



**Subject:** Outcomes of EEAC-EASAC workshop ‘The Role of Science in Strengthening an Integrated Policy Approach to our Seas and Oceans’

January 2018

As the Chairs and Co-Chairs of the Marine Working Groups of the European Network of Environment and Sustainable Development Advisory Councils (EEAC) and the European Academies Science Advisory Council (EASAC), we are sending you this letter to share the main outcomes of the workshop ‘*The Role of Science in Strengthening an Integrated Policy Approach to our Seas and Oceans*’, which was organized by our institutions in November 2017 (the conclusions of the workshop are set out in the annex to this letter).

#### **Integrated solutions require integrated science**

Seas and oceans currently face complex problems that require informed solutions from scientists. At the same time, the marine environment is managed in a highly sector-based manner, making governance even more complicated. In that context, the scientific community often finds it difficult to develop suitable solutions for taking action in an integrated and coherent manner.

Earth’s terrestrial and marine ecosystems are part of a complex and interconnected planetary system, consisting of many interacting elements. Any sustainable action developed in this framework must be aware of this complexity and must be aimed at managing it. This requires an integrated approach that encompasses the numerous interactions between land, sea, and atmosphere, as well as those occurring between interlinked elements of marine ecosystems.

In line with EU policies in this area, an integrated maritime policy that facilitates the participation of all stakeholders must be implemented on a solid, integrated and coherent scientific basis.

Seas and oceans form a single, interconnected system with component ecosystems. The connections and interactions between the different parts of the sea and between the different components of marine biology and ecology, combined with the European ambition to achieve marine sustainability in a time of change for oceans and seas, require an integrated approach.

We still lack such an integrated approach. The scientists, policy advisers, experts and NGO and government representatives present at the EEAC-EASAC workshop therefore concluded that we all need to strengthen our efforts to work in a more integrated way.

*(1) The Marine co-chairs of the EEAC and EASAC therefore call upon the members of the European Parliament’s Fisheries Committee to support the establishment of a European Marine University, the sole aim of which is to more effectively integrate scientific knowledge concerning our terrestrial and marine environments. This University should train experts capable of managing the complexity implied by the paradigm of integrated marine policies. It is of the*



*utmost importance to create new multidisciplinary profiles for a new, integrated and multidisciplinary paradigm.*

### **No Green without Blue (and no Blue without Green)**

The importance of seas and oceans to life on land is incontestable. However, we all need to communicate this message more effectively. The scientific community needs to improve the way it conveys general concepts which can be understood by everybody. Furthermore, we all need to make an additional effort to increase 'marine literacy' among EU citizens: 'no green without blue'.

*(2) In order to do so, the Marine co-chairs of the EEAC and EASAC request the European Parliament to organize a European Year of the Oceans and Seas (or, possibly, a European Decade) to improve awareness and marine literacy among our fellow Europeans.*

### **Ensure political follow-up**

The European Union has made considerable progress in developing effective policies for our seas and oceans. The Marine Strategy Framework Directive (MSFD) is an example of such efforts. An effective implementation of the MSFD will be key to ensuring sustainable use of the seas by deploying an ecosystem approach and emphasizing ecosystem health, expressed through the concept of Good Environmental Status (GES). The EU has now proposed that the rest of the world should also adopt this approach, as endorsed by \*your committee / the European Parliament's Fisheries Committee in its contribution to the Parliament Report 'On international ocean governance: an agenda for the future of our oceans in the context of the 2030 SDGs' (2017/2055(INI)).

However, it seems that neither scientists nor managers of so-called Marine Protected Areas have sufficient means at their disposal for GES measurements or reporting. While European politicians have often underlined the importance of sustainable seas and oceans and are currently proposing the GES approach to the global community, it seems that the follow-up is insufficient.

*(3) Consequently, the Marine co-chairs of the EEAC and EASAC call upon the members of the European Parliament to make sure that political support goes beyond policy-making. Europe needs to invest in improved observation systems, in integration and synthesis, and in professionals able to gather and analyze data, to ensure integrated ecosystem management.*

### **Avoid unsustainable harvesting from our seas and oceans**

The world is on an unsustainable pathway. To avoid dramatic losses in biodiversity – which would destroy functioning ecosystems in our oceans and seas – a revised Common Fisheries Policy must be introduced. There is also a need for greater commitment to policy and knowledge development on improving the ecological efficiency of ocean harvesting.

