European Commission

Regenerating our Ocean and Waters by 2030

Interim report of the Mission Board Healthy Oceans, Seas, Coastal and Inland Waters

Independent Expert Report

Research and Innovation

Regenerating our Ocean and Waters by 2030

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Regenerating our Ocean and Waters by 2030

Interim report of the Mission Board Healthy Oceans, Seas, Coastal and Inland Water

This document is an interim report of the Mission Board's progress towards the definition of a Mission in the area of healthy oceans, seas, coastal and inland waters. The draft Mission outline presented will be the basis for further discussion and consultation, including with European citizens, resulting in adjustments and refinements for the Mission Board's final advice.

Directorate-General for Research and Innovation
2020 Healthy Planet

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REGENERATING OUR OCEAN AND WATERS BY 2030

This Mission proposes to regenerate our European ocean and waters by 2030, by reducing human pressures on marine and freshwater environments, restoring degraded ecosystems and sustainably harnessing the essential goods and services they provide.

1 The Mission Explained

Protecting and restoring our ocean and waters is one of the defining tasks of our time, as human existence and all life on this planet fundamentally depend on them. The ocean and waters hold solutions to feed, power and heal our citizens. Yet for too long, societies have ignored their existential and environmental role and have not given them the attention they require, which risks turning ocean and waters from source of life to a threat to our way of life.

2 Challenges Addressed

The health of our ocean and waters is under pressure like never before. Decades of pollution and damaging uses have severely degraded the condition of aquatic ecosystems. Climate change and ocean acidification come as additional pressures, with more and more measurable impacts. In turn, the capacity of the ocean to regulate the Earth's climate is jeopardized. Finally, the tools at our disposal to restore and manage the aquatic systems are significantly imperfect, for lack of knowledge and lack of public connection to the ocean on the one hand, and poor governance on the other. The proposed Mission addresses all of these challenges.

2.1 Unsustainable human footprint

Humanity has left an unsustainable footprint on the ocean and waters, with many uses and activities producing multiple pressures on ecosystems. According to the IPBES, sixty-six percent of the ocean area is experiencing increasing cumulative impacts, and over 85 percent of wetland areas have been lost. Human actions, including unsustainable production and consumption patterns, threaten more species with global extinction now than ever before. One million species – aquatic and terrestrial – are at risk of extinction, assuming a total of 8.1 million species[1].

Pollution

Pollution is degrading all parts of the water cycle from the top of the Alps to the bottom of the Ocean. There are four major types of pollution of the ocean, seas and freshwaters, which the proposed Mission will address: **eutrophication** (the excessive enrichment of water by nutrients such as nitrogen and phosphorus), **contaminants** (such as persistent organic pollutants, heavy metals, radioactive substances and pharmaceuticals), **marine litter** such as **plastics and microplastics**, as well as **underwater noise**.

The main sources of marine pollution are mostly land based, with rivers playing a crucial role in driving pollution to the ocean. Therefore, an integrated land-sea approach to prevent and reduce pollution is crucial, i.e. a transformational change through a circular economy.

Unsustainable fisheries and aquaculture

The production of aquatic biomass sustains livelihoods for many communities and contributes to food security. However, current practices have a range of negative impacts on freshwater, coastal areas and the ocean, as they severely degrade benthic ecosystems, alter local biodiversity, and modify water circulation. Fisheries are among the most impactful activities for the decline of marine biodiversity and biomass in the past 50 years. According to FAO[2], only 7 percent of global fish stocks are underexploited. Unsustainable fishing practices such as bottom trawling and discarding of unwanted species alter marine ecosystems. Seafood production by aquaculture, on the other hand, offers growth opportunities providing new technologies, new cultivation methods and new species (lower trophic level species, with lower greenhouse gas emissions and ecological footprint) are utilised to minimising its impacts.

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[1] IPBES. 2019. *Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.* IPBES secretariat, Bonn, Germany

[2] FAO. 2018. *The State of World Fisheries and Aquaculture 2018 - Meeting the sustainable development goals*. Rome, Italy.

Unsustainable coastal and maritime tourism

Coastal and maritime tourism puts great pressure on land and water, thereby undermining its own success, as tourism significantly relies on the quality of the environment. Overexploitation of coastal land for infrastructures, sand and gravel extraction, construction of offshore installations notably wind farms, coastal construction and dumping at sea as well as activities such as seabed mining and telecommunication connections, trigger habitat loss or degradation and often damage large swathes of the seabed and affect fragile species. The introduction and spread of alien species affecting and changing local ecosystems is caused by the increases in the volume of shipping infrastructure (e.g. canals), coupled with the warming of the ocean.

2.2 Climate Change

While the ocean is essential to regulate the Earth's climate, human-induced climate change is altering the state of the ocean and waters and the critical functions they fulfil. These changes are projected to further increase over the course of the 21st century according to the IPCC[3]. **Sea level** rise will further accelerate reaching up to 1.10m by 2100, if emissions are not sharply reduced. Extreme sea level events and floods will occur more frequently and may be further exacerbated by **extreme weather events and coastal erosion**, with damages to Europe's coastal communities projected to increase many fold[4]. The Gulf Stream, which is largely contributing to Europe's mild climate, sufficient precipitation for reliable agriculture and high yields of Atlantic fisheries[5] is slowing down and changes position which will alter the relation of warm-cold water over the 21st century. Moreover, increased carbon dioxide emissions into the atmosphere, and their subsequent absorption by the ocean and waters, leads to **acidification**.

Water regimes are also projected to change drastically. Large areas may become unsuitable for human life because of water scarcity, with changing rainfall patterns resulting in more severe and long-lasting **drought periods**, while in other areas floods may become more extreme with serious consequences. Furthermore, these regime changes have major impacts on **global food production and catch potential.** This will be compounded by the changes to glaciers and cryosphere, which will further affect **water resources** and their uses on such as land agriculture, energy production and transport

2.3 Lack of knowledge, understanding and connections with our ocean and waters

Despite their fundamental importance to humanity's existence, public and political attention has not corresponded to the urgency to address the above-mentioned pressures. Historically, there has been a significant political and financial underinvestment in the public goods that the ocean and waters provide

[3] IPCC, 2019. *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate*. In press.
[4] EEA 2019. *Global and European sea-level rise*.
[5] Latif et al. 2017*. The Future of the Gulf Stream Circulation*. DKK and KDM: Berlin.

driven by a lack of adequate scientific understanding on the one hand and citizen's emotional and rational disconnection from aquatic environments on the other.

While the effects of pollution, human activities and climate change are documented and observable, there remain significant gaps in our understanding and knowledge of the ocean and waters and the cumulative effects of the pressures they are under. Moreover, the full extent of ecosystem services they provide is not yet fully known and many potential solutions are yet to be discovered. **Closing these knowledge gaps** will be key to better protect, manage and harness the potential of the ocean. New opportunities arising from a better knowledge of our aquatic systems could create a new push for the development of a sustainable and inclusive blue economy, filling the existing investment gap and act as an incentive for the creation of new skills and jobs.

In addition and connected to the lack of scientific knowledge and understanding, there is an emotional gap as the general public is largely disconnected from the ocean. The historical and cultural connection of European citizens with the continent's ocean, seas and waterways is complex and diverse. A key challenge facing the ocean is its vastness, as ocean and aquatic environments are often 'out of sight, out of mind'. **Citizen's emotional and rational disconnection** from aquatic environments constitutes a barrier to catalysing the scale of change required to address the above outlines challenges. It is therefore of paramount importance to 'replenish this emotional deficit' and empower and inspire citizens to become **ocean/water literate as well as** turning better information into knowledge, and knowledge into public awareness about the existential threats and the many benefits and solutions the ocean and waters have on offer. Only this can turn into large-scale societal mobilisation, political and economic action to value, protect, restore and enhance the essential goods and services they provide.

2.4 Governance

The ocean and waters and their resources are governed by a fragmented, partial and often sectoral framework of international, regional, national and local institutions, which hampers their effective and sustainable management.

At European level, one of the most comprehensive policy frameworks in the world has been put in place with the ambition to set-up a holistic, ecosystem-based approach to the protection of the freshwater and marine environment. The Water Framework Directive (WFD) and the Marine Strategy Framework Directive (MSFD) set the ambition to achieve 'Good Environmental Status'. However, the persisting multisector and multilevel segmentation of the instruments, policy frameworks and institutional arrangements weakens the overall European governance framework. Despite of the efforts to design an Integrated Maritime Policy – in particular its Blue Growth dimension and regional sea basins strategies, Marine Spatial Planning and the above-mentioned initiatives– there is a lack of an overall framework for all these interventions, which would connect them to marine protection objectives from a water cycle approach.

At global level, a similar **institutional fragmentation** can be observed. The UN Convention on the Law of the Sea (UNCLOS) provides the overall legal framework. There are also different conventions dealing with environment protection objectives, such as the Convention on Biodiversity (with the 'Aichi' targets[6]) or the International Convention for the Regulation of Whaling. A legally binding instrument for management of biodiversity and biological resources beyond national jurisdiction, including for the establishment of protected areas, is currently under negotiation (BBNJ)[7], where the European Commission has taken a proactive role in the ongoing negotiations.

Moreover, the international community has agreed on the UN Agenda 2030 setting Sustainable Development Goals[8] (SDG), where SDG 6 establishes targets for water and SDG 14 for the marine environment. In parallel, there are a number of initiatives to support knowledge, like the UN Decade of Ocean Science for Sustainable Development (2021-2030) with contributions from the World Ocean Assessment I[9] on the state of the ocean.

