Baltic Marine Environment Protection Commission

HELCOM Fish Correspondence Group concerning a draft document on BAT/BEP descriptions for sustainable aquaculture in the Baltic Sea region (CG Aquaculture)

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Document title	Draft ideas for BAT/BEP for sustainable aquaculture in the Baltic Sea
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Background

In 2016 HELCOM Contracting Parties adopted recommendation 37/3 on “Sustainable Aquaculture in the Baltic Sea Region”. It recommends to develop BAT and BEP measures aiming at sustainable aquaculture in the Baltic Sea region based on guidance as contained in Annex 1 of Recommendation 37/3. The HELCOM HOD 54-2018 (Outcome § 4.57) requested the Contracting Parties to contribute to the work on BAT/BEP for sustainable aquaculture. This document contains first ideas of Germany considering the issues and content of BAT/BEP for sustainable Baltic Sea aquaculture. These are intended to focus and structure the discussion at the CG QUACULTURE 2-2018 meeting.

Action requested

The Meeting is invited to:

- take note of the first ideas on BAT/BEP for sustainable aquaculture in the Baltic Sea; and
- use them in the discussion on BAT/BEP and for planning the future work.

Draft ideas for BAT /BEP for sustainable aquaculture in the Baltic Sea

Introduction

In 2016 HELCOM Contracting Parties adopted recommendation 37/3 on "Sustainable Aquaculture in the Baltic Sea Region". It recommends to develop BAT and BEP measures aiming at sustainable aquaculture in the Baltic Sea region based on guidance as contained in Annex 1 of Recommendation 37/3. The HELCOM HOD 54-2018 (Outcome § 4.57) requested the Contracting Parties to contribute to the work on BAT/BEP for sustainable aquaculture. This document contains first ideas considering the issues and content of BAT/BEP for sustainable Baltic Sea aquaculture. These are intended to focus and structure the discussion at the CG Aquaculture 2 meeting. They are based i.a. on the following:

- HELCOM Recommendation 37/3 on guidance for BAT and BEP measures aiming at sustainable aquaculture in the Baltic Sea region http://www.helcom.fi/Recommendations/Rec%2037-3.pdf
- HELCOM Recommendation 25/4 on "Measures aimed at the reduction of discharges from freshwater and marine fish farming" http://www.helcom.fi/Recommendations/Rec%2025-4.pdf
- EU strategic guidelines for sustainable development of EU aquaculture https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52013DC0229
- "Priorities for environmentally friendly responsible aquaculture in the EU" Joint NGO paper 2014 https://seas-at-risk.org/images/pdf/archive/2014/Joint_NGO_position_paper_-_aquaculture_-_FINAL_15_August_2014.pdf
- Aquaculture Stewardship Council certification and accreditation requirements
- CCB position paper on principles and requirements for sustainable aquaculture in the Baltic Sea region https://ccb.se/wp-content/uploads/2014/11/CCB-Sustainable-Aquaculture-proposal-FINAL2014.pdf
- OSPAR PARCOM Recommendation 94/6 on Best Environmental Practice (BEP) for the reduction of inputs of potentially toxic chemicals from aquaculture use
- Selected scientific papers on the issue.

The ideas contained in this document are proposals collected by experts and do not represent the opinion of Germany. They are meant to provide a first orientation on possible aspects and issues that might be relevant when developing BAT/BEP and to provide a way to thematically structure the discussion at CG Aquaculture 2 and the future work. The ideas are far from exhaustive and CG Aquaculture 2 should identify further relevant topics if needed.

Scope of this document

It is suggested to discuss BAT/BEP for three major processes:

1) establishment of aquaculture operations (types, site selection, permitting regulations, MPAs etc.)
2) management of the operation of aquaculture
3) monitoring of the impacts from aquaculture operations.

In addition, there is also a need for elaborating criteria/indicators and an appropriate reporting format for demonstrating compliance with Recommendation 37/3 and more specifically with BAT/BEP. This issue is not addressed in this document and should be considered at a later stage.

