*European Economic and Social Committee*

**NAT/770**
**Blue bio-economy**

# OPINION

European Economic and Social Committee

**Blue bio-economy**
Exploratory opinion

Rapporteur: **Simo TIAINEN**
Co-rapporteur: **Henri MALOSSE**

| | |
|---|---|
| Referral | Finnish EU Presidency, 07/02/2019 |
| Legal basis | Article 304 of the Treaty on the Functioning of the European Union |
| Bureau decision | 19/02/2019 |
| Section responsible | Section for Agriculture, Rural Development and the Environment |
| Adopted in section | 01/10/2019 |
| Adopted at plenary | 30/10/2019 |
| Plenary session No | 547 |
| Outcome of vote (for/against/abstentions) | 151/1/1 |

## 1. Conclusions and recommendations

1.1 The blue bio-economy means economic activities and value creation based on sustainable and smart use of renewable aquatic resources and the related expertise. There is a vast amount of expertise, know-how and human tradition linked to water, aquatic resources and the blue bio-economy in Europe. Nonetheless, with regard to its potential and opportunities, business activities related to the blue bio-economy are still rather modest in Europe. There are several barriers that have to be addressed.

1.2 The full potential of the blue bio-economy in the EU has to be identified and research priorities defined to enhance the sustainable growth of this economy. In particular, it is necessary to develop a better understanding of the applicability of aquatic raw materials in value-adding processes. Strengthening sustainable growth requires targeted research funding to boost innovation, multidisciplinary development, entrepreneurship and new high-quality jobs. Sustainable growth also demands a level competitive playing field as an operating environment, and broad collaboration and creation of new partnerships between industry, research organisations, public authorities and the third sector.

1.3 The status of waters and aquatic ecosystems is not adequate in many areas of the EU. Good water quality and healthy aquatic environment, however, are the basis for the blue bio-economy. There is a need to preserve and restore the good status and biodiversity of the oceans, seas, lakes and rivers. This requires a major effort from all the stakeholders, including the EU, national and regional institutions, universities and research centres, all professionals involved (e.g. fishing and tourism sectors) as well as civil society organisations. These efforts must include adequate research, training and transfer of know-how.

1.4 Increased investments are needed in the management of aquatic environments and sanitation facilities to ensure access to, and sustainable use of, clean water and adequate sanitation for all. Competitive solutions are needed to remove waste from water and to develop water-saving and recycling technologies. New cost-effective solutions are needed to decrease nutrient loads draining into natural waters, and to restore critical habitats and changed water bodies.

1.5 The EESC calls for the EU and other actors within the blue bio-economy to come up with urgent action to combat climate change and its impacts. In particular, urgent adaptation of fisheries and aquaculture to climate change is critical as the conditions change dramatically and this has a major impact on these important livelihoods. Fisheries, aquaculture and algae culture are crucial to increase sustainable aquatic food production in EU. Developing climate-resilient aquatic food systems requires further research and innovation prior to successful implementation. Algae biomass is a potentially important aquatic resource that can be used as a raw material for a wide range of uses.

1.6 Joint efforts between universities, research centres, NGOs and the fishing sector are needed to develop new added value products from fish by-products and waste materials. New financing instruments are needed to promote technological innovations and services. Collaboration across sectoral boundaries and better decision-making processes are needed. Restoring the biodiversity of the seas, lakes and rivers will open up new opportunities for business, mainly, including

family and small businesses on local markets. Furthermore, promotion of new business models for water tourism and recreational use of aquatic resources offer new sustainable business opportunities for remote regions.

1.7 The priorities for development measures on the blue bio-economy agenda include (i) clean water and sanitation, (ii) a healthy, diverse and safe aquatic environment, (iii) sustainable aquatic food production, (iv) high-value non-food products, (v) climate change adaptation, (vi) blue health and well-being, and (vii) better coordination in combating illegal activities related to aquatic resources. By investing in this development, Europe can reinforce its position as a leading player in the circular economy.

1.8 The European Union is called upon to promote awareness-raising, education and training incorporating research and the exploitation and transfer of the know-how of communities in coastal and inland water areas, enabling respectful management of the environment and the creation of European training networks in this field. For agriculture, the EU should also address the issue of water scarcity.