For freshwater, 70 % of all river basins in the world are transboundary, i.e. shared by two or more countries. Yet, traditionally each country has managed their water resources independently. This has caused a lot of tension between upstream and downstream countries. Increasing water consumption for agriculture, industry and drinking water together with decreasing availability of water because of the climate change provides a high risk of humanitarian crises in many parts of the world. This calls for good governance, i.e. strong action for joint, integrated and sustainable management of water resources.[10]

This weak international governance, in which the EU has nevertheless traditionally played a leading role, results in inconsistencies, overlaps and gaps between jurisdictions and illegal practices because of weak transparency, accountability and compliance of the members of the organisations and parties to the agreements, and ultimately a poor – almost non-existent – protection of marine resources in areas beyond national jurisdiction.

The challenge in the decade to come will be to build on these many policies, agreements and initiatives at various levels. The EU can take on a leading role and showcase how it will be able to ensure coherent and science-based governance of ocean and waters to ensure and promote the sustainability of activities and the regeneration of aquatic ecosystems in Europe and globally.

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[6] CBD 2010. Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity targets. https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.pdf

[7] https://www.un.org/bbnj/

[8] United Nations, 2015. Transforming our World: The 2030 Agenda for Sustainable Development. https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf

[9] https://www.un.org/regularprocess/content/first-world-ocean-assessment

[10] The UNECE Transboundary Water Convention, which became global five years ago provides a good basis for this, but many countries need support for establishing well-functioning joint management.

3 Mission goal, objectives and timelines

The goal of the proposed Mission is the ***full recovery and regeneration of European marine and freshwater ecosystems by 2030.*** In order to achieve this goal and recognising the need to taking a holistic approach to address the water system as a whole (oceans, seas, coastal and inland waters), the Mission comprises five main objectives[11] - illustrated by the metaphor of a 'starfish' - which will together contribute to the restoration and regeneration of ecosystems:

The 'starfish' metaphor

Zero Pollution

Mobilize citizens and stakeholders through the design and experimentation of solutions and demonstration projects following a systemic approach (linking fresh- and marine waters, circular industrial or urban systems, etc.) in the following domains:

[11] Three are thematic objectives (zero pollution, regeneration of degraded habitats, decarbonisation) and two are underpinning (knowledge and ocean literate society, governance) and supporting the three thematic objectives.

- An assessment of the state of the environment and the impact pathways of freshwater and marine pollution on biodiversity and human health, so that priorities can be established on a sound basis.
- Upstream prevention of pollution at source, notably litter (incl. plastics), contaminants and nutrients through the development of new materials, recycling, innovative circular infrastructures and technologies, etc.
- Reduction of combined sewers overflows, appropriate treatment of storm/ground water.
- Optimise all possibilities for limiting noise in line with EU Biodiversity Strategy and enhance knowledge about noise status assessment.

Regeneration of degraded habitats

Halt the net loss and regenerate degraded marine habitats through reforestation, rewilding and other ecological engineering as well as full ecosystem-based management:

- Increase protection of EU waters and MPAs.
- Demonstrate the blue carbon potential in the restoration of marine vegetation where large portions of the coastline have been lost to development.
- Relieve blockage of sediments and diadromous species in rivers.
- Build with nature and develop nature-based solutions, design of new green/blue infrastructure and ecological engineering methods to avoid or mitigate flood or drought damage and decrease disaster risk from extreme weather and other events.
- Enhance the provision of coastal protection and sea level rise and flooding mitigation services of vegetated marine ecosystems, which regulate water quality, provide critical habitat for many marine species including commercially important fishery targets, thus increasing catch potential, enhancing system biodiversity and resilience, and providing additional revenues through tourism and recreational activities.
- Restore surface water body hydro-morphology and improve biodiversity.

Decarbonising our waters, ocean and seas

Create a carbon-neutral circular blue economy, maximising its contribution to making Europe a climate-neutral continent by 2050 by accelerating the decarbonisation of existing sectors and developing carbon-neutral new activities:

- Cover the energy needs in coastal areas and islands with low-impact offshore renewables, like wind and ocean energy.
- Reduce the environmental impact of fisheries and develop new sources of alternative zero-/low-carbon and low environmental impact rich protein, through innovative aquaculture for food and feed and promoting small pelagic fishes for consumption.

- Green retrofitting of ferries and other short-sea shipping with renewable propulsion and carbon-neutral port facilities and create a dismantling and recycling environment for the disposal and dismantling of older vessels.
- Renovate tourism infrastructure and buildings like ports, marinas, touristic resorts and promote alternative eco-touristic models and destinations.

A transparent ocean that is fully known, appreciated, understood, predicted, mapped, sequenced and well-funded

Empower citizens to better connect to value and safeguard their ocean, seas waters and coastlines in ways that are mutually beneficial to humans and nature. Generate and organise the necessary science and data to better understand, monitor and predict the ocean and waters and their impacts on communities, and to discover the full extent of the solutions they provide. This will also act as a key enabling intervention to underpin major economic recovery developments as well as provide the necessary information to monitor, observe and enable the actions on pollution, regeneration of degraded habitats and decarbonising our ocean and waters:

- Ensure that every citizen in Europe becomes 'a shareholder of the Mission', assuming ownership of the Mission's objectives and actively contributing to their realisation.
- Engage, inspire and motivate citizens and youth in particular, through blue education for all generations, citizen science, ocean literacy campaigns and cultural and sports initiatives.
- Train and upskill a new gender-balanced blue workforce.
- Develop trusted (as it is) fit for purpose science deliverables and data (map, observation system, modelling capacity) for predictive services to underpin the different proposed actions of this Mission.

Adequate European and international governance

For the EU to take on a "blue leadership" role to identify all the inconsistencies, coordinate existing different fragmented legislation, bridge any gap between the policies over oceans, seas, coastal and inland waters:

- Propose, steer and ensure the efficient cooperation between different agencies at European, national, international and regional level over the governance of the ocean and waters and the activities affecting them.
- Support the implementation of the outlined Mission objectives as well as steer and support existing efforts for coherent data throughout Europe and globally.

3.1 EC policy priorities supported

The proposed Mission to regenerate Europe's ocean and waters will be key for reaching the European Green Deal objectives and contributing to the implementation of the UN Agenda 2030 for Sustainable Development. It will also be a powerful vehicle for the recovery from the crisis caused by the covid-19 pandemic and for making our communities more resilient to future crises. By investing in innovative solutions that not only address this crisis by spurring new circular and low-carbon economic activity, but also accelerate the transitions that our planet and society need, this Mission will demonstrate concrete and inspirational examples of how our communities can live and our economies can flourish within planetary boundaries and through a truly transformative recovery.

In particular, the Mission will contribute - *inter alia* - to reaching the objectives of the following EU policies:

- European Green Deal (recently adopted EU Climate Law, New Circular Economy Action Plan, Biodiversity Strategy 2030 and Farm to Fork, upcoming: Zero Pollution Action Plan and revised EU Climate Adaptation Strategy); Updated Skills Agenda for Europe
- Marine Strategy Framework Directive, Water Framework Directive and related legislation, notably Nitrate Directive.
- Maritime Spatial Planning Directive
- Common Agricultural Policy, European, European Fertiliser Regulation
- Common Fisheries Policy, forthcoming Green Recovery for the Blue Economy Strategy and EU Offshore Renewable energy strategy
- EU Plastics Strategy and its three outstanding components (Single Use Plastics Directive, Port Reception Facilities, the microplastics REACH process, etc.).
- International Ocean Governance: an agenda for the future of our oceans
- European Digital Strategy, Digital Agenda for Europe (DAE)

3.2 EU added value

Our world's ocean, seas, coastal and inland waters, form one integrated system, connected through the water cycle, which cover around 75 percent of the Earth's surface. **Regenerating this interconnected system lies beyond the capacity of one region or country alone, but requires a concerted effort and strong cooperation at European level and beyond.**

- tackle the many diffuse sources and pathways of pollution of our ocean and waters;
- protect and restore ecosystems that are connected across borders;
- develop and deploy decentralised technologies to decarbonise the blue economy;
- pool and connect the scientific knowledge, data and observational capacity to allow an integrated assessment and prediction of the ocean and waters; as well as
- put in place appropriate governance frameworks and institutions that allow for and coherent management and regulation of the water cycle as a whole.

3.3 Synergies with other Missions

Our ocean and waters are vital for all life on this planet. Regenerating our ocean and waters therefore has wide-ranging benefits for our planet and society as a whole. Their regeneration will thus also contribute to a range of EU policies, SDGs and other Horizon Europe Missions:

Mission in the area of climate change adaptation including societal transformation

- Regeneration of marine and freshwater ecosystems, which sequester and act as carbon sinks.
- Increased climate resilience of coastal communities, incl. through nature-based solutions and the restoration of ecosystems providing protection from sea level rise, flooding, and coastal erosion.
- Increased understanding of and knowledge of the climate-ocean nexus.

Mission in the area of climate-neutral and smart cities

- Improvement of treatment of urban wastewater and pollution prevention.
- Blue renovation and decarbonisation of the blue economy and coastal communities with green/blue port building, infrastructures, marinas, tourism resorts.

Mission in the area of soil health and food

- Develop food from the ocean and waters thereby reducing the pressure on soils to increase productivity.