Proposals for issues to consider when developing BAT/BEP for sustainable aquaculture contained in this document aim at reducing negative impacts of marine and freshwater aquaculture on the coastal and marine environment. Not included are issues such as human health, animal welfare, social and economic aspects, information of the public, resource and energy efficiency. The terms of reference for CG Aquaculture demand at least the consideration of aspects of economic viability and social equitability, but it needs to be discussed whether and how this could be achieved. Furthermore, it is clear that a differentiation is needed between proposals for BAT/BEP that could be applied to all aquaculture facilities (whether existing or planned) and BAT/BEP that can only be applied to new facilities or the enlargement of existing ones.

Lastly, the focus of this document is predominantly on sea-based aquaculture. While land-based aquaculture should be included according to recommendation 37/3 it might be necessary to limit the scope.

1) **BAT/BEP for the establishment of aquaculture operations**

1.1 Types of aquaculture

Considering land-based aquaculture it should be discussed whether recirculating aquaculture systems (RAS) constitute BAT/BEP. RAS are fully closed, thereby ensuring zero leakage of nutrients and hazardous substances. Next generation RAS allow for denitrification, thereby reducing water consumption. There is the potential of recycling excess nutrients from RAS, generating useful waste products, e.g. by combining aquaculture and agriculture. Furthermore, aquaponics (combining conventional aquaculture with the cultivation of plants in water) constitute a sustainable type of land-based aquaculture. As already discussed at CG Aquaculture 1, when considering land-based aquaculture small land-based fish farms with a production not exceeding 1000 kg fish/year and fish ponds using natural fertility could be excluded.

With respect to fed marine aquaculture operations the potential of innovative integrated multitrophic aquaculture facilities (IMTAs) needs to be discussed. In general, culturing species that do not need to be fed (shellfish, seaweeds - extensive aquaculture) have less environmental impacts than culturing fed species (finfish – intensive aquaculture).

1.2 Site selection

Locating aquaculture operations appropriately is very important and strategic planning can avoid or minimize many of aquaculture’s environmental impacts. While dilution is not the solution to pollution the impacts of marine aquaculture operations in particular with respect to the discharges of nutrients can be reduced by selecting sites which are open, situated in deeper water and are well-swept by currents. Site selection should potentially take into account the assimilative capacity or carrying capacity of the environment, defined as the amount of pollutants that can be processed without causing high concentrations and non-compliance with water quality standards of WFD, MSFD and HELCOM. Models can help in determining the assimilative capacity of the environment.

Further, more specific site selection criteria with respect to hazardous substances and eutrophication are proposed in sections 2.2 and 2.3 below.

HELCOM Recommendation 37/3 from 2016 on SUSTAINABLE AQUACULTURE IN THE BALTIC SEA REGION states that fish farms should not be placed in areas reserved for nature protection, if that might conflict with the aims of protection for that area and that regional planning as an instrument for directing aquaculture activities to suitable areas and for mitigating conflicts between aquaculture and other uses of that area be employed. This Recommendation was adopted by HELCOM in order to ensure that aquaculture operations are not compromising conservation objectives inside or outside MPAs. It is well known that for instance, fed marine aquaculture and mussel aquaculture lead to an accumulation of organic matter below the farms that has negative impacts on benthic organisms and this could contradict the objective to protect sensitive benthic habitats. Since the impacts of marine aquaculture operations can be wide-spread (transportation of nutrients, hazardous substances, escapees by currents) their siting in the vicinity or upstream of MPAs/Recovery Areas should be in any case avoided.

Site selection could be in general supported by using hydrodynamic modelling that allows a prediction about the area of potential impact. Some of the impacts of aquaculture could be effectively reduced by keeping the densities of aquaculture facilities low and by coordinated fallowing.

Site selection also needs to take into account the “HELCOM / VASAB Baltic Sea broad scale marine spatial planning principles” and the “Guidelines for the implementation of the ecosystem-based approach in marine spatial planning in the Baltic Sea area”.

1.3 Species selection

Species selection could be based on principles of risk management in relation to genetics risks, needs for pharmaceuticals, antifouling agents and cleaning agents, type of feed needed (herbivores/carnivores/ omnivores) and risks related to the spreading of diseases, parasites and escapees.