1.9 The EESC suggests that the blue bio-economy become one of the flagship areas of EU policies and in its cooperation policies with neighbouring countries, as well as in the framework of the UN Sustainable Development Goals and the COP 21 Goals of the Paris Agreement. In this regard, the EESC proposes that the EU Council and to the European Parliament ask the Commission to launch several pilot actions in the different marine and aquaculture areas of the EU, taking care to choose those that represent the great diversity of existing situations in the EU, the degree to which they are affected by the risk of collapse and the development potential of the blue bio-economy. A management committee should be set up including Member States, regions, and stakeholders, with the participation of the EESC, in order to organise exchanges of practices and ensure that successful pilot projects are developed on a larger scale.

## 2. Introduction

2.1 The blue bio-economy means economic activities and value creation based on sustainable and smart use of renewable aquatic resources and the related expertise. Businesses and activities that grow the raw materials for these products, or extract, refine, process and transform the biological compounds, all form part of the blue bio-economy.

2.2 The importance, characteristics and opportunities of the blue bio-economy in the different Member States varies widely according to geographical conditions, and this has to be addressed. Most of the Member States have direct access to the ocean or seas. Coastal waters are extremely important for many Member States. In addition, lakes and rivers play a crucial role in most countries.

2.3 In May 2019, the EESC adopted an opinion[1] on the European Commission's Communication updating the 2012 bio-economy strategy. The conclusions and recommendations set out in the

[1] EESC opinion on the *Communication updating the 2012 Bio-economy Strategy*, OJ C 240, 16.7.2019, p. 37.

opinion are relevant from the point of view of the blue bio-economy. The present opinion describes the possibilities and potential of the blue bio-economy in more detail. The blue bio-economy is closely linked to the concept of the circular economy.

2.4 Clean water and renewable aquatic resources represent significant sustainable business opportunities and may offer key solutions to many of the global Sustainable Development Goals (SDG2, SDG3, SDG6, SDG7, SDG8 and SDG14). Through this exploratory opinion, the EESC aims to respond to the question raised by the Finnish presidency of the Council of the EU of how the EU can boost the development of the blue bio-economy and what measures must be prioritised.

## 3. General

3.1 The blue bio-economy can offer multiple benefits only as long as the aquatic environment is healthy and productive. Threats to biodiversity, coupled with climate change, pose a high risk to the production capacities of aquatic organisms, as demonstrated by the IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) report from May 2019. Overexploitation, pollution, coastal development, peak tourism and transport all constitute serious challenges, especially in those areas of the European Union most affected (particularly the Mediterranean) by these stressors. There is a need for solutions adapted to different environments and regions.

3.2 The demand for biomass will increase in the future and the EU has to address this challenge. A biomass-based transition towards a greenhouse gas-neutral economy will be limited by the availability of land. Therefore it will be important to improve the productivity of aquatic resources in capturing the full range of opportunities of the bio-economy. This includes for instance the production and use of algae, and other novel sources of protein which have the potential to relieve the pressure on agricultural land.

3.3 The blue bio-economy has growing potential to improve food security and provide healthy and low-carbon footprint food, novel foods and food additives, animal feeds, nutraceuticals, pharmaceuticals, cosmetics, new materials, clean water, non-fossil energy, nutrient recycling and many more benefits. The growth of the blue bio-economy depends on ensuring the good status of waters and aquatic ecosystems, resilient fisheries and aquatic production systems, effective systemic collaboration across sectoral boundaries, technological innovations, new financing instruments and improved services and sustainable business models.

3.4 It is essential to underline the importance of cultural factors in the implementation of a blue bio-economy. The know-how of human populations of coastal and inland water areas represents an exceptional asset for Europe as long as it is identified, preserved and passed on to new generations. Thus, any action that is undertaken in the blue bio-economy should incorporate the cultural and human dimension and ensure that all relevant stakeholders are involved, and especially local representatives, professionals and civil society.

## 4. Blue bio-economy and the Sustainable Development Goals

4.1 The UN's SDGs are closely linked to water and aquatic environments. These goals address the key global challenges we face and outline how to achieve a more sustainable future with reference to fundamental issues such as food security, climate change and the prevention of environmental degradation. The goals are highly interconnected and are considered in this document from the perspective of sustainable business opportunities based on water and aquatic natural resources. There is a strong nexus between water, energy and food in particular.