3.4 Sustainable Development Goals supported

Regenerating our ocean and waters will directly contribute to a range of Sustainable Development Goals, most notably SDG 14 *Conserve and sustainably use the oceans, seas and marine resources for sustainable development*[12] and SDG 6 *Ensure availability and sustainable management of water and sanitation for all*[13]*.*

However, the regeneration of ocean and waters and SDGs 14 and SDG 6 interact with most of the other Sustainable Development Goals (see illustration). Amongst other, the water cycle plays a central role in the Earth and climate system, thus affecting climate action (SDG 13) and life on land (SDG 15). Regenerated ecosystems provide food security (SDG 2) and sustain livelihoods (SDG1). Moreover, a decarbonised blue economy can provide affordable and clean ocean energy (SDG7), foster circular and responsible production and consumption patterns (SDG 12), thus improving the

[12] incl. targets 14.1, 14.2, 14.3, 14.4, 14.5, 14.6, 14.7, 14.A, 14.C
[13] incl. targets 6.1, 6.3, 6.4, 6.5, 6.6, 6.A, 6.B

sustainability of cities and communities (SDG11) and providing decent work and economic growth (SDG 8). Moreover, the strong research, innovation and training fostered by the proposed Mission will provide strong innovation (SDG 9) and quality education (SDG 4). Last but not least, the proposed Mission would not be successful without engaging in global partnerships (SDG17).

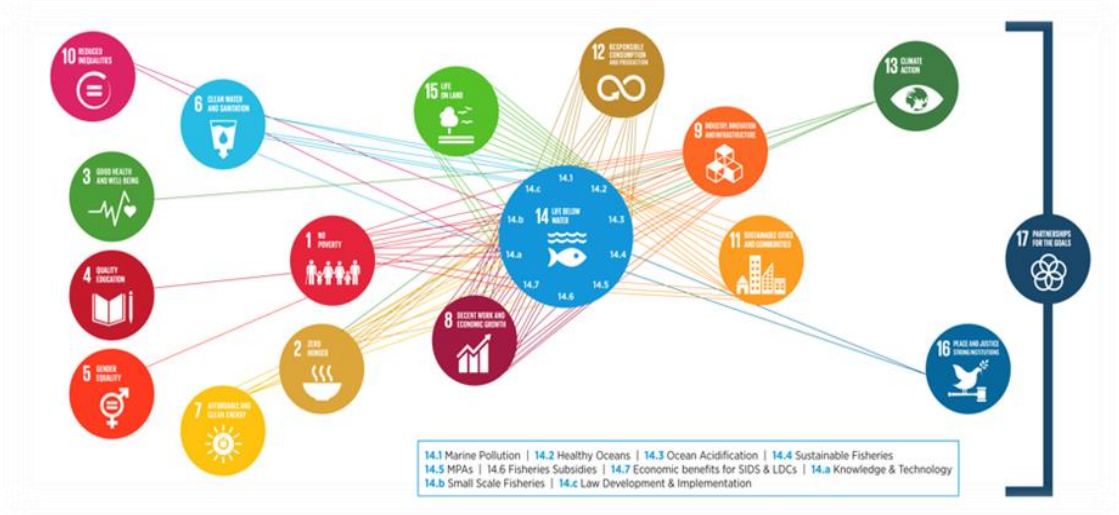

Figure 1 SDG 14 Interaction with other SDGs[14]

3.5 Justification according to criteria in the legal basis

Bold and inspirational: ***Regenerating our ocean and waters is vital for human existence, wellbeing and the livelihoods of European citizens.***

The **ocean and waters are the essential reason that humanity enjoys a stable, life-sustaining climate**. They play a pivotal role in regulating the Earth's climate and contain large parts of global heat, water and carbon, key climate drivers. Moreover, **the connected water system is the origin of all life on Earth and all forms of life depend on it**. It is home to hotspots of **global biodiversity**, our **planetary genome**, and p**rovides our citizens with the water we drink, the air we breathe and the food we eat.** It regulates our climate and our weather and provide us with energy, novel medicines and raw materials. It is a place of well-being, tourism, trade, and transport.

[14] Schmidt et al. 2017. "Conserve and sustainably use the oceans, seas and marine resources for sustainable development" in International Council for Science, 2017. *A Guide to SDG Interactions: from Science to Implementation*. International Council for Science: Paris

Moreover, the European Union is essentially an "Ocean and Seas Union", with a coastline of over 55,000 km – longer than the coast of Russia (37,654 km) and the USA (19,924 km) – and a combined Exclusive Economic Zone of its Member States which is the largest in the world. About 70 European rivers have a catchment area which exceeds 10 000 km^2. Over 40 percent of the EU population lives in coastal areas and for a large proportion of that population, marine and freshwater environments are interlinked with their culture, identity and sense of belonging. Regenerating our ocean, seas, coasts and waters therefore is in the interest of and for the benefit of European citizens and the Union as a whole. **Furthermore, as part of the delivery of *a common public good* this proposed Mission will:**

By 2025: celebrate Europe's most precious resource – its life-giving waters; create a sense of awe and wonder around Europe's inland waters, coastlines, seas and ocean; champion new exploration, the excitement of new science and the surprise of new discoveries; help citizens want to protect what they still have, and to recover what's been lost; lead citizens towards meaningful actions, demonstrating how small everyday choices can make big impacts; make the whole water system – from source to sink – an understandable, reliable and vitally relevant topic, thus creating the basis for delivering a common public good.

By 2030: Europe's entire water cycles will be revealed as never before so that citizens engage and care about the need for healthy regenerated oceans, seas, coastal and inland waters; European citizens will have realised that individual choice is important, significant and the 'new normal', no matter the perceived scale of the problem; the ocean and water systems will be embedded in school curricula across Europe and supported by engaging educational media, arts, cultural events for pupils and adults of all ages

Ambitious: ***The proposed Mission not only aims to halt the degradation of the water and marine ecosystems, but seeks to regenerate their health thus making an ambitious and positive contribution, which will require a concerted effort at European, national, local and global level.***

The European Green Deal and the digital transformation proclaimed at European level provide a core opportunity to kick-start the economy through targeted capital investment, while being at the same time conducive to effective ocean action. Using this window of opportunity **to achieve the required transitions to a healthy planet within the next decade will be key for protecting and restoring this major ecosystem.** This proposed Mission will also be a powerful vehicle for the recovery from the crisis caused by the covid-19 pandemic and for making our communities more resilient to future crises. By investing in innovative solutions that not only address this crisis by spurring new circular and low-carbon economic activity, but also accelerate the transitions that our planet and society need, the mission will demonstrate concrete and ambitious examples of how our communities can live and our

economies can flourish within planetary boundaries, ensuring that the recovery is truly transformative[15].

Moreover, there is growing **international momentum for regenerating the ocean and waters.** The explicit recognition of '**life below water' and 'clean water and sanitation'** as **a UN Sustainable Development Goal in their own right** together with declarations to increase ocean action by the G7, G20 and UN Environment Assembly, Conclusions on seas and ocean by the Council of the European Union, and the decision of the UN General Assembly to launch a **UN Decade of Ocean Science for Sustainable Development 2021-2030**, are illustrative examples of the increased public and political attention, which the proposed Mission seeks to build on in order to regenerate our ocean and waters.

Measurable and time-bound: ***Activities of and proposed outcomes of the proposed Mission are a set of concrete targets for 2025 and 2030 defined for each of the five main objectives and strands of the portfolio as outlined in the following section.[16].***

4 'The Portfolio' – The building blocks of the Mission

In order to achieve the goal of restoring and regenerating our ocean and waters by 2030, the proposed Mission encompasses five interconnected streams of actions – illustrated by the metaphor of a "starfish" with five legs:

Zero-pollution by 2030

In line with and to complement the objectives of reaching good ecological and/or chemical status in all water bodies under the EU Water Framework Directive and good environmental status[17] under the EU Marine Strategy Framework Directive, specific targets for the mission are:

By 2025:

- Zero plastics-pollution to be piloted in the Mediterranean Sea and its main river catchments.
- EU ban on all single-use plastics
- Dumping of red muds, mining residues and dredged sediments in rivers and seas is halted
- Advanced waste water treatment to be piloted in coastal areas
- Construction of 50 plastic recycling plants across the EU

[15] For more information about the Mission Board's proposal for the EU Recovery Package see appendix 3.
[16] Work is continuing to further prioritise the objectives, targets and proposed actions for this mission; some of these might be funded by the future Horizon Europe Programme, others by other instruments of EU/national funding streams.
[17] Descriptors 5, 8-11

- Thousands of pupils have taken part in citizens science initiatives and schools have introduced 'specific plastic/litter free modules' in school curricula
- Implementation of a fully operational European assessment register of all anthropogenic sources of underwater noise, and a coordinated monitoring system

By 2030:

- A zero plastic/ litter-free Mediterranean and other Sea basins (Atlantic, , Baltic, Black, and North Sea) including their main river catchments (95% decrease in litter inputs, X% of litter taken each year)
- All plastics on the EU market is reusable or recyclable
- Eutrophication of European Seas and waters is halted
- 100% of urban wastewater is subject to tertiary (advanced) treatment
- Reduce significantly the losses of nutrients into the environment by at least 50% and the reduction of use of fertilisers by at least 20% by 2030
- 100% of the critical raw materials recovered from wastewater treatment are both reused and carbon neutral in new wastewater treatment plants
- Reused water contributes to an average of 20% of total irrigation (currently 5%) [18]
- 100% of waste water is treated and reused in new cruise ships
- Zero spill of persistent organic pollutants
- The release of pharmaceuticals has been reduced by 50%
- Based on the newly established underwater noise register, definition of noise impact mitigation measures in each European marine region and in continental sub-aquatic environments aiming at a reduction of at least 50% of anthropogenic acoustic emissions.

