

## OPEN OCEAN AQUACULTURE DEVELOPMENT

From visions to reality: the future of offshore farming

[www.aquaculture-forum.com](http://www.aquaculture-forum.com)



Investment in sustainable fisheries  
Co-financed by the European Union  
European Fisheries Fund EFF

Ministry of Economics,  
Labour and Ports



Freie  
Hansestadt  
Bremen

Bremerhavener Gesellschaft  
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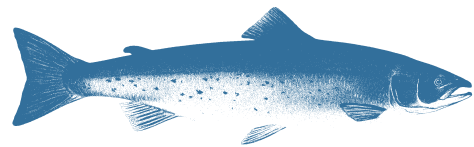
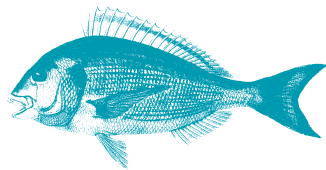




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**Testing new structures for offshore seaweed farming:**

Preparation of Laminaria harvest from the ring formerly located at Helgoland Roads in the harbour of Helgoland. The ring was lifted from the water by a land-based crane.



# BREMERHAVEN DECLARATION Part II

## Recommendations on subject areas and justifications



### Recommendation 1

Compliance of Open Ocean Aquaculture with the United Nations Convention of the Law of the Sea (UNCLOS) and other global, national, and regional legal requirements is needed.

A legal framework for Open Ocean Aquaculture should have clear standards and thresholds according to best environmental practices and best available technologies while also addressing issues of public trust, ownership, and liabilities.

### Justification

At present there is an incomplete legal framework available for the development of aquafarming in open waters. Based on the UN Convention of the Law of the Sea (UNCLOS) using the terms “Open Ocean Aquaculture” as well as “offshore” seem to be questionable, and may have no legal relevance.

To date, offshore aquaculture has been defined as being in exposed sites, or in high energy environments (Ryan 2005), and not by distance from the coast, but this term has no legal meaning. Legally it is critical whether marine aquaculture is located within the territorial waters of the coastal state, in the EEZ, or on the High Seas. Therefore, precise definitions of offshore aquaculture orientated to zoning as defined in the UNCLOS is more appropriate to develop a common legal framework. Thus, marine aquaculture which is operated in the territorial seas of a state can only legally be described as “coastal aquaculture”.

For aquaculture operations in the EEZ and the continental shelf the term “EEZ aquaculture” is a more appropriate legal term that is defined clearly in an international legal framework. Besides this basic definition, there remain numerous unsolved legal aspects in many jurisdictions as to the licensing procedures. We believe it is time for governments to resolve these in order to offer potential investors a clear legal structure from the beginning, and to develop appropriate terminology to match the legal situation in compliance with international and national rules and standards. There are also many regulations in existence for many other coastal and open ocean operations with regard to technologies and logistics such as navigation and safety standards, both for equipment and operators. These should be carefully checked, adopted, or amended as appropriate.

There is an urgent need to establish an international working group that addresses these legal issues to provide the necessary guidance for legal frameworks. The terms of reference should elaborate on options to harmonize and simplify the application process to achieve a more uniform licensing format applicable to various jurisdictions.

At present there are differing and confusing permit procedures in place that are not only time consuming, but also prevent development. Zoning in the context of marine spatial planning should be incorporated into legal frameworks to better facilitate licensing and monitoring obligations (see also justification under recommendation 3 as well as 6).

### Recommendation 2

Planning for Open Ocean Aquaculture for both research as well as for commercial enterprises should, from the start, consider the economies of scale required for its sustainable development in regard to its social and economic viability.

### Justification

Many trials in the past focused on technical feasibility by developing various technological details for best performance in harsh environments without due consideration of the minimum scale of production needed to bring the investment and operational costs per production unit down to realistic levels in order to reach profitability.

Furthermore, the necessary infrastructure development offshore and related onshore infrastructure needs have not yet been sufficiently considered in relation to scale in space and time. These issues need urgent attention in research and development efforts, which should be done at a larger scale in order to provide the needed data for sound economic feasibility assessments. This should include the assessment of infrastructure co-use, e.g. together with offshore wind farms, in order to create possible economies of scope.

### Recommendation 3

There is an urgent need to address how societal values and policies affect the acceptance, structures, and types of offshore aquaculture.