*Clean water and sanitation*

4.2 Goal 6 (Clean water and sanitation) aims to ensure access to and sustainable use of clean water and adequate sanitation for all. Globally, more than 1 billion people still do not have access to fresh water of adequate quality and more than 2 billion people are living with the risk of reduced access to freshwater resources. The global need for fresh water is expected to increase significantly by 2030. The EESC addressed the topic of drinking water in an opinion in 2018[2].

4.3 Although progress has recently been made in the EU and other regions, there needs to be increased investment in the management of freshwater resources and sanitation facilities. The key objective is to find competitive solutions to remove waste from water and to develop water-saving and recycling technologies to reduce water waste. There is major potential in water-saving and water-recycling solutions and technologies, and in smart management of water resources and supply. There are new water-sanitation concepts and new technologies to remove drug and hormone residuals as well as micro-plastics from waste water. There are also promising innovations to turn seawater into drinking water using renewable energy.

4.4 Good water quality is the basis for the blue bio-economy. Good management of water resources is an essential part of the solution to almost all major problems in the world, such as overconsumption of aquatic resources and the need to adapt to climate change. Water lifecycle management requires clear goals, up-to-date information, planning and management. This includes digital solutions for water services and monitoring, and versatile new technological solutions for wastewater treatment (membrane technology) and nexus thinking out of silos.

4.5 The EU has the potential to become a major global player in the water sector as a provider of water-related technologies and services. Digitalisation offers a new opportunity for the water businesses, and can significantly increase the efficiency of water resource management, as well as of production and service concepts. Digital solutions can be used to produce services that meet customer needs now and in the future. The EU can offer competitive and sustainable solutions in this field to the whole world.

2 EESC opinion on *The quality of water for human consumption (recast)* (Drinking water directive), OJ C 367, 10.10.2018, p.107.

*Healthy, diverse and safe aquatic environment*

4.6 Oceans, seas and inland waters serve as the world's largest sustainable source of protein, with more than 3 billion people globally dependent on marine and coastal biodiversity for their livelihoods. Our oceans, seas and inland waters are being rapidly degraded by human activities. In particular, coastal and inland waters are deteriorating due to pollution and eutrophication, and the loss of habitats is alarming. All of these changes have a devastating effect on the functioning of aquatic ecosystems and biodiversity, and thereby on potential food production. Careful management of this essential global resource is a key feature of a sustainable future.

4.7 Goal 14 (Life below water) aims to conserve the oceans, seas and aquatic resources, and promotes their sustainable use. Several measures are needed to improve the situation, including significantly reducing aquatic pollution of all kinds and managing all human activities more effectively. New solutions are needed to decrease nutrient loads draining into natural waters. Economically efficient means and methods to improve the ability of soil to catch and bind nutrients must be developed and tested. Eutrophication can also be reduced by increasing the use of under-utilised fish species as well as the production and harvesting of algae (as nutrients are removed with catches). New solutions are needed to reduce eutrophication and restore rivers, lakes and seabeds.

4.8 Healthy aquatic environments can provide a significant number of new high-quality jobs. Healthy fish stocks and clean waters are the basis of sustainable fishing and recreational water use, and open up new opportunities for the blue bio-economy. River and freshwater restoration efforts are being undertaken worldwide to restore degraded habitats, ecosystem processes, migrating fish stocks, biotic communities and the services they provide. Restoring migrating stocks will bring new potential livelihoods to sparsely populated areas, providing jobs for people under a family business model with access to local markets.

*Sustainable aquatic food production*

4.9 Global food demand is expected to increase significantly. Goal 2 (Zero hunger) aims to end hunger, achieve food security, improve nutrition and promote sustainable primary production by 2030.

4.10 Fisheries and aquaculture provide nutritious food and generate much-needed incomes, while supporting rural development and potentially also protecting the environment. Currently, fish represent about 17% of the global animal protein supply and 6.5% of all protein for human consumption. For hundreds of millions of people fish is the major source of protein and essential nutrients. Many fish stocks are still being over-exploited and require better management. Heavy subsidies are still maintaining serious overcapacity of fishing fleets in many parts of the world. Oceans, seas and inland waters should be utilised much more sustainably than is currently the case. Investment in aquaculture, fisheries and fish processing, and in the development of new products from waste and side-streams, is crucial to increase sustainable food production and help maintain food security. In particular, the EU has a substantial negative trade balance when it comes to fish and fishery products; around 60% of the

seafood eaten in the EU is imported: these imports do not always match the EU criteria for sustainable production and food security.