Regeneration of degraded habitats

By 2025:

- Regeneration of 10% of degraded habitats through removal of pressures, reforestation (Blue Park Programme starting with a Pilot Blue Recovery Nursery) and other ecological engineering as well as full ecosystem-based management of local activities
- Each Member State to participate in at least one large-scale regeneration project with citizen stewardship, and establish a European regeneration voluntary corps with branches in all European countries
- EU introduces full ban on all activities causing seabed habitat loss or degradation and actively restore 10% of EU degraded seabed habitats through reforestation, rewilding and other ecological engineering as well as full ecosystem-based management

[18] See impact assessment water re-use regulation:
https://ec.europa.eu/environment/water/pdf/water_reuse_regulation_impact_assessment.pdf
https://watereurope.eu/wp-content/uploads/2020/04/WE-Water-Vision-english_online.pdf

- At least 5% increase of scaled up ecosystem-based services, nature based solutions to improve resilience from sea level rise, floods and coastal erosion
- Invest in local communities to become co-manager of marine protected areas and ensure an effective protection level in 30% of EU waters
- Restore 10-15% of surface water bodies in the EU suffering hydro-morphological pressures
- Removal of 10-15% of obsolete dams in Europe by 2025, i.e. 6000-9000 dams

By 2030:

- At least 30% of EU waters under highly protected MPAs
- 20% of all degraded habitats are regenerated, 50% of coastal habitat-building and oxygen producing species, including all biodiversity hotspots protected
- At least 20% increase of scaled up ecosystem-based services, nature based solutions to improve resilience from sea level rise, floods and coastal erosion
- 30% of Europe's rivers are de-dammed
- Restore 30% of surface water bodies in the EU suffering hydro-morphological pressures
- Continuity of watercourses is restored: 100% for sand, 30% for coarser sediments
- 50% decrease in total water abstraction and 20% decrease of groundwater abstraction compared to 1990

Decarbonising our waters, ocean and seas

Increase share of renewable ocean and coastal energy

By 2025:

- Increase coastal energy production by 200% from low-impact, offshore renewable energy

By 2030:

- At least 35% of the EU energy mix covered by clean, low-impact, renewable ocean energy

Decreased environmental footprint of fisheries and aquaculture

By 2025:

- 50% of fish stocks are not altered by fishing
- 50% increase in the consumption of EU food produced from low-trophic aquaculture
- Increase by 100% the EU algae production
- Increase by 20% the production of shellfish and other invertebrates

- 50% increase of use of raw materials from low trophic aquaculture (including waste streams) for other purposes (e.g. pharmaceuticals, cosmetics, nutraceuticals, etc.)Increase coastal energy production by 200% from low-impact, offshore renewable energy

By 2030:

- Fishing is not altering biodiversity and stocks
- Increase of 70% consumption of sustainable alternative sources of proteins (e.g. algae, shellfish, other invertebrates) from European waters, seas, and ocean
- X jobs created from sustainable production of food from waters, seas and ocean

Decreased environmental footprint of shipping

By 2025:

- EU adopts a holistic EU Clean Shipping Strategy
- Reduction of 30% CO_2 emissions and at least 50% other waste and container loss from the shipping sector operating in the EU compared to 2018
- 50% of propulsion engines for ferries and other short-sea shipping to be converted to renewable propulsion
- 20 % of old cargo vessels are dismantled and recycled in Europe
- Ban of beaching of ships
- Shipping is included in the EU Emissions Trading System and an EU operational shipping speed is enacted
- 30% of ports provide electricity at berth for ferries, cruises and any kind of ships

By 2030:

- Reduction of 45% CO_2 emissions from the shipping sector operating in the EU compared to 2018
- At least 75% other waste and container loss from the shipping sector operating in the EU compared to 2018
- All ports have facilities to receive waste and waste waters from ships
- 50% of old vessels dismantled and recycled in Europe under European rules
- 100% of propulsion engines for ferries and other short-sea shipping to be converted to renewable propulsion
- 100% of European ports are carbon-neutral and provide electricity at berth. All ports have facilities to receive wastewaters from ships

Blue tourism: regeneration, wellbeing and sustainability

By 2025:

- Blue low carbon renovation wave of X% of EU infrastructures, ports buildings, marinas, tourism resorts [including energy efficiency, waste water treatment, food]
- Creation of green/blue transport infrastructures for connection of coastal areas through EU waterways (blue belts)
- Increase eco-tourism facilities by 25%
- Support the transformation of 20% of existing camping facilities to eco-touristic
- Finance at least 20% of new arts & culture initiatives as an economic engine of regeneration and renovation

By 2030:

- X carbon neutral cities/coastal communities with green/blue port buildings & infrastructures, marinas, tourism resorts
- Reduce by 75% the environmental footprint of European coastal tourism.
- Transformation of 50% of existing camping facilities to eco-touristic
- 30% increase in arts, sports culture initiatives as an economic engine of regeneration and renovation

A transparent ocean that is fully known, predicted, understood, mapped, sequenced appreciated and well-funded

Closing knowledge gaps

By 2025:

- European digital twin pilot of European ocean and waters is operational (all available observation data is pooled in an open-source, real-time, easily accessible and understandable interface and matching application)
- The North Atlantic Seabed is mapped in high-resolution
- European marine and freshwater observation is streamlined: all data collected by EU MS is pooled centrally and made accessible to all.
- All European countries have a full functioning fit for purpose predictive capability and early warning systems in place

By 2030:

- Global digital twin of the ocean and waters is operational (all globally available observation data is pooled in an open-source, real-time, easily accessible and understandable interface and matching application)
- Complete and coherent high-resolution mapping of the European seabed
- Global marine and freshwater observation is streamlined: all data collected is pooled centrally and made accessible to all
- All EU countries have established fit for purpose flooding early warning systems and put necessary coastal and river protection into place
- 50% of the DNA of life in the ocean and waters is fully sequenced

Connecting and engaging Europeans with the ocean and waters through education, training and culture

By 2025:

- At least 50% increase in ocean/water literacy, citizens science and engagement activities in EU thanks to initiatives to be launched in all Member States to replenish 'emotional deficit' of European citizens with ocean and waters. This includes the launching in all European countries of blue solidarity corps; ocean/water ambassadors, blue schools, curricula, teacher training, apprenticeships and lifelong gender-balanced learning opportunities for all ages to re- and up-skill a blue gender balanced workforce; the creation of a pan-European education/training Programme as well as Blue ERASMUS-like programme (mission specific masters and PhD programmes) etc. and enhanced ocean/water literacy mainstream actions.
- Scientists, artists and filmmakers to captivate relevance of Mission objectives in all its forms and champion excitement in the exploration of Europe's ocean/water systems and 30% increase in media products, through educational media for all ages to make the water system from source to sink understandable, vitally relevant.
- 20% of data collections comes from citizen's science initiatives (e.g. build on and further develop the Plastic-pirates Initiative
- X cultural events with a blue dimension (Museum, exhibitions, media campaigns, festivals, competitions etc.) to be organised in all Member States, starting with those most affected by the Covid19 crises, first virtually but physically from 2021 onwards. As of 2021 every country to organise a blue week every year with focus also on blue/water cultural heritage and art

By 2030:

- European citizens overcome the 'emotional gap' they have with ocean and waters and are actively engaged 'shareholders' of the Mission

Adequate European and international governance

By 2025:

- All harmful fisheries subsidies have been eliminated, including fuel and new vessel construction subsidies
- All fisheries partnership agreements involving the EU are compatible with sustainable management of fish stocks, protect marine biodiversity and are fair and equitable"
- International ban on all activities causing seabed habitat loss and degradation is enacted
- Contribution to the successful implementation of the UN Decade of Ocean Science for Sustainable Development
- The EU to create an integrated system of ocean and water governance led by a newly created European Ocean and water agency

By 2030:

- IUU fishing is eradicated
- Strong and enforced BBNJ Treaty
- International ban on all activities causing seabed habitat loss and degradation takes effect
- Fully established European Ocean and Water Agency

4.1 Research and innovation content and activities

While the effects of pollution, human activities and climate change are documented and observable, there remain significant **gaps in our understanding and knowledge** of the ocean and waters and the cumulative effects of the pressures they are is under, of the full extent of ecosystem services they provide and many needed solutions are yet to be discovered and consequently deployed.

Closing these knowledge gaps for all the above outlined objectives, building blocks and related targets and actions will be key to better protect, regenerate, manage and harness the potential of the ocean and waters, and will ultimately enable and underpin the successful implementation of the proposed Mission overall.

4.2 Proposed changes in framework conditions

Legislative

EU Marine/Maritime and Water Environment legislation provides already a holistic framework subject to regular evaluations under Better Regulation principles; reviews are ongoing for example for the Urban Waste Water Treatment, Bathing Water and Marine Strategy Framework Directives. However, this Mission can provide through its different actions (demonstration projects, improvement of the knowledge base, etc.) political impetus for improvements of agreement with third countries, at global level or in the context of Regional Sea Conventions such as the Barcelona Convention for the Mediterranean, etc.