#### Justification

In the development and implementation of offshore aquaculture projects, considerable progress has been made in methods and tools that assess biophysical and economic pre-conditions in terms of site selection and adaptive technologies.

On the other hand, social, cultural or political conditions surrounding aquaculture projects are seldom explicitly addressed in marine spatial planning. As a consequence, the implementation of projects and establishment systems fail due to factors that could have been foreseen if a more thorough analysis would have been employed that paid sufficient attention to the socio-economic dimensions of aquaculture. Besides general criteria and strategies to be employed, there are regional and local differences in the social-economic settings that need to be addressed in order to minimize the risks for undesirable outcomes. Especially in the offshore realm, stakeholders of aquaculture projects encompass a wide range of actors with different and often contrasting views, objectives and capacities that can act as detrimental forces to the overall sustainability of offshore aquaculture projects and investments.

There is a need to take also a more holistic approach including appropriate risk assessment methodologies as outlined in the GESAMP 2008 (Report and Studies No 76) on “Assessment and communication of environmental risks in coastal aquaculture“, where risk communication between stakeholders and consensus building is one of the key issues in conflict resolution.

Along the same line of arguments it seems advisable to also involve farmer organisations and governing bodies of regional environmental agreements<sup>1</sup> to develop rules, standards and thresholds. Close reference to the FAO Code of Conduct on Responsible Fisheries and Aquaculture and the FAO Ecosystems Approach to Aquaculture are recommended.

<sup>1</sup> HELCOM, ICES, OSPAR in European waters and other respective agreements in other jurisdictions



### Recommendation 4

There is an urgent need to plan for the comprehensive development of land- and water-based infrastructures needed for the technical and logistical support and supply of Open Ocean Aquaculture that incorporates the multi-dimensional interacting factors for successful operations.

#### Justification

Aquaculture in exposed sites and in the open ocean requires efficient support systems in the ocean as well as ashore that must support effective logistics for both transportation and storage. Additionally, specific equipment permitting a high level of automation is needed to minimize service and maximize safety at sea. Furthermore, extended lifetimes for both instrumentation and structural materials will be needed to permit ease of handling under adverse environmental conditions.

The social acceptance of aquaculture in general and offshore farming in particular may change with increasing food concerns. These issues must be addressed. It can be anticipated that job opportunities will most likely be very important in the aquaculture onshore support sectors in technology development, supplies, transportation, feed production, and hatcheries and less so in the grow-out offshore facilities where maintenance and services will be reduced to a minimum and most likely replaced by largely automated systems. This will require decisionmakers to be aware of the large potential for job creation if more comprehensive land-water infrastructure planning is conducted for the full development of Offshore Aquaculture.

### Recommendation 5

Priority should be given to the culture of species well-established in aquaculture (preferably natives) which can provide large quantities of seafood for which aquaculture technologies are known and have the potential to become acclimated to offshore farming conditions.

#### Justification

Using species already well-established in aquaculture has the advantage that most of their physiological, behavioural and stress responses are well understood. The use of species with known performance characteristics helps to make appropriate technology adjustments to species needs in offshore settings without extensive and expensive lead times. Furthermore, using such well-known species may allow to combine them in various trophic assemblages following the FAO Ecosystems Approach to Aquaculture protocols that details social-ecological concepts with the goals of optimal benefits for economic and ecological interactions with marine ecosystems.

### Recommendation 6

Organize international research and development platforms involving countries active or intending to initiate Open Ocean Aquaculture development projects.

#### Justification

Going offshore is costly and risky and needs large investments. In order to realize synergetic effects, common use of infrastructure and logistics could lead to more effective and timely developments, involving all major countries presently active or intending to initiate Open Ocean farming developments. Because of the large scale, multi-disciplinary and interdisciplinary approaches needed, and because of the need for large teams to address the very complex and interacting factors that determine success, it is unlikely that a local or national project alone would be cost effective.

Testing the complex design criteria and various operational parameters needs to be studied simultaneously to achieve full comparability of results. Such development platforms would allow operations to be scaled at commercially viable scales while also combining past experiences. This would enhance greatly the chances for success, thereby saving time and resources while greatly reducing the risks of failures. An additional spin-off would be the development of common standards for both technology and environmental certification.