*(4) To this end, the Marine co-chairs of the EEAC and EASAC call for more research in order to develop knowledge on the potential for ecologically efficient aquaculture and the potential for the harvesting of species groups from lower trophic levels.*

On behalf of the members of the EASAC Marine Working Group and the EEAC Marine Affairs Working Group, we would like to thank you in advance for your consideration of these points.



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## Annex

### MAINLINE SUMMARY OF EEAC-EASAC WORKSHOP 'THE ROLE OF SCIENCE IN STRENGTHENING AN INTEGRATED POLICY APPROACH TO OUR SEAS AND OCEANS'

#### Introduction

Our seas and oceans are of the utmost importance to humanity. Not only are the seas and oceans our global food supplier, they also constitute the largest environmental compartment on earth. When considered as a volume and not just as a surface, oceans comprise the majority of the space that allows for the expression of life. However, we need to step up our efforts to preserve this vital part of the global ecosystem. Scientists, policy advisors, NGOs, experts and government representatives gathered at the recent EEAC-EASAC workshop 'The Role of Science in Strengthening an Integrated Policy Approach to our Seas and Oceans', based on the document viewable [here](#). The workshop participants agreed that additional steps need to be taken to enhance marine sustainability in an age of changing oceans and seas.

The topics analyzed by the workshop participants included the current state of scientific knowledge and the identified gaps between (deep) knowledge and (political) reality. They also discussed the lack of an integrated (scientific) approach and ways in which a clearer narrative could help to transmit knowledge about our oceans and seas, and looked into the way we harvest from our oceans. This mainline summary only touches upon the surface of an in-depth and complementary knowledge exchange between scientists, policy advisors, NGOs, experts and government representatives.

#### 1. Concerns raised

##### 1.1. The effects of climate change

Based on the discussions, it became clear that the impact of climate change on the ecosystems in our seas and oceans should not be underestimated. The EASAC study on marine sustainability explains that "with an intensification of climate change, stark consequences for marine biodiversity and productivity can be expected." The ecological and economic impacts of marine acidification are uncertain, but could be severe.

For example, the impact of climate change is becoming apparent in the Mediterranean Basin. So-called 'cold engines' transport cold water via the Gulf of Lion, the northern Adriatic Sea and the northern Aegean Sea to the deep portions of the Mediterranean Basin, and supply oxygen to deep-sea life forms. Possible failures of these cold engines as a consequence of climate change would result in an interruption of cold water currents and would have major effects, as happened during the Eastern Mediterranean Transient.

A decline in biodiversity and (deep) sea life should be considered inevitable. Another example of shifts in ecosystems due to climate change can be found in the Black Sea. In this basin, jellyfication is endangering original species. However, effects occur not only in the Mediterranean and Black Sea Basins. Changes in the cold engines in the Great Ocean Conveyor Belt would affect global circulation processes. Therefore, it



is vital that these circulation mechanisms and the effects of climate change are properly understood in the light of the ecosystem approach.

### **1.2. An integrated approach and the need for a clearer narrative**

The major effects of climate change are not under dispute. However, there is a lack of scientific data to fully underpin these changes. One possible reason for this may be the lack of knowledge about the history of ocean and sea ecosystems. This 'time dimension' is needed as part of an integrated perspective on oceans and seas.

Insufficient consideration of the 'time dimension' is not the only element of concern regarding an integrated approach. Researchers study the high seas, deep-sea environments, coastal zones, etc., but there is no integrated, holistic view that combines these domains. Indeed, the domains are separated only in our approaches, but closely connected in reality. We should move from analysis to synthesis. There is a need to integrate the different elements of marine science. Furthermore, we should move away from thinking in terms of areas. We should think in terms of volumes, also adding the time dimension to our analyses. Only then will an integrated ecosystem approach be truly effective.

The fragmented approach also endangers scientists' ability to present a clear narrative about what is needed to preserve our seas and oceans. A clear and appealing narrative is needed to enhance marine literacy. Most Europeans are focused on developments on land. The message and understanding that 'without blue there is no green' needs to be more firmly supported. This should be done not only by the scientific community; policy-makers should also make an effort. Societal awareness (literacy) may also help to put marine topics on the political agenda, something that is really needed. It is particularly the lack of political will that hinders the efforts made by scientists, stakeholders and policy-makers to enhance the sustainability of our seas and oceans.

### **1.3. Need for data and scientists**

Even though scientific data are available, there is a shortage of "brains that connect the different pillars of knowledge". Information does not mean knowledge. Since there is a clear need to move from analysis to integrated synthesis, there is even more pressing need for scientists who can connect insights originating in different disciplines.