Education, Training and Culture

The launch of the above outlined European Ocean and Water education, training and culture programming is a key component of the proposed Mission. Creating and upskilling a new blue workforce through a complete review of (blue/green) training and education provision for people of all ages (incl. a diversified skill and competences framework) will be necessary. The creation of a pan-European Ocean Literacy network, the provision of Ocean literacy activities and curricula for schools as well as a coherent Europe-wide curriculum for marine science will form an integral part of this endeavour, as will media campaigns and awareness raising actions which include citizens science initiatives (e.g. Plastic Pirates

Programme) and youth engagement. Culture and sport activities demonstrating the importance that our waters and ocean represent will accompany all this in all countries, particularly at local level. All this can only be achieved through the active cooperation with and co-ownership of all Governments and Ministerial bodies co-responsible for its implementation.

It is proposed to achieve this by:

- Bringing together new and existing European Marine Universities and Departments, Marine Campuses, to coordinate, support and implement harmonized goals for marine science.
- Enhancing at local level cooperation with universities, vocational education and training centres, chambers of commerce and innovative SMEs to develop new skills/competences frameworks focusing on preservation and protection of marine biodiversity ocean and human health. This will increase employment opportunities for local and regional communities and alleviate challenges such as social exclusion and brain drain.
- Supporting the education and training to promote citizens science activities, including collection and monitoring of relevant 'blue' data.
- Working closer in all countries with existing network of science museums, aquariums, and cultural/art centres in general to add a 'blue dimension' to their overall art/culture and cultural heritage activities; working with scientists, filmmakers and create enduring campaigns to support the proposed Mission.
- Using local cultural traditions and art as a means of building local visions of new economies, social contracts and community identities led by local people, inspire and empower them.

4.3 Investments needed in infrastructure, digital or physical

A key infrastructure investment will be the development of a "digital twin" of the ocean and waters, which will create and build synergies with existing infrastructure investments in Member States. The digital twin will:

- integrate existing European data, technology, infrastructures;
- encourage and enable the infusion of 'non-scientific data streams' through citizens engaged data gathering, and through joint efforts from a community composed of users
- contribute to significantly increase the observation capacity of coastal and marine waters, the sharing, availability and visualisation of data, and its purposeful uses;
- close the remaining gaps in observation and governance of marine science and gaps related to predict extreme weather/events/sea level rise;
- make society aware of what we know and need to know to better understand the vital role the ocean and waters play for our survival and of how the marine environment functions and interrelates with human activities;
- allow for fact-based decision-making and greater economic operators and citizen engagement towards healthy ocean and waters by enabling their

understanding of the dynamics, interactions and evolution of the ocean and waters and facilitate faster implementation of legal requirements (MSFD, WFD, MSP, etc.)

Amongst others, research vessels will continue to play a critical role for marine science, research, observations and monitoring. The European fleet, composed of 99 vessels, is owned managed and operated differently in 23 European countries and provides excellent support to European and wider marine science. However, the fleet is ageing; further investment will be needed to ensure that the fleet can continue to provide its services, and widen access to ship time to many researchers from countries that lack required capability within their own national fleet.

4.4 Potential synergies with EU and Member State Programmes as well as other funding programmes/investments

Public and Private sector engagement and investment (including for-profit and not-for-profit entities)

Investments in the Blue Economy are stifled by the often-dire needs of the wider economy and redirected to other competing priorities. Available studies[19] on the support of investment towards the sustainable development of the Blue Economy have demonstrated that in particular small and medium-sized enterprises (SMEs) face difficulties in financing their activities because of higher levels of information asymmetry between them and investors, the lack of certain types of assets to pledge as collateral for loans, and investors' preference for larger financing deals due to economies of scale.

Relevant financing for the necessary research and innovation investment in the EU to also underpin sustainable ocean action is equally lagging behind, when it is already proven that research creates the economy of the future. Sadly, at the beginning of 2020 a new crisis has emerged. The Covid-19 pandemic has necessitated unparalleled health measures, with whole swathes of the economy halted, restrictive measures imposed and normal operations disrupted in nearly all industries, including in the blue economy. Investing in sustainable ocean action during these times of unprecedented emergency might be seen as less urgent, but can in fact constitute an opportunity for a massive recovery of the whole economy. In order to support this Mission, an ***R&I investment agenda*** will bring together miscellaneous financial and non-financial tools and mechanisms, existing or under development, from private and public sources. It will encompass the whole set of funding instruments (from grants to financial instruments) and relevant EU funding Programmes in an integrated way, offering connections to national or regional funding. It will explore blended financing (i.e. mixing grants and equity to support innovation) as a new tool in Horizon Europe and more generally the next Multiannual Financial Framework

[19] https://webgate.ec.europa.eu/maritimeforum/en/node/4226

(MFF), as well as part of the proposed EU Recovery Plan and its related new recovery instruments such as Next Generation EU.

Given the interconnectedness of the entire water cycle and systems, and the multitude of challenges to the health of the ocean and waters, their recovery and regeneration requires a concerted effort at EU, national, regional and local levels. Synergies with other EU and Member States Programmes, in addition to synergies with the other Missions, will therefore for be essential. Around 85% of all funding for marine and maritime research and innovation in Europe comes from Member States. The following programmes or planned Partnerships in particular will need to support this Mission and leverage funds[20]:

- *Zero Pollution*: European Maritime Fisheries Fund (EMFF), LIFE Programme, European Structural and Investment Funds (ESIF) as well as future Horizon Europe European Partnerships (Chemical Risk Assessment, Water4All, Circular bio-based Europe)
- *Regeneration of degraded marine and freshwater ecosystems*: LIFE Programme, EMFF, European Structural and Investment Funds (ESIF) Horizon Europe European Partnerships (Rescuing biodiversity to safeguard life on Earth, Water4All)
- *Decarbonising our waters, ocean, and seas*: Connecting Europe Facility, EMFF, European Structural and Investment Funds (ESIF), Horizon Europe European Partnerships (Clean Energy Transition, Waterborne Transport, A climate neutral, sustainable and productive Blue Economy, EIT InnoEnergy, EIT Climate-KIC)
- *A transparent ocean that is fully known, predicted, understood, mapped, sequenced, appreciated and well-funded*: Horizon Europe Cluster 4 – Digital, Industry and Space, ESA Funds, Horizon Europe European Partnerships (A climate neutral, sustainable and productive Blue Economy, EIT Digital, Climate and Food)
- *Adequate European and international governance*: EMFF, ESIF, EU Neighbourhood Instruments, and other EU Instruments related to EU external policy.

As regards private investment, those of interest are the ones directly related to innovation: different products of EIB[21], the InvestEU Programme and its EU Taxonomy legislation, dedicated European and international blue investment funds, blue bonds, European Circular Bioeconomy or BlueInvest Fund. Other venture capital funds such as the European Investment Plan under the Green Deal, Innovation Fund. On a more global level, just to name a few: World Bank funding, UN Green Climate Fund and Blue Action Fund, as well as investments from philanthropists.

This engagement and investment will enable better market uptake and early deployment of innovative technologies and solutions in the EU, crowding in

[20] References will need to be checked and corrected once the new MFF, as well as part of the proposed EU Recovery Plan and its related new recovery instruments such as Next Generation EU are adopted

[21] Clean Oceans Initiative, Sustainable Ocean Fund, InvestEU, Breakthrough Energy Ventures-Europe, etc.

private investment whilst targeting sustainable financing and bringing enhanced attention to demand-driven innovation.

The important expected impact, particularly for the purpose of this Mission is that it will increase the level of understanding/ dialogue to de-risk private investments by providing more clarity about markets and framework conditions and appetite for investment. It will also increase the pipeline of innovations in Europe with the greatest potential to deliver on this Mission, from incremental innovation to disruptive and breakthrough innovation.

Finally, it will leverage more private investment in Europe in disruptive research, breakthrough innovations and in the creation of new businesses in the blue sectors.

4.5 Engagement of citizens in the implementation of the Missions

Citizen engagement is and will play a central role to ensure that every citizen in Europe becomes 'a shareholder of the Mission', is fully involved in decision-making, becomes co-owner but also co-responsible for the success of the implementation and deliverables of the mission.

Engagement events will continue to be organised beyond the scoping phase throughout the implementation phase of the Mission, to allow to European citizens to jointly set the direction and to become real 'shareholders' of this Mission. The above-described section 'Education, Training and Culture' is also linked to this important part and will contribute decisively to achieve the much needed engagement with our citizens.

Citizen science will also play an important part, given its potential to inspire behavioural change and social innovation on one side, and provide the scientific world with missing data on the other side. Citizen science will help address the knowledge gaps identified by the Board, while creating awareness and inspiring citizens to act in protection of our ocean and waters.

For more details, please see Annexes.

5 Annexes

The Mission Board has started its deliberations and scoping of the mission from two basic assertions:

- The health of our ocean and waters is under pressure like never before. Given their essential and existential role for the survival of the planet and of the human race, how can we ensure their continued supply of benefits?
- There is lack of understanding and public attention for the importance of the ocean and waters. Given the need for urgent and decisive action, how can the mission turn better information and knowledge into public awareness, societal mobilisation, and political and economic action to protect and regenerate our ocean and seas?

For these reasons, the Board has solicited inputs for the scoping of the Mission from a number of sources and has actively engaged and consulted stakeholders, experts, citizens and other organisations through meetings, events, conferences, workshops and surveys (see appendix I and II).

5.1 Evidence

The Mission Board, in its task to identify and design a Mission, has collected evidence through a set of studies and surveys.