4.11 Aquaculture has significant potential for further growth. Considerably more biomass could be produced sustainably in European aquaculture by increasing the number of species used in aquaculture, including the lower-trophic marine species (e.g. algae and molluscs). However, the development of aquaculture has many barriers. First of all, growing aquaculture production requires additional sources of feed. The catches of low-value fish in capture fisheries will in the future be increasingly used for direct human consumption and less as raw material for animal feed. Additional feed biomass is needed to grow aquaculture and could come from currently largely under-used species such as krill and other mesopelagic organisms, seaweeds, as well as from processing waste (side-streams). Secondly, the limited space available for aquaculture facilities is an increasing problem that needs to be solved. Key to sustainable development of aquaculture is good planning of marine and freshwater activities that considers ecological, economic, social and cultural dimensions. Thirdly, better solutions are needed to solve the issues of nutrient leakage and disease control.

4.12 Strict environmental regulation in different countries has a major effect on the costs and competitiveness of aquaculture. Various new technologies are being intensively developed but a large number of economic and technological uncertainties remain. Recirculating aquaculture systems (RAS) offer several benefits such as minimum water requirement, effective control of effluents and waste, small space requirement, and control of production conditions. RAS technologies have potential especially in freshwater systems. It is likely, however, that an increasing share of marine aquaculture will have to take place in off-shore waters. New approaches to multiuse and integrated management, including spatial planning and local management plans, are needed.

*Added-value aquatic products and non-food uses*

4.13 Processing fish and other aquatic organisms for human consumption generates side-streams, which are often not used for direct human consumption. It is estimated that 30-70% of all harvested fish biomass becomes low-value by-product or is completely wasted. This comprises potentially useful and valuable material, which could potentially be used by industry for food and non-food purposes. High-value functional ingredients for specialised products can be developed from these materials. A variety of aquatic organisms can support the development of new products such as nutraceuticals, pharmaceuticals and cosmetics. They can also provide new enzymes, lipids, biopolymers, and other biomaterials. Making use of these raw materials in an eco-efficient way is crucial. There is considerable global pressure to improve the use of all biological material and thereby also reduce waste. Marine biotechnology can play an important role in creating added value in the blue bio-economy.

4.14 Algae biomass is becoming increasingly significant as a resource for a variety of commercial applications in the blue bio-economy. Algae provide an effective, sustainable and still largely untapped resource for bio-based processes and products. Algae are rich in nutrients and dense with energy. Increased production of macroalgae and microalgae is gaining widespread recognition in Europa as a resource that can be used as a raw material for a wide range of uses.

There is a growing interest in harvesting, cultivating or processing algae to create a wide range of high-value products, including food, animal feed, nutraceuticals and bio-based products.

*Climate change mitigation and adaptation*

4.15 Climate change is widely recognised to affect a range of environmental variables, including rainfall, temperatures, river flows, harmful algal blooms and ocean acidification. Goal 13 (Climate action) encourages urgent action to combat climate change and its impacts. Rising temperatures impact oceans, seas and other waters as well as nutrient networks, fisheries and livelihoods. In Europe, climate change is expected to increase winter precipitation and, together with rising temperatures, the risk of eutrophication and deterioration of water quality increases. This will have many adverse consequences for fish stocks and other aquatic resources, and thereby also on fisheries and other modes of production. High temperatures hamper the life of cool water species such as salmonids, and contribute to the spread of many harmful species and diseases. Species that benefit from eutrophication are gaining ground. High temperature peaks present major challenges for aquaculture farms. For agriculture, the EU should also address the issue of water scarcity.