1.4 Permitting regulations

Aquaculture facilities should only be established upon granting permits or according to prior regulations by the competent authority or appropriate body in accordance with existing legislation (including EIA and SEA Directives for EU Member States), as is probably already the status quo in most HELCOM Contracting Parties. If the aquaculture facility has any transboundary impact (e.g. demonstrated by hydrodynamic modelling) it could be important to seek consent from potentially affected Contracting Parties before establishing the facility. Marine aquaculture needs to take into account the provisions of the WFD and MSFD for those Contracting Parties that are EU Member States as well as respective regulations provided by Russian law. In coastal waters the WFD “no deterioration” provisions apply.

2) BAT/BEP for the management of aquaculture operations

2.1 Certification

Certification to independent certification standards could be generally encouraged and it should be evaluated whether particular existing standards can be generally recommended (e.g. Aquaculture Stewardship Council).

2.2 Nutrient pollution

Fed aquaculture operations, as long as they are not run as closed systems, lead to direct discharges of nutrients and organic material. Dissolved nutrients stem from fish excretions (urine and releases from the gills), while particulate organic material stems from fish faeces and uneaten feed.

The Baltic Sea, being a semi-enclosed sea, is particularly vulnerable to nutrient inputs. According to the recent HOLAS II assessment, 97% of the Baltic Sea were assessed as eutrophied, suffering from too high nutrient inputs. Hence, reducing nutrient pollution from land-based and marine aquaculture should be one of the priorities for the management of aquaculture operations. When it comes to siting of sea-based aquaculture facilities there are several options for the Baltic Sea that could be discussed. Siting could consider the respective eutrophication status of the waters as assessed by HELCOM and the respective ecological status in coastal waters as assessed by the WFD. Furthermore, siting could also take account of the nutrient reduction scheme established as part of the Baltic Sea Action Plan, e.g. by considering the maximum allowable inputs (MAI) set per basin or considering the country-allocated reduction targets (CART) or country-specific nutrient input ceilings. These options differ in their degree of precaution.

Culturing mussels does not release additional nutrients into the marine environment but reduces nutrients through harvesting of the cultured species. Nevertheless, such aquaculture is not without impacts. Mussels excrete faeces and pseudofeaces and their accumulation underneath the farm can cause undesired impacts on benthic habitats (e.g. through oxygen depletion). Hence it is suggested to also consider mussel farming and potentially other types of extractive aquaculture (seaweeds) when developing BAT/BEP. Adjusting stocking densities of mussels to the assimilative capacity of the environment they are cultured in and avoiding mussels falling off ropes could be one potential recommendation concerning BAT/BEP for this type of aquaculture.

Permits could be a means of quantifying the allowable discharge of nutrients to the environment (or the maximum allowable feed consumption, the maximum amount of N/P in the feed). New N/P limits given e.g. per 1 kg fish produced could be developed and included in BAT/BEP based on the limits give in Recommendation 25/4.

The number of finfish cultured in a certain water volume could be balanced according to the water exchange rate and the feeding method. Colleting dead fish immediately could reduce impacts on benthic habitats as well as the risk for diseases. The general aim could be a nutrient-balanced aquaculture. To demonstrate this, nutrient budgets could be developed as a required part of aquaculture permits.

Feed efficiency could be maximized to minimise the nutrient leakage from fed aquaculture. Since dry feed potentially reduces the nutrient leakage, its use could be recommended. A goal could be the continuous improvement of feed conversion rates, approaching 1:1 (1kg of fish produced per 1kg of feed).

Waste and waste water from handling or processing aquaculture products should also be addressed in BAT/BEP. It could be treated, disposed and if possible utilized. Sludge underneath farms could be removed regularly.

Further issues to consider: Are there particular species that can be recommended in order to minimise nutrient pollution from finfish aquaculture facilities? Are there particular types of food that can be recommended? Any other relevant management techniques?