The first milestones provided to the Board in support of its mission identification efforts were a foresight study, an analysis of projects studying the emotional disconnect of citizens towards the ocean and waters, the feedback provided by the Mission Assembly to a set of questions and the results of a civil society survey addressed to European environmental NGOs. The Board has also engaged with different experts and organisations and invited them to present their positions and findings.

Survey results for the Mission Board on Healthy Oceans, Seas, Coastal and Inland Waters. Foresight in Demand Policy Brief, Totti Könnölä, Ferdinando Boero, Denis Lacroix, Andreas Ligtvoet, Evangelos Papathanasiou, March 2020.

This study reviewed numerous forward-looking reports, scanned specific foresight databases and news feeds to develop five possible focal areas for the mission, and subsequently invited approximately 3000 stakeholders from research and development, policy, industry and civil society to participate in a Delphi survey. The study and survey results were presented to the Mission Board on two occasions.

The results of the survey largely confirmed the challenges and lines of action proposed by the Mission Board. In particular, the results showed consensus on the need for recovery of the health of the ocean and waters and consensus about the need to adopt a holistic, ecosystem approach. The study concluded that the challenges related to the sustainability of the water cycle on earth are numerous and immense. They all require a higher level of knowledge,

technologies, funding, but moreover a better awareness of our responsibility to secure healthy waters, fresh or marine. The conceptual landscape embracing water ecosystems (including both oceanic and inland waters) is very fragmented and needs a holistic approach, calling for enhanced efforts in improving ocean literacy at all levels.

Emotional disconnect with the ocean: A Report for the EC Mission Board for Healthy Oceans, Seas, Coastal and Inland Waters, Emma McKinley, Rebecca Jefferson and Natalie Hart. February 2020.

At the request of the Board, the EC commissioned an analysis of Horizon 2020 projects relating to the 'emotional disconnect' of citizens vis-à-vis oceans, seas, coastal and inland waters, whose findings were twice presented to the Board.

The analysis highlighted the importance of understanding the narratives people hold towards the ocean, coasts and other aquatic environments, as they would provide insight into the values and meaning of these spaces, and could be harnessed to galvanise communities. To tackle this emotional disconnection it is important to use language and imagery that is relatable to citizens and engage with multiple actors, as visibility of action has the power to catalyse change in other groups. The analysis also highlighted the growing benefits of citizen science initiatives for both the citizens (in terms of well-being and environmental awareness) and the science community. Last but not least, the study emphasised the importance of understanding how the most vulnerable will be affected by the scale of social and economic change required to respond to the ecological and climate crisis and the need to enhance science-policy interface to allow social science to influence decision-making

5.2 Engagement with citizens and stakeholders

The Mission Board embarked on a number of citizens and stakeholders events throughout the scoping phase, with particular attention given to the engagement with citizens and youth. The results of these discussions have provided invaluable input to the deliberations of the Board and have shaped the scoping process. Continued engagement is foreseen over the summer 2020, as well as throughout the implementation of the mission.

Events supported by Members States

A number of Member States organised specific events for engagement of citizens and stakeholders for the Mission in which Board members participated. Spain organised a mission-dedicated session on the occasion of COP25 in Madrid and Austria an interactive mission café in Vienna in January 2020.

Inspired by the Swedish citizen engagement experience, members of the sub-group of the Horizon Europe Shadow Programme Committee from Denmark, Estonia, Finland, Poland, Sweden and Norway, in close collaboration with Board and Assembly members, have set up an informal working group for the organisation of surveys and citizen engagement activities in their respective countries. The survey will be launched at the end of May and will be followed by online co-design sessions in June. Furthermore, the Board has identified Ireland

and Romania for the organisation of the first two official citizen engagement events in June and July supported by a European Commission pilot service contract. The events will be organised in close cooperation with the respective Mission Board members and members of the sub-group of the Horizon Europe Shadow Programme Committee.

Additional youth or citizen engagement events in other Member States or Countries Associated to the Framework Programme will continue with the support of the Mission Board and the EC. In the meanwhile, a citizen survey was carried out in Italy and a stakeholder survey had been organised in Finland with the support of two Board Members.

Engagement with youth

Youth are also an important component in the mission's citizen engagement efforts, recognised through the organisation of two dedicated events:

- 17 April 2020: An online session of the European Youth Parliament, where one of the Board Members had an opportunity to engage with interested young people from across the continent in a discussion around marine pollution. The Youth Parliament proposed a resolution which was later submitted to the European Parliament;
- June 2020: virtual engagement event with the European Youth Forum, where young people from all over Europe will discuss around the main challenges identified by the Mission Board and present their proposals for the Mission.

Engagement with stakeholders

The Mission Board has participated in a number of stakeholders events in 2019 and 2020, which have provided input to the deliberations of the Board. To highlight a few, the Board has collectively met with a wide range of stakeholders during the 2019 Research and Innovation Days in Brussels, followed by an interactive discussion with stakeholders during the 2019 edition of the Paris Peace Forum.

Various interactions with the European Parliament (EP) took place, including the participation of Board Members in some events organised by the European Parliament, such as an event on 'Fostering knowledge on a sustainable ocean: what benefits for the EU?', one organised by the Parliament's Intergroup on Seas, Rivers, Islands and Coastal Areas (SEARICA) in February 2020 and a conference on 'Sustainable oceans for the future: a call for a green blue deal' which took place in March 2020. Due to the Covid-19 pandemic, a number of events in other European countries have been cancelled, others are being organised virtually. A comprehensive list can be found in appendix II.

The Horizon Europe Shadow Programme Committee sub-group on Healthy Oceans, Seas, Coastal and Inland Waters interacted with the Board on a number of occasions since the beginning of its work in September until the final phases of the scoping exercise.

The Board decided to go beyond the engagement with citizens and stakeholders and, during the first discussion with the sub-group of the Horizon Europe Shadow Programme Committee in 2019, enquired with national representatives the possibility to set-up informal National Contact Groups, to facilitate the interaction between the Board, the Assembly, the sub-group and national stakeholders. So far, a number of countries have created such informal groups, including Austria, Belgium, Finland, France, Ireland, Italy, Poland, Romania, Spain, Sweden and Norway. Official meetings between the so-called National Contact Groups and Members of the Board have been organised in Belgium and France.

The **Mission Assembly** has also provided feedback to the Board as the Chair has invited members to share written input on the scope of the mission around three guiding questions:

- *What would be a major challenge our oceans, seas, coasts and inland waters are facing that a mission could contribute to solve through research and innovation or other EU programmes?*
- *Why are these challenges so far removed from public perception and discourse and how could a mission best engage European citizens in tackling these?*
- *How should the mission be designed to create a European public good?*

Overall, the Mission Assembly identified – also thanks to proactive interactions with the Mission Board – very valuable input as the state of the oceans, seas, coastal and inland waters as well as the lack of awareness thereof, making a strong call for citizen engagement, bridging the need for a systemic approach with targeted approach. Moreover, Assembly members emphasised that citizen engagement and storytelling needs to be at the heart of the mission.

The Board put great effort in ensuring the inclusion of civil society, in particular **Non-Governmental Organisations (NGOs)**, and other civil society organisations and actors in the definition and implementation of the mission(s). This led to the creation of an NGO contact group (attended by WWF, Greenpeace, OceanUnite, Pew, Seas at Risk, to name a few) and the production of a survey.

The main takeaways from the survey were that NGOs were not sufficiently aware of the existence of the Mission but ready and willing to contribute. NGOs highlighted the fragmentation of the international community with regards to aquatic governance and were particularly focused on involving governments, businesses, NGOs and other stakeholders in the Mission design than on citizen engagement.

To provide further evidence to the work of the Board, the Board invited experts to present at Board meetings:

- Presentation by Emil Dediu of The Pew Charitable Trusts, November 2019.
- Presentation by Nathalie Rey of Ocean Unite, November 2019.
- Presentation by Monica Verbeek of Seas At Risk, December, 2019.
- Presentation by Rémi Gruet (Ocean Energy Europe) and Alexandre Affre (Business Europe), December 2019.
  Presentation by Vladimir Ryabinin (IOC UNESCO), January 2019

APPENDIX I – MAP OF ACTIVITIES

APPENDIX II – EVENTS

Event/Dialogue	Place	Date	Type of audience
Research and Innovation Days	Brussels, BE	24-26 September 2019	Member States sub-group, stakeholders
NTNU 4th European Conference	Brussels, BE	10 October 2019	Stakeholders
European Geosciences Union	Brussels, BE	17 October 2019	Stakeholders
Paris Peace Forum	Paris, FR	11-12 November 2019	Stakeholders
Fostering knowledge on a sustainable ocean: what benefits for the EU?	Brussels, BE	19 November 2019	European Parliament, stakeholders
Barcelona Convention COP 21	Naples, Italy	2-5 December 2019	Stakeholders
COP 25: Healthy Oceans, Seas, Coastal and Inland Waters mission debate	Madrid, Spain	11-12 December 2019	National Contact Group, Stakeholders
EuroMarine General Assembly	Piran, Slovenia	16-17 January 2020	Stakeholders
Mission Cafe	Vienna, AT	16 January 2020	Stakeholders
UN Decade of Ocean Science Regional Workshop for the Mediterranean	Venice, Italy	21-23 January 2020	Stakeholders
MAREVIVO Association – Assembly of Friuli-Venezia-Giulia delegation	Trieste, IT	24 January 2020	Stakeholders
Circular Economy conference	Parma, IT	25 January 2020	Stakeholders
Meeting of FR National Contact Group	Paris, FR	27 January 2020	National Contact Group
Meeting of BE national contact group	Brussels, BE	27 January 2020	National Contact Group