Moreover, it seems that not all relevant scientific data are available to scientists and policy-makers. In some cases, basic questions (for example about extinction, biodiversity, or quantitative insights into the ability of oceans to store greenhouse gas emissions) cannot be answered. Consequently, it is not possible to characterize the health of marine ecosystems in a consistent way. The academics gathered in the workshop warned that solely investing in technically advanced solutions to gather more data is not sufficient. Mere data gathering without integrated analyses would only further strengthen 'silo thinking'.

Policy-makers are expected to use with wisdom the knowledge produced by the scientific community. The information society should evolve into a society of knowledge and wisdom, with a close symbiosis between those who produce knowledge and those who use it to make decisions. However, it is important that decision-makers are presented with the full picture rather than partial perspectives, hence the need for a holistic approach.



#### **1.4. The Marine Strategy Framework Directive**

The European Union has developed a strong policy instrument that incorporates an ecosystem-based approach: The Marine Strategy Framework Directive (MSFD). This Directive introduces the concept of Good Environmental Status (GES) as an instrument to measure the sustainability of our oceans and seas.

GES is assessed using eleven descriptors mostly based on biodiversity and ecosystem functioning. However, most scientists and managers of Marine Protected Areas (MPAs) do not have data that can prove the status of the waters they study and protect. For example, taxonomy expertise is disappearing, making it increasingly complex to underpin the status of waters with data. There is a growing mismatch between what is needed, and the activities undertaken. There is a need to upgrade observation systems to understand change and to identify humanity's possible role in these changes.

The MSFD is in danger of becoming a 'toothless tiger' due to the lack of data to underpin the status of European oceans and seas, and the lack of integrated scientific knowledge. According to the participants in the EEAC-EASAC workshop, this situation is both undesirable and unacceptable because the GES principles are the best available ones, and should not remain a mere paper reality.

#### **1.5. Feeding a growing population: more people, high trophic levels**

An additional topic of concern is global population growth and the expected demand for products (harvested from the oceans and seas) that are high on the trophic pyramid. As the EASAC reports states: "Some fisheries are comparable to hunting 'wolf eaters' (trophic levels above top predators) and consequently even at a minor yield (in terms of food for the human population), overfishing is not surprising from an ecological point of view."

Moreover, the EASAC report on marine sustainability states that "the ceilings for increased food production appear more severe on land than in the ocean and, consequently, attention to the increased utilization of marine living resources seems inevitable. Under current practice, overfishing is a serious concern that affects 39% of assessed commercial fish stocks in the North East Atlantic, with 88% in the Mediterranean and Black Seas considered overexploited." Consequently, the expected food extraction from the earth's seas and oceans will soon become unsustainable. It seems that economic growth still leads to ecological decline, whereas we need to move from growth to prosperity.

### **2. Solutions and recommendations**

#### **2.1. Combating the effects of climate change**

European policy-makers should keep pushing to drive the transformation to a carbon-free society. For example, without the implementation of carbon emission reduction programmes, efforts to achieve marine sustainability will most likely not succeed. Moreover, a more integrated scientific understanding of marine ecosystem structure and function and ecological connectivity should be developed. Consequently, we need to invest in greater understanding of water movements and ecological connections between water volumes. Furthermore, there is a need to devote more attention to the role of pelagic systems in generating change.



## 2.2. Steps towards an integrated approach

We need a shift to an integrated scientific understanding of marine ecosystem structure and function and ecological connectivity. Therefore, there is a need for a sustained European strategy for ecosystem observation. European policy-makers should make an effort to facilitate biological monitoring with ongoing physical and chemical programmes, as prescribed by the MSFD.

Furthermore, in order to arrive at an integrated approach, it is necessary to include the time dimension by conducting biological observations using a sustained, long-term network of time series. Moreover, to further support an integrated approach, different disciplines within marine science should be connected. Open access to marine data must therefore be improved. Consequently, the workshop participants endorsed the establishment of a (virtual) European Marine University.

Besides integrating various fields of expertise within marine science, there is also a need to integrate different scientific disciplines. For example, social scientists should be included in marine science. An interesting and successful example of this approach can be found in the USA, where the Centre for Ocean Solutions has opened its doors.

A more integrated approach requires policy-makers who recognize complexity, interconnections and scientific uncertainties, and who are agile enough to be adaptive in the light of new scientific insights.