### Recommendation 7

Investigate whether the cultivated species can provide high value marine products other than foods which can also be simultaneously obtained thereby contributing substantially to the economic viability of offshore operations.

#### Justification

Operating Open Ocean Aquaculture systems is expensive. Besides the economies of scale, the diversification of products gained from the same species can contribute to economic sustainability. Therefore, species should not only provide high quality products for food markets but also be researched to serve as bioreactors for products urgently needed by other industries.

There are a wealth of substances that may be extracted or specifically produced from these species for use in industries such as cosmetics, pharmaceuticals, general chemistry, energy and other specific production lines. So far, little emphasis on products other than for food markets have yet been explored in aquaculture, although the use of skin, bones, cartilage, intestines and other by-products are traditionally used from fish and shellfish. Recently, several new products have been developed from algae, invertebrates and

fish, often using processing wastes, which are considered as new resources rather than as wastes.

Innovative research and development has great potential to open new markets but also to enhance cost-effectiveness of operations. Such multi-product concepts would also need to be properly accommodated by the respective certification and labelling systems as new criteria will be required in terms of both economy and ecology.

### Recommendation 8

Create education and training networks to provide the required multidisciplinary and interdisciplinary expertise for safe and professional operations of Open Ocean Aquaculture systems.

#### Justification

There are substantial opportunities to investigate the interactions between potential multiple uses of ocean observations, fisheries, aquaculture, reserves, and their ecological, economic, social and technological interactions. Marine technology research parks in an ocean area could attract considerable funding. Some marine scientists have touted the considerable ancillary benefits of increases in non-consumptive use values for research, multidisciplinary education, hands-on training at realistic scale, diving, photography, tourism, and conservation of marine biodiversity. Use of ecological design and engineering principles and practices could allow design optimization of energy generation, seafood production, biodiversity, and marine ecosystem health in research and education centers that could potentially benefit all stakeholders and increase research and development funding to boost the “innovation economy”<sup>2</sup>.

<sup>2</sup> One model is an innovative R&D strategy recently announced in Ireland at a recent meeting titled, “Harnessing Ireland’s Potential as a European and Global Centre for Ocean Technology”. Ireland plans to develop 10 “Ocean Innovation Test Platforms” that will allow companies to form partnerships in order to test new concepts, equipment, technologies, and solutions in real-life situations. Called “SMARTOCEAN Innovation Clusters” they seek to target newly emerging niche markets (marine renewable energy, environmental monitoring, and water management), as well as established markets (oil and gas, aquaculture, maritime transport, tourism, coastal erosion) to develop innovative and competitive production systems and service models and target both niche and high value markets.





## Recommendation 9

Utilization of Open Ocean Aquaculture systems as potential environmental quality monitoring stations should be promoted as part of the international ocean observing systems networks.

### Justification

Offshore aquaculture systems need environmental monitoring for both system management and meeting standards of environmental regulations. There are also expensive global, regional and local environmental monitoring networks, often using remote sensing, submersible vehicles, drifters, ship-born data profiles, and other means. The option should be explored to align the development of Open Ocean Aquaculture with the international Open Ocean Observing Systems organizations that would enlarge the worlds' ocean observations station density for better environmental monitoring of the ocean.

Bremerhaven, March 27, 2012

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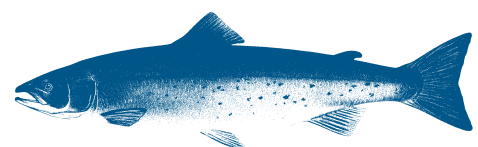
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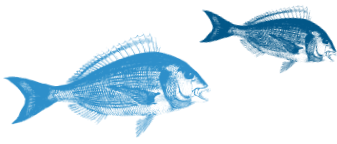
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These views were accommodated as much as possible by the editorial committee (Rosenthal, Costa-Pierce, Krause, Buck). Participants offering support to the views expressed in this Declaration are listed as follows:

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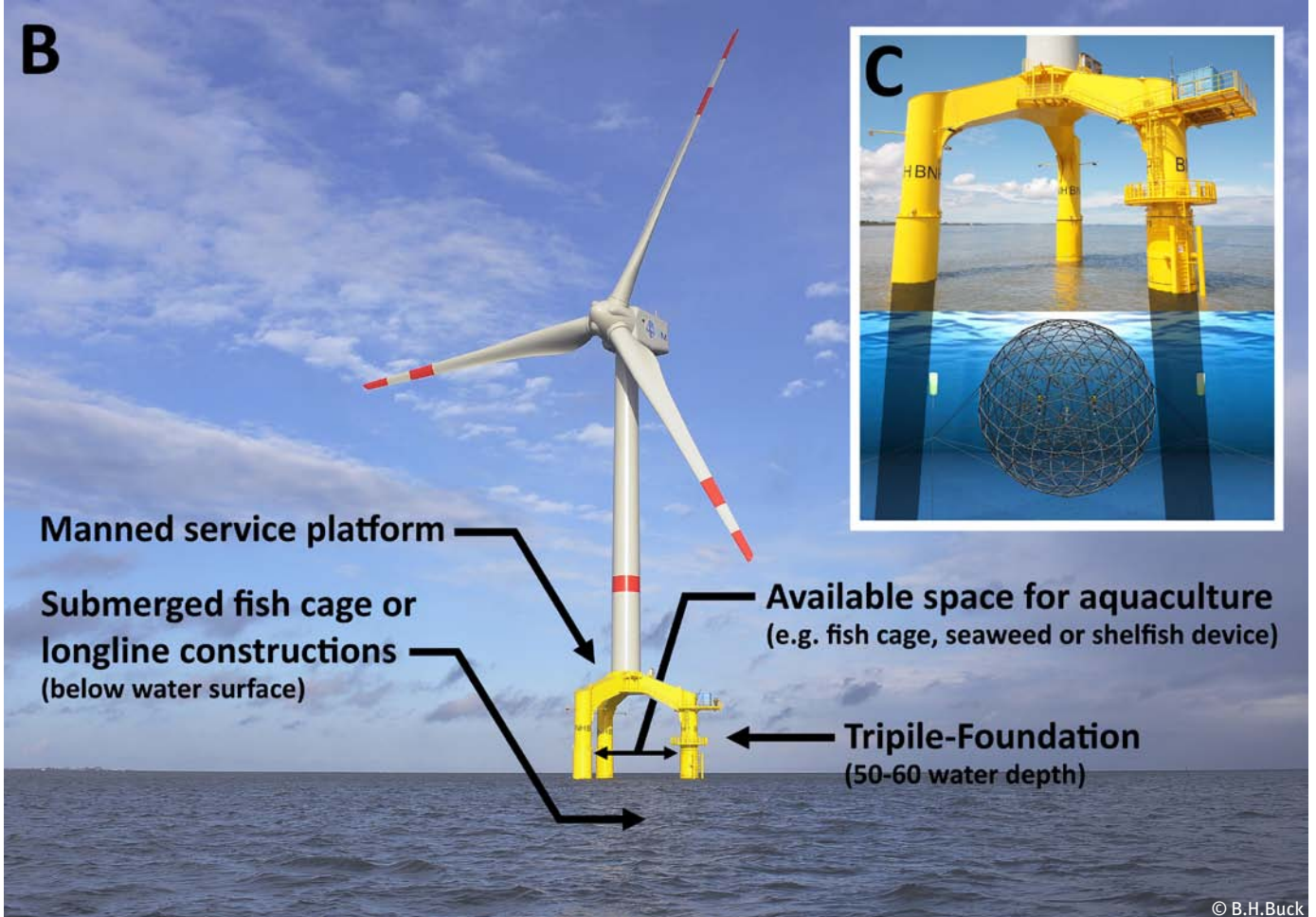


Contributions to the Bremerhaven Declaration on “Open Ocean Aquaculture Development” were received from Members of the Programme Committee, Session Chairs and speakers as well as from Workshop participants who presented their views during the Panel discussion.