Sustainable oceans for the future: a call for a green blue deal", Renew Europe Conference	Brussels, BE	29 January 2020	European Parliament, stakeholders
Citizen Dialogue with Commissioner Gabriel	Sofia, BG	31 January 2020	Stakeholders
Meeting with IFREMER	Brest, FR	3 February 2020	Stakeholders
BlueInvest Annual Event	Brussels, BE	4 February 2020	Stakeholders
OceanAction! Conference, Seas at Risk	Brussels, BE	5 February 2020	Stakeholders
All Atlantic Ocean Research Forum	Brussels, BE	6-7 February 2020	Stakeholders
UKRI Horizon Europe Missions Networking	London, UK	14 February	Stakeholders
European Parliament SEARICA event: Mission Clean Oceans - How can science and innovation tackle ocean pollution?	Brussels, BE	17 February 2020	European Parliament, stakeholders
Ensemble, protéger la biodiversité marine, connaître pour agir	Paris, FR	12 March 2020	Stakeholders
European Youth Parliament - session on marine pollution	Virtual	17 April 2020	Youth
Helmholtz Association Networking	DE	26 May 2020	Stakeholders
Marevivo event – World Oceans Day	IT	8 June 2020	Stakeholders, citizens
Meeting of the French National Contact Group	FR	11 June 2020	Stakeholders, National representatives
Planned events (*list not exhaustive*)			
Breakfast with Member	DE	17 June 2020	National

Parliamentary Assembly – German Bundestag			representatives, stakeholders
Debate on the Healthy Oceans, Seas, Coastal and Inland Waters Mission (NO)	Virtual	23 June 2020	Stakeholders
Forum of the International Ocean Institute Directors	Virtual	23 June 2020	Stakeholders
Moby Litter launch in Italy	Virtual	26 June 2020	Stakeholders/citizens
Mission debate with the European Regions Research and Innovation Network	Virtual	June 2020	Stakeholders
European Youth Forum - Mission session	Virtual	1 July 2020	Youth
Co-design workshop in DK, EE, FI, SE, PL, NO	Virtual	July 2020	Citizen
Citizen engagement workshop, Romania	Virtual	2 July 2020	Citizen/stakeholder
Citizen engagement workshop, Ireland	Virtual	July 2020	Citizen
Forum de la Mer - Bizerte (Tunisia)	Virtual	15-16 July 2020	Stakeholders
Euroscience Open Forum, Trieste, (IT)	Virtual	September 2020	Stakeholders/citizen
European Research and Innovation Day in Brussels (BE)	Virtual	22-24 September 2020	Stakeholders, citizen engagement

APPENDIX III - CONTRIBUTION OF THE MISSION BOARD HEALTHY OCEANS, SEAS, COASTAL AND INLAND WATERS FOR INCLUSION IN THE STIMULUS PACKAGE

Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
1. Coastal and offshore energy production programme	✓ Increase coastal energy production by 200% from offshore renewable energy ✓ [X] islands powered by renewable energy and storage	Offshore turbine installations being grid connected. Port Facilities with increased capacity Multi-use platforms with aquaculture, marine observation, tourism, MPAs, grid connected Biomass in the EU energy mix Smart Grid / Storage integrated initiative **<u>Example A: Estimation from the Canary Islands</u>** The Canary Islands could allocate up to 30% (900 MW) of offshore wind energy by 2025, if the funding would be available. The number of jobs created could be increased using the same space and small increments in the investments by the	2021: 6bn EUR 2021-2025: 69bn EUR (51 billion EUR installations 12 billion EUR grids, 6 EUR billion ports) **<u>Estimation from the Canary Islands</u>** 3.6bn EUR (4MEUR/MW) The total effect on	**<u>Estimation from the Canary Islands</u>** Up to 7200 jobs in Spain (up to 6000 on

[22] Base year 2020

APPENDIX III - CONTRIBUTION OF THE MISSION BOARD HEALTHY OCEANS, SEAS, COASTAL AND INLAND WATERS FOR INCLUSION IN THE STIMULUS PACKAGE

Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
		multipurpose approach, but depending on the combined activities, the number of jobs could vary significantly (e.g. aquaculture requires more 10 times more jobs by Km2 than desalination plants, that could be operated almost automatically and technologies do not require a large job intensity in operations and maintenance). Multipurpose offshore approaches (either co-location or multiuse offshore platforms) are incubators for innovative concepts by design, the approach involves new business models, technologies, robotics, materials, communications or logistics in the maritime economy. The multipurpose approach drives a natural evolution by pushing the technological frontiers, but also creates innovative business concepts, innovating legislations and cross-fertilization among disciplines and sectors. The maritime sector will benefit from driving forces to introduce new technology and innovating at a faster speed and green deal	the Spain GDP would be over 3.4mEUR/MW during the entire life-cycle, i.e. up to 3.1bn EUR.	Canaries) The required investment should be creating around 4 jobs/MW (direct) plus 4 (indirect + induced) jobs by MW (total 8 jobs/MW) in Spain.

APPENDIX III - CONTRIBUTION OF THE MISSION BOARD HEALTHY OCEANS, SEAS, COASTAL AND INLAND WATERS FOR INCLUSION IN THE STIMULUS PACKAGE

<table>
<tr><th>Destination</th><th>Targets 2025[22]</th><th>Description of actions</th><th>Investment Needed 2021; 2021-2025 (5 years)</th><th>Jobs Creation Potential</th></tr>
<tr><td></td><td></td><td>outcomes, as a consequence of new

<u>Example B: Projection from IE: 2020-2030 Deployment of additional capacity:</u>
<table>
<tr><th>Technology</th><th>No of farms/ projects</th><th>No of units</th><th>Total Energy production</th></tr>
<tr><td>Fixed Wind</td><td>6</td><td>50</td><td>3.000 MW</td></tr>
<tr><td>Floating Wind</td><td>4</td><td>40</td><td>2.000 MW</td></tr>
<tr><td>Wave Energy</td><td>2</td><td>100</td><td>200MW</td></tr>
</table></td><td></td><td><u>Example B: Projection from IE: 2020-2030:</u>

Up to 60,000 (person-years) until 2030

FTE employment impact by 2030 is projected to be just over 7,000</td></tr>
</table>

APPENDIX III - CONTRIBUTION OF THE MISSION BOARD HEALTHY OCEANS, SEAS, COASTAL AND INLAND WATERS FOR INCLUSION IN THE STIMULUS PACKAGE

Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
2. Clean Vessel Programme	✓ 30% of propulsion engines for ferries and other short-sea shipping to be converted to renewable propulsion ✓ 10% fewer discharges from shipping, 10% fewer CO2 emissions, 20% less waste, 20% less oily residues and 10% less underwater noise ✓ 10 % of old small vessels (below 9 meters) dismantled and recycled	**1. Green Retrofitting of ferries and other short-sea shipping with renewable propulsion** **2. Create a dismantling and recycling site competitive environment for the disposal and dismantlement of older vessels below 9 metres.**	1. **Retrofitting renewable Propulsion** 2021: 200m EUR 2021-25: 1bn EUR **2. Dismantling and recycling** 2021: 24m EUR 2021-25: 120m EUR	
3. Zero-/Low-Carbon Aquaculture	✓ Increase by 100% the EU algae production (including macroalgae,	New sources of alternative zero/low carbon and low environmental impact rich protein, through innovative aquaculture	**1. Algae**: 2021: 50m EUR	**1. Algae**: 15,000 jobs

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
	microalgae and cyanobacteria such as spirulina) ✓ Increase by 20% the production of shellfish and other invertebrates ✓ 50% increase in the consumption of EU food produced from low-trophic aquaculture (including shellfish, other invertebrates and algae) ✓ 50% increase of use of raw materials from low trophic aquaculture (including waste streams) for other purposes (e.g. pharmaceuticals, cosmetics, nutraceuticals, etc.).	for food and feed Increase production and commercialisation of algae and shellfish and other invertebrates Promote and transform consumers acceptance of food based on low-trophic level aquaculture products targeting younger people with product development Facilitate access to EU markets and local consumption Setting up of pilot systems with different species in different environments integrating the new techniques	2021-2025: 200m EUR **2. Shellfish and invertebrates:** 2021: 50m EUR 2021-2025: 120mEUR **Total:** **320m EUR by 2025 of which 100m EUR in 2021**	**2.Shellfish and invertebrates:** 8,000 jobs **Total:** **23,000 jobs**

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
4. Water and waste water treatment/management	On track for full compliance with the Drinking Water Directive (DWD) and the Urban Waste Water Treatment Directive (UWWTD) by 2030 ✓ At least 80% (with longer term objective to reach 100 %) of wastewater and biosolids are recycled and are both carbon neutral, providers of alternative water resources and energy positive. Zero GHG direct emissions from waste water treatment processes (methane, nitrous dioxide…). ✓ Significant reduction <30% of water losses	Several EU countries do not comply with the Urban Waste Water Treatment and Drinking Water Directives (DWD). Some vulnerable groups or marginalised communities may not have access to safe drinking water. As regards urban wastewater collection and treatment, the secondary level of treatment remains an objective in some territories. The UWWTD also requests more stringent treatment in sensitive areas. Several countries, especially in rural communities, rely on Individual and other Appropriate sanitation Systems (IAS; for instance, sceptic tanks), and it is not always clear how the performance of such systems is monitored and compliance with the UWWTD is enforced. Another area of concern are combined sewer overflows and urban runoff. In times of climate change and recurring heavy rainfall events, the pollution from these sources becomes increasingly important to address.	According to a recent OECD/EC study (currently discussed at OECD EPOC), total cumulative additional expenditures by 2030 for water supply and sanitation amounts to EUR 289 billion for the EU Member States to comply with the DW and UWWT Directives and to enhance the efficiency of water supply systems. This would represent an average increase of	

