



## Healthier oceans and human beings: Sponges as “engine” of the deep sea

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Event Report



Deep-sea sponge grounds are one of the most diverse, ecologically and biologically important and vulnerable marine ecosystems of the deep-sea but hitherto have received very little research and conservation attention. The [SponGES project](#), funded under the European Union’s Horizon 2020 research and innovation programme (H2020), intends to develop an integrated ecosystem-based approach, to preserve and sustainably use deep-sea sponge ecosystems of the North Atlantic. This event, hosted by **MEP Ricardo Serrão Santos** and co-organized with **FAO**, gathered stakeholders and policy-makers for a better understanding of the importance and fragility of deep-sea sponge ecosystems, their potential and the need to take appropriate measures to sustainably use and protect deep-sea sponges. The panel included:

- **MEP Ricardo Serrão Santos**
- **Marco Weydert**, Senior Policy Officer, Marine Resources Unit, DG RTD
- **Claus Hagebro**, Food and Agriculture Organization of the United Nations (FAO)
- **Hans Tore Rapp**, University of Bergen
- **Javier Cristobo**, Spanish Institute of Oceanography
- **Anna de Kluijver**, Utrecht University
- **Ana Colaço**, IMAR & University of the Azores
- **Tiago Henriques da Silva**, University of Minho, Portugal

**MEP Ricardo Serrão Santos** introduced to the Intergroup event and pointed out that all processes in the oceans are interconnected. “Sponges deserve particular attention. The services they provide for the whole ecosystem, where they live, are of utmost relevance”. The gap in scientific knowledge about deep-sea sponges is one reason why this

Intergroup event was organized. In the light of Mr. Serrão Santos' opinion that "without good science there are no good policies, but without good policies there are no good challenges for science" he thanked the Food and Agriculture Organization of the United Nations (FAO) for the co-organisation of the event due to its objective to transform the best scientific knowledge in good environmental policies. Mr. Serrão Santos acknowledged that proper funding is essential and highlighted the contribution of the H2020 programme to advance the knowledge about the deep-sea ecosystems.

Representing the European Commission, **Marco Weydert** pointed out how old and fascinating deep-sea sponge grounds are. The sponge aggregations are important indicators of the stresses the oceans are experiencing. In consideration of the [COLUMBUS project](#) Mr. Weydert emphasized the crucial role of the applicability of results to other sectors. Afterwards, he underlined the missing of 99% of the maritime litter and the urgent need to find out which impact or possible toxicity the litter has on the deep-sea sponges. Due to that and his strong interest in scientific results, he invited and called out for a direct communication. Concluding, Mr. Weydert stressed the necessity of an early start to get at potential follow-up project on the way.

**Claus Hagebro** from FAO, welcomed the joint initiative with the EP Intergroup on Climate Change, Biodiversity and Sustainable Development and thanked the European Bureau for Conservation and Development (EBCD), represented by Ms. Despina Symons and her team for arranging this meeting. During his intervention, he introduced the [properties of deep-sea sponges](#). Specifically, he mentioned that sponges are simple multicellular organisms without digestive or nervous and circulatory systems. They are geographically widespread and can be found in a depth from 30 to 3000m. Summing up his presentation, Mr. Hagebro stressed the huge filtration capacity of sponges and illustrated their cleaning feature through a video.

In addition, **Hans Tore Rapp** presented the [importance of studying deep-sea sponges](#). Sponge aggregations are key players for nutrient cycling and provide habitat and nursery for other species. Mr. Rapp underlined that areas with sponge aggregations exhibit the highest diversity, but however sponge grounds are among the most understudied habitats of the deep-sea. He [highlighted that the overall objective](#) of SponGES is to develop an integrated ecosystem-based concept for the preservation and the sustainable exploitation of vulnerable deep-sea sponge ecosystems of the North Atlantic. In conclusion, the aim of SponGES project is to deliver new knowledge on the diversity, distribution and functions of sponges as well as innovations regarding blue biotechnology, and to provide practical tools for further research and management of vulnerable deep-sea ecosystems.

**Javier Cristobo** from Spanish Institute of Oceanography introduced the [biodiversity and the relevance to conservation of sponge grounds ecosystems](#) in the North Atlantic. According to Mr. Cristobo, one essential part of the project is the assessment of the biodiversity contained within sponge grounds, which includes the identification of all sponge-dominated habitats, the investigation of associated fauna and the examination of the diversity and functions of microbial consortia. After pointing out that approximately 91% of the marine biodiversity is undescribed, Mr. Cristobo stressed the necessity to close this knowledge gap, which will require a renewed interest in exploration and taxonomy. As the main issue Mr. Cristobo pointed out the protection of the explored biodiversity after he showed a map of hitherto protected and not-protected areas of sponge aggregations.

In her contribution, **Anna de Kluijver** deepened the [understanding of the function and importance of sponge grounds](#). Ms. de Kluijver introduced the sponge loop to answer the question if deep-sea sponges are ecosystem engines. The sponge loop connects dissolved organic matter (DOM) to sponges. The DOM is converted by the sponges to particulate organic matter, which provides an essential base for small fauna, which in turn is feeding larger fauna until it dissolves. Due to this loop, sponges are key players in maintaining energy in the ecosystem and therefore Ms. de Kluijver affirmed that sponges are ecosystem engines.

Ana Colaço introduced the [threats and impacts on sponge grounds](#), stressing the effects of fisheries and climate change to the sponge aggregations in the North Atlantic. After highlighting the functional role of sponges for the ecosystem, Ms. Colaço pointed out what threats to sponges would implicate for the ecosystem as a whole and its habitats. Assessing the fisheries' impact, she underlined the bycatch of sponges in 14% of the fishing sets during a collection of data in the Azores. Ms. Colaço estimated that 1.5 million tonnes of sponges have been removed between 2010 and 2013 due to fisheries, which implicated a reduction in the filtering capacity of 182 million m<sup>3</sup> of water and the carbon removal of 54.7 tonnes per year. Following, she presented the impacts of sedimentation and climate change to the sponge grounds. As a result of a long-term experiment, the filtration capacity of sponges reduces on account of changes of temperature and pH-value. Furthermore, sponges tend to fill up with sediments of mining, which cause the death of the organism. Ms. Colaço concluded that sponges can cope with some stressors, but multiple stressors might compromise sponge integrity. All in all, more studies are needed to understand if the results related to the aforementioned species are dependent or generalizable.

Last but not least, **Tiago Henriques da Silva** provided an introduction to the biotechnology potential (BlueTech) of sponges. Sponges are the most prolific source of marine-derived chemicals with pharmaceutical applications; due to this reason SponGES assesses the metabolic diversity of sponge species, using metabolomics to identify sponge ground bio-products with industrial potential. In addition, deep-sea sponges produce intricate and hierarchic silica skeleton, which are of great interest for bone tissue engineering and regenerative medicine. Besides the need for clarification in terms of the intellectual property rights, the potential of sponges could be unlocked through developing methods for a sustainable production of the resources.

A key point outlined during the final discussion was the needs for both more taxonomists and better training for them for further research about deep-sea sponges and their potential. Two issues remained open due to a current gap of knowledge, specifically the economic value of deep sea sponges, as well as the impacts of human actions on sponge grounds in the Northern Seas. The excellent job of the SponGES project was welcomed by all participants, while the urgent need for a follow-up project was also highlighted. Stefan Fritz from the German Marine Research Consortium pointed out the necessity to protect sponge grounds in international waters, and the requirement of the European Union to take the lead in the protection of deep-sea sponge grounds through national or international jurisdiction.

[Documents of the meetings can be found here.](#)

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