## 2.3. Conveying the message

There is a need to be more transparent about uncertainties. Scientific reports should include a paragraph about uncertainties, comparable with the way in which the IPCC works. A transparent perspective on uncertainties allows policy-makers to clearly consider their options in their pursuit of solutions. Scientists should be well aware of the fact that their advice is considered in a political and value system in which binary options are usually highly valued.

To include a variety of insights and to create an integrated view of (scientific) data and knowledge, policy-makers should continue to organize broad stakeholder dialogues. These dialogues require time and respect, but most of all they need scientific input. Stakeholders who represent certain interests have legitimate reasons to share their views, but European institutions should make sure that the scientific community is properly heard to ensure a basis for informed discussion and debate.

The workshop participants also agreed on the need to strengthen the relationship between science and society. "We need to include the public in order to gain their support for the messages that scientists share with policy-makers." A participatory process and an appealing as well as understandable narrative are therefore required.

In order to place marine matters on the societal agenda and to enhance marine literacy, the workshop participants call on EU policy-makers to introduce a 'European Year of Oceans and Seas' (or, even better, a 'European Decade of Oceans and Seas'). This event should not only receive attention in countries with a strong connection to the European oceans and seas, but also in more terrestrial regions in Europe: 'without blue there will be no green.'



#### **2.4. New coalitions**

The EU should (co-)fund human capacities, both in individual disciplines and in their combination and integration to support data interpretation. Only by doing so can Europe avoid ending up with ICT-driven 'natural stupidity'.

As previously mentioned, the need for holistic, long-term, cross-sectoral approaches to tackle the marine sustainability problems will require the integration of natural sciences with human and social sciences, as already requested under the ecosystem approach. Reductionist scientists should be complemented by colleagues from different scientific backgrounds. Furthermore, marine scientists and technologists of the future will also need to be trained communicators who can engage, educate and inform society's choices.

#### **2.5. Marine Strategy Framework Directive: avoid a 'toothless tiger'**

The Marine Strategy Framework Directive (MSFD) aims to support ecosystem-based management of human uses of the sea. To prevent the MSFD from becoming a 'toothless tiger', policy-makers and scientists need to define clear goals for ecosystem health, in order to identify which level of disturbance is unsustainable. Moreover, cross-sectoral management must use these goals as the framework for planning and management across all activities. Furthermore, improved independent early warning assessment of the impacts of policy is also needed.

Besides these efforts, the EEAC-EASAC participants had a clear message for the European political leadership: "Make sure that political support goes beyond policy-making. Europe needs to invest in improved observation systems, in integration and synthesis, and in professionals able to gather and analyze data, to ensure integrated ecosystem management."

#### **2.6. Increasing ecological efficiency**

The world is on an unsustainable pathway. To avoid dramatic losses in biodiversity which would destroy functioning ecosystems in our oceans and seas, a revised Common Fisheries Policy must be introduced by the European Union. There is also a need for greater commitment to policy and knowledge building on improving the ecological efficiency of ocean harvesting. To this end, more research is needed in order to develop knowledge on the potential for ecologically efficient aquaculture and the potential for the harvesting of species groups from lower trophic levels.

Harvesting at lower trophic levels would result in increasing the ecological efficiency of the harvest. The EASAC publication on marine sustainability states: "If 8% of the oceanic primary production is used by means of harvesting at the herbivore level (e.g. mussels), the hypothetical herbivore harvest would amount to 4,000 million tonnes wet weight, compared to 100 million tonnes wet weight achieved through current fishery practices. The overall ecological efficiency of the herbivore harvest would equal 0.8%, compared to the existing efficiency of 0.02% for the current fishery harvest."

#### **2.7. How can we organize the policy-science interface more effectively?**

The workshop participants agreed that in order to improve the science-policy interface, an accountability system should be developed. In this system, policy-makers should be legally bound to provide





transparency on the actions taken in response to the advice they received. This mechanism should be considered in the spirit of the Aarhus Convention.

## **2.8. What changes are needed in education to better educate scientists about the integrated problems?**

There is a need to sustain and expand capacities in marine science, and to develop capacities in integrative marine science. The EASAC report on marine sustainability states: “The educational landscape that currently produces our professional marine experts in Europe is quite complex and fragmented. Furthermore, there is a lack of coordination between faculties and schools. The previously recommended (virtual) European Marine University could help to focus the development of cross-disciplinary graduate training, and to foster the coherence of marine expertise in Europe. Furthermore, the workshop participants also called for maintaining a broad offer of different subjects in schools: “we should start with the scientists of the future.”