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
	in distribution networks through infrastructure renovation (potable, non-potable, irrigation, dual networks, reclaimed water, etc.) using IT, robot and sensors for losses detection and innovative solutions to fix pipeline breaches. ✓ Increase reuse for irrigation and groundwater recharge of treated municipal wastewater by 50%, especially in coastal areas, where effluents are mostly lost to the sea. ✓ By 2025, 95% of urban waste water is subject to tertiary (advanced) treatment	Society would benefit from cleaner water, abatement of water pollution (water treatment facilities coping with pollutants of emerging concerns, in particular microplastics, chemicals and pharmaceuticals), reduced landfilling (sewage sludge treatment), increase resilience to climate change, increase energy-efficiency of water supply, protection of integrity of coastal aquifers and aquatic ecosystems, and more sustainable use of resources (water reclamation and reuse; resource recovery and reuse; sanitation and reuse; energy recovery and use). Therefore implement new knowledge and technology and rethink the design and functionality of the water management infrastructure, based on a truly inter-operable, intelligent and data-centric digital ecosystem, to achieve a climate resilient and carbon neutral water supply and sanitation sector. Management and operations to implement pollution	annual expenditures for water supply and sanitation by 45% in order to comply with the directives. **Investment needed to reduce water losses:** **Example Belgium:** Distribution losses (including leakage) amount to about 20%. The current renewal rate is below 0.5%. This is far too low if the lifetime of pipes is estimated at 50 years. A 2%	

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
	in designated coastal areas (100% by 2030).	reduction at source and low-cost nature-based solutions and multifunctional green infrastructure for improved wastewater treatment and reduction of risks of flooding and combined sewerage overflows (CSOs) would be part of the action.	renewal rate (of the 100,000 km distribution network) would cost 200,000 EUR/km = 400 million EUR/yr. **2021: 400m EUR** **2021-2025: 2bn EUR**	
5. Coastal Tourism Renovation Programme	✓ Redistribution of X% (at least20%) of tourists from overcrowded attractions (Venice, Barcelona, including insular and river deltas etc.) to smaller ones (such as…) and promote all year round use of	Coastal, river deltas and Islands tourism (including outermost regions) renovation programme based on decarbonisation, renovation thereby reducing by 20% the environmental footprint of European coastal tourism. Promote sustainable and efficient eco-tourism as a trend, especially among young people Stimulate local marine food supply based	520,000 EUR /fish market facilities (cost to construct facilities that enable fishers/farmers to sell to consumers) 7.4m EUR/ medium-sized port	

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
	those territories; ✓ Increase eco-tourism facilities by 20-25%, including 'locally grown' fish restaurants ✓ Appropriate facilities for fishers/aquaculture farmers that can support in the selling of fresh fish directly to consumers. ✓ Finance at least 20% of new arts & culture initiatives as an economic engine of regeneration and renovation. ✓ Support the transformation of 20% of existing camping facilities to eco-touristic ✓ Blue low carbon	on cooperation with the aquaculture sector to promote the concept of fishermen's restaurants, consume 'locally grown' and help reduce the sector's carbon footprint. Promote and finance local blue culture heritage & art as a means of dealing with difference within community, changing communities, as convenor across language and cultural barriers and intergenerational tensions; culture as a human right and community response to supporting culture, local and global community responses to Covid 19. Buildings renovation + decrease density, landscape regeneration, recovery coastal areas, reconstruction of sewage network in coastal area	(overall capital cost of installing electricity in ports (cold ironing technology) in medium-sized ports. Based on two case studies (e.g. Sweden and the UK): 4.7m EUR for the set-up of plastic bottle deposit scheme For water fountains: 48,000 EUR for the set up + 18,000 EUR/year for the	

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
	renovation wave of X% of EU infrastructures, ports buildings, marinas, tourism resorts [including energy efficiency, waste water treatment, food] ✓ Creation of green transport infrastructures for connection of coastal areas through EU waterways (blue belts) ✓ X% of electric sailing and speedboats in EU seas and rivers ✓ On shore side electricity stations for recharging vessels in X touristic harbours) ✓ Keep beaches clean		management	

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
	by implementing a plastic bottle deposit scheme ✓ Keep beaches clean by investing in water fountains.			
6. Blue Parks Programme	✓ Halt the net loss and actively restore 1% of EU degraded seabed habitats (i.e. 570 km2) through reforestation, rewilding and other ecological engineering as well as full ecosystem-based management. ✓ Invest in local communities to become co-manager of marine protected areas and ensure an effective protection	The Programme will halt the net loss and regenerate 50% of degraded marine habitats through reforestation, rewilding and other ecological engineering as well as full ecosystem-based management. The Programme will start will a Pilot Blue Recovery Nursery in 2021 that will work with local communities in regions most affected by the crisis, to protect coastline from further development and strict protection of all biodiversity hotspots and regeneration of coastal habitat-building and oxygen-producing species (such as seagrass meadows in the Mediterranean, kelp forests from Ireland to Portugal, river deltas, mangroves and other brackish water and coastal wetlands, coastal coral	€8-21bn EUR for restoration of 570 km2 degraded habitats (calculated on the basis that it costs approx. 140,000-370,000 EUR per ha of restored marine habitats, depending on local costs). Considerably less for simple protection	Active restoration of coastal and seabed habitats (will create around 15 – 30 jobs per 1m EUR invested), in particular for: - Kelp - Seagrass - Mussel beds - Oyster beds

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
	level in 30% of EU waters.	and oyster reefs, mussel beds, algae, etc.). The programme will demonstrate the blue carbon potential in the restoration of marine vegetation where large portions of the coastline have been lost to development, as well as in the expansion of macroalgae aquaculture and its full value chain. In addition to their carbon sequestration capacity, vegetated marine ecosystems provide coastal protection and sea level rise and flooding mitigation services, regulate water quality, provide critical habitat for many marine species including commercially important fishery targets, thus increasing catch potential, and enhance system biodiversity and resilience, and provide additional revenues through tourism and recreational activities. Thus, the protection and restoration will have multiple synergistic benefits. The Programme seek to involve each Member State to participate in at least one large-scale regeneration project with	1.2-3.5bn EUR (average cost of one site of 40 km2 per year is 90,000 EUR) for improved MPA management	

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
		citizen stewardship, and establish a European regeneration voluntary corps with branches in all European countries in order to contribute to the aim that in 2025, 30% of European waters designated as Marine Protected Areas (effectively enforced, equitably managed, ecologically representative and well-connected) with 10% under strict protection. **Example from Spain Cap de Creus, MPA:** **Projections 2010-2030** The combination of an alluvial plain, a coastline and mountainous areas over a relatively small surface area (13,854 hectares, of which 20% are coastal waters), provides this region with rich biodiversity (320 species counted, including 200 species of birds and 75% of all mammalian species found in Catalonia). A total investment of 65.5m EUR to		

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increase the protection over a period of 2010-2030 is projected to generate 3.5bn EUR in benefit.

		Scenario 1 Business as Usual	Scenario 2 Increased Protection
Benefits present value	Commercial fishing	6,785	6,547
	Recreational fishing	7,584	8,338
	Tourism	2,989,260	3,477,665
	Scuba diving	27,387	30,050
	CO_2 Stockage	11,878	11,977
	Total	**3,042,893**	**3,534,576**
Costs present value	Administration budget	26,316	64,675
	Surveillance expenses	2,074	1,171
	Total	**28,391**	**65,846**
Net present value		**3,014,502**	**3,468,730**
Rate of change from S1 and S2			15.1%

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
7. De-damming of rivers	✓ Restore 10-15% of surface water bodies in the EU suffering hydromorphological pressures ✓ Removal of 10-15% of obsolete dams in Europe by 2025, i.e. 6000-9000 dams;	The Programme will remove 6000-9000 obsolete dams (10-15%) across the European Union by 2025, thereby restoring rivers hydromorphology, improve biodiversity, ecological status, and recreational use of rivers. This will lead to a return to natural functioning for sediment dynamics and river wildlife at the entire river-sea system scale and ensure balance between sustainable hydropower generation and a healthy natural river environment. The Programme will involve local communities in dam removals and in the identification of recreational uses of rivers by removing river barriers. Actions: 1) Comprehensive mapping of all small and large dams in Europe; 2) Creation of a priority list for removals of obsolete dams; 3) removal obsolete dams + restoration river connectivity in	**3.5-4.5bn EUR**, (assuming that 75% of dam removals would be small projects at 50.000 EUR, 24% medium projects at 500.000 EUR and final 1% large projects at 10m EUR each)	7000-9000 jobs (if we assume that 50% is labour cost at 27-30 EUR/hour, 140 productive hours/month)

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
		other dams (migratory species, sediments) 4) Natural water retention measures: Re-meandering of rivers, Wetland/floodplain restoration, afforestation of uplands, etc. (http://nwrm.eu/) 5) Integration of dam removal into River Basin Management Plans; 6) Involvement of local communities in dam removals and identification of recreational uses of rivers by removing river barriers		
8. Plastics technology upscaling	✓ 1. Construction of 50 chemical recycling plants across