2.3 Hazardous substances

The use of veterinary medicines (including antibiotics), biocides or cleaning- resp. disinfection agents in aquaculture can be a source of hazardous substances. Toxicity to non-target organism or antimicrobial resistance are widely discussed risks to the aquatic environment. Substances of concern are especially those which are persistent, bioaccumulative and toxic (PBT) or very bioaccumulative and very persistent (vPvB), as well as substances of equivalent concern like endocrine disruptors.

Describing BAT/ BEP with respect to hazardous substances should according to Recommendation 37/3 have the aim to ” ...minimize, strictly regulate and effectively control the use of legally approved bioactive chemicals, antibiotics and other pharmaceuticals at aquaculture farms and effectively control the abundance to avoid risks to the environment”. Human health effects are not addressed in this context.

BAT/BEP concerning the use of veterinary medicines could include the application of veterinary medicines (only if health problems are confirmed), the choice of veterinary medicines (only approved veterinary medicines), restrictions of certain veterinary medicines and promotion of vaccination , the documentation of veterinary medicines used as well as the disposal of unused veterinary medicines. Restrictions for the use of antimicrobials could be considered. Vaccination could be promoted. Effective disease management helps to reduce the use of veterinary medicines as well as management practices like fallowing, site rotation and low stocking densities should also be addressed in BAT/BEP.

The use of cleaning and disinfecting agents should be considered taking into account the handling of these agents as well as the choice of products with less environmental hazardous properties. Also, possibilities to minimize the use of these substances should be included in BAT/BEP. The use of ecolabelled products should be promoted.

Concerning antifouling techniques solutions without the use of hazardous substances could be promoted (e.g. washing/drying of net cages). Furthermore, the discussion in WG PRESSURE concerning the update of the HELCOM Recommendation on anti-fouling systems needs to be considered. This currently concerns a potential prohibition of the use of copper and cybutryn as antifouling agents as well as recognising that the degree of fouling is dependent on salinity and becomes less of a problem in fresher Baltic Sea waters.

2.4 Biodiversity impacts - alien species and escapees

Aquatic invasive alien species are a major threat to marine and freshwater ecosystems. They compete with indigenous populations for food and space and can spread disease and parasites. The HELCOM HOLAS II assessment has shown that the Baltic Sea is not in good status with respect to non-indigenous species, since 12 new species were introduced between 2011-2016, while the target is zero new introductions. Aquaculture is one of the biggest vectors for the introduction of alien species in European Seas. Hence, it should be discussed whether there could be a general recommendation not to culture alien species in marine aquaculture in the Baltic Sea in order to prevent escapes of such species into the environment with potentially severe consequences for marine ecosystems and biodiversity. At least BAT/BEP should consider the recommendations of EU regulation No 708/2007 concerning the use of alien and locally absent species in aquaculture as a minimum standard. The regulation requires a permitting procedure for non-routine introductions including a risk assessment (minimum requirements laid down in Annex II). Species listed in annex IV (e.g. Pacific oyster) are exempt from this regulation.

On land, according to the provisions of EU regulation No 304/2011 alien and locally absent species can be cultured if the potential for escape of the organisms to be farmed and of non-target organisms is addressed during transportation and if these species are cultured in closed facilities.

Fish may escape from farms as a result of human error during handling, mechanical failure or damage to pens by weather or predators, such as seals. Escapes are more likely to occur from open farms than closed farms. Farmed fish typically have different genetic characteristics to their wild counterparts as a result of selective breeding. If they escape, they may interbreed with wild fish, which could lead to the extinction of vulnerable wild populations. Genetic mixing can also occur if fish release fertilized eggs from open farms into the surrounding waters (escape by spawning). Genetic impacts are more likely if native populations are structured, containing sub-populations that each have a distinct genetic profile.

BAT/BEP should ensure that native species in open cage systems have no or low risk of mixing genetically with wild fish present in the ecosystem. Zero escapes could be an aspirational target. A technical standard for sea cage aquaculture equipment that minimizes or prevents escapes should be defined. If there are escapes, these should be immediately reported. Traceability of escapes to source could be ensured through the use of tags or DNA tracing. Evidence of escapes from finfish aquaculture to the wild could be linked to actions such as temporary halting, or if frequent incidents occur, stopping production. With respect to culturing
Atlantic/Baltic salmon and sea-trout in open-cage aquaculture in the Baltic Sea it should be discussed whether these are suitable species due to risks they pose to wild salmonid stocks.