**Open space for the installation of aquaculture devices (e.g. feed, equipment)**

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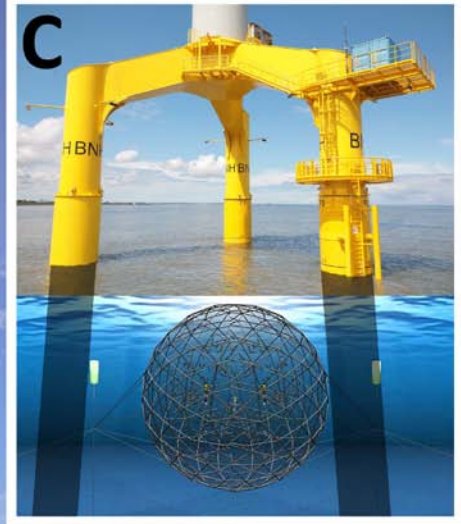
**B**

**Manned service platform**

**Submerged fish cage or longline constructions (below water surface)**

**Available space for aquaculture (e.g. fish cage, seaweed or shellfish device)**

**Tripile-Foundation (50-60 water depth)**



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# 2012 2013

Business and science for a sustainable European aquaculture

## Aquaculture Forum

BREMERHAVEN

### WORKSHOP STRUCTURE AND CONTENT

The workshop series 2012–2013 of the „Aquaculture Forum Bremerhaven“ includes three additional events as announced on this page. These workshops will bring together speakers and participants from industry, science and administration.

Several keynote lectures relevant to each of the central themes plus a series of contributed papers will be included in the programmes. A social evening event will provide ample opportunity for participants to exchange views and discuss future concepts. An extended Panel discussion on day two will provide ample opportunity to debate the future of aquaculture in Europe, addressing obstacles and opportunities in view of the globalized and highly competitive markets.

The outcome of the Panel discussions will be reflected in jointly formulated specific recommendations which will be published and distributed to industry, European agencies as well as regional and national authorities for further considerations.

The organizers will provide space for poster presentation for companies (including small exhibits).

Workshop III

February 18–19, 2013

### FINFISH NUTRITION AND AQUACULTURE TECHNOLOGY AT THE CROSSROADS

# 3

The future of fish nutrition; high versus low tech systems or integrated aquaculture?

With the expansion of the industry it is obvious that fishmeal replacement is a must. New protein sources may not be the prime concern but marine fats are to meet the demanded quality and provide the required level of unsaturated fatty acids. What are the future solutions? Further, the trend towards intensification will continue and water will be at the premium in most resource systems. Recycling of water is one issue but integrated recycling systems where wastes become valuable resources, providing options for optimizing the utility of natural resources (water, nutrients, energy).

Visits to experimental facilities and to commercial producers can be organized (optional)



Workshop II

October 15–16, 2012

### AQUACULTURE PRODUCT QUALITY AND CONSUMER DEMANDS

# 2

The Djungel of Labelism: Do we need to label the labellers?

Product quality control and consumer safety is of prime interest to society. During the pioneering phase (last century) modern aquaculture has seen little standardization of production processes. With increasing consumers awareness for quality and safety, national and regional regulations evolved often in parallel but with little standardization across production systems and jurisdictions. Also, enforcement of regulations was initially limited, offering little transparency, thereby failing to build consumer confidence. A new market for certification evolved to respond to the consumer demand.

The workshop will receive keynote presentations from the certification industries and regulatory authorities, to learn from experiences of producers with such labelism. Additionally, the processing industry will express their views on how to cope with the variety of labelling procedures. Numerous labelling philosophies and procedures have evolved and continue to appear with good intention, however, with little coordination, sometimes even with competing objectives. Develop many new codes and certificates may create a DJUNGEL of labelling options that confuses rather than convinces the consumer while making monitoring and enforcement measures less transparent for all involved.

An excursion to one of the largest processing plants in Germany can be organized (optional)

Workshop IV

September 23–24, 2013

### DEVELOPMENTAL TRENDS AND DIVERSIFICATION IN EUROPEAN AQUACULTURE

# 4

New species and/or new products from established aquaculture species?

The rapid growth of the industry in several parts of the world has been based on a limited number of species. Several new species are now in production, the names of which were largely unknown by the consumers 10 years ago. Can we expect this trend to continue? Should we try to investigate in option to diversify aquaculture through the development of culture know-how for new species?

Alternatively, should we diversify products derived from a limited number of species for which our knowledge on reproduction, growth, nutrition, and health is well established? Does future aquaculture produce only for the food market or will aquaculture species become increasingly the bioreactors to extract additionally high-priced substances needed by others than the food markets? Will freshwater or marine species dominate the future mass production systems?

The workshop will focus on these and related issues.