4.16 The future food system must be part of the solution to climate change, not part of the problem. In essence, fishing and aquaculture are effective ways of producing protein from the point of view of climate emissions. Therefore, sustainable fishing and fish farming should be promoted. Furthermore, strengthening the resilience of fisheries and aquatic production systems is essential. Fishing activities must adapt to the changed conditions such as extreme weather conditions and ice-free winters. In aquaculture, one potential way to prepare for temperature peaks is through offshore cultivation, which can in some cases benefit from the increase in average sea temperature. Recirculating aquaculture systems (RAS) can help the aquaculture industry to adapt to climate change. Fish breeding programmes can improve the tolerance of cultivated fish to higher temperatures.

*Blue health and well-being*

4.17 Goal 3 (Good health and well-being) aims to ensure healthy lives and promote well-being for all at all ages. There is significant growth potential in well-being and recreational services based on aquatic environments. Promoting sustainable recreational use of aquatic resources offers new business opportunities for remote non-urban regions, which will contribute to the generation of new high-quality jobs. Due to its importance and economic potential, the blue bio-economy also contributes to Goal 8 (Decent work and economic growth).

## 5. Priority actions

5.1 The priorities for development measures on the blue bio-economy agenda are: (i) clean water and sanitation, desalination of sea water, reduction of pollution, (ii) a healthy, diverse and safe aquatic environment, and restoration of ecosystems and biodiversity in aquatic environments, (iii) sustainable aquatic food production, (iv) creation of high-value non-food products, (v) climate change adaptation, (vi) blue health and well-being, energy saving and renewal energy production from the sea and from rivers and lakes, (vii) better saving and preserving

water resources, and (viii) better coordination in combating illegal activities related to aquatic resources. In addition, low-cost and clean aquatic bioenergy and utilisation of organic waste are important emerging topics. By investing in this type of development, Europe can reinforce its position as a leading player in the circular economy.

5.2 The EESC proposes that the EU Council and the European Parliament ask the Commission to launch specific pilot actions aiming to improve the status and production capacity of aquatic ecosystems in selected locations of the EU, taking care that they represent the diversity of existing situations and the development potential of blue bio-economy. These pilot actions should be carried out in coastal and inland water areas (including islands) that are moderately or badly affected by human impact such as excessive seasonal tourism, pollution, nutrient load from land-based sources, modified watercourses, and excessive exploitation of aquatic resources.

5.3 The pilot projects should be implemented as quickly as possible, in conjunction with local elected representatives, universities and research centres, professionals and relevant civil society actors. The projects should enable the key actions and measures to be developed and tested in order to improve the current inadequate situation at the pilot sites. The EESC is recommending a reasonable number of pilot projects to be conducted in the Mediterranean, the Black Sea, the Atlantic coast, the North Sea and the Baltic Sea, as well as in inland water areas with major potential for improvement. These projects could, for instance, entail cleaning nutrient-rich or polluted waters in areas such as ports or tourist zones using specific filtering species such as oysters, sea urchins, mussels or aquatic plants (algae), or restoring migratory pathways and spawning grounds in order to restore the life cycles of migratory fish. At the same time, the capacity to capture $CO_2$ on a large scale could also be tested in these pilot projects. Pilot projects could also examine the feasibility of new technologies to produce energy from seas and lakes or to find new ways of saving water resources.

5.4 On the basis of the results and experiences obtained in the pilot projects, the European Union is called upon to promote training and transfer of the know-how in the communities in coastal and inland water areas, enabling the restoration and adequate management of the environments and the creation of European training networks, and demonstrating opportunities for creating high-quality jobs in this field.

5.5 A management committee should be set up for the pilot projects including Member States, regions, and stakeholders, with the participation of the EESC, in order to coordinate exchanges of practices and ensure that successful pilot projects are developed on a larger scale. At the same time, the EU Member States and concerned regions should be encouraged to prepare blue bio-economy strategies, with consultation of local stakeholders and civil society organisations.

5.6 EU expertise on the blue bio-economy gained through the research programmes of Horizon Europe, LIFE and the blue bio-economy pilot projects should be available, under certain conditions, to third countries, in particular the Eastern Neighbourhood countries, the Mediterranean and African countries, Russia for the Baltic sea area, as well as other interested countries. The blue bio-economy should become an EU flagship in its cooperation programmes with the UN and a tool to achieve the COP 21 Paris goals in the fight against global warming.

Brussels, 30 October 2019

Luca Jahier
The president of the European Economic and Social Committee