2.5 Litter

Much of the gear utilized in modern aquaculture practices is made of plastics. These durable materials are excellent for aquaculture production in saltwater, however, they are at the same time highly persistent and causing harmful impacts to marine organisms and habitats. Aquaculture structures are mainly lost due to wear and tear of anchor ropes, storms, and accidents or conflicts with other maritime users. The primary source of macrolitter from marine aquaculture is lost or abandoned gear (e.g. cover netting/sheets, cages, bags, ropes, EPS floats, baskets and pipes). In addition, microplastics can also be released to the marine environment due to mechanic strain on used or lost gear as well as due to the continuous removal of biofouling organisms from aquaculture facilities, as this cleaning can release net and rope fibres.

The HELCOM regional action plan on marine litter also addresses litter related to aquaculture. One of the regional actions involves “identifying the options to address key waste items from the fishing and aquaculture industry, which could contribute to marine litter, including deposit schemes and extended producer responsibility”. National actions involve: improving the enforcement of EU Regulation 404/2011 on gear marking, improving the enforcement of EU Regulation 1224/2009 on reporting lost gear and enhancing resource efficiency by facilitating markets and applications for plastic waste from the fishing, aquaculture and shipping industry (e.g. by bringing together producers of waste and recycling companies) by looking at specific items and differences in materials, including giving value to waste streams by financial incentives. These actions should be considered when developing BAT/BEP for aquaculture.

Generally, actions against plastic litter released from aquaculture can be grouped into prevention, removal and emergency response (e.g. after storms). Possibilities for actions to be included in BAT/BEP are: using alternative materials in aquaculture (e.g. for mussel longlines hemp is under investigation); providing the appropriate infrastructure and incentives to dispose of and recycle derelict aquaculture gear; brand/label IDs to all aquaculture gear to identify the owners of litter from aquaculture operations; collect derelict aquaculture gear immediately and prepare a plan for emergency responses after storms and conflicts with other maritime users.

2.6 Sustainable feeds

The fish feed often harvested from overfished stocks needed for aquaculture is a key issue for sustainability of an aquaculture operation. In general, BAT/BEP should aim at reducing the amount of wild fish for fish feed and using alternative fat and protein sources such as mussels, algae, insects or microbial meals. Mussel meal as feed from mussels cultured in the Baltic Sea with the aim to remove nutrients could be especially recommended, since this would generate a viable market for such mussels that are not fit for human consumption due to their small size.

The use of plant-based feeds in finfish aquaculture could be maximized. Also, fish waste from fishing vessels and fish-processing constitute a sustainable source for feed production.

In the Baltic Sea catchment, it could be recommended that fish protein/fat in feed should only come from the Baltic Sea catchment and should originate from sustainably harvested stocks to reduce unnecessary nutrient import. Landed bycatch should not be used for fish feed production since this might counteract the pressure to minimize bycatch in fisheries. In general it should be aimed to increase the number of herbivore fish species raised in aquaculture facilities.

Fish and fish waste used for feed production should have a low content of toxic substances and no genetically modified organisms should be used in fish feed.

Production permits could set requirements on the content of the feed to be used and the traceability of feed components should be ensured. Fish meal could be certified by a credible and independent certification scheme that uses low trophic index assessment criteria and FAO code of conduct principles.

3) BAT / BEP for monitoring of the impacts from aquaculture operations

Monitoring obligations constitute an important part of BAT/BEP since they are the basis for understanding environmental impacts of aquaculture operations and for taking actions for remediation. Discharges and ecological effects could be supervised by regular monitoring. The required monitoring parameters and appropriate monitoring frequency could be laid down in the permit. With respect to nutrient pollution, it could be mandatory to e.g. regularly monitor the eutrophication status, oxygen depletion, state of the sediment (organic content) and harmful algal blooms. Furthermore, the discharge of hazardous substances could potentially be monitored. To control escapes of farmed fish to the wild environmental DNA monitoring could be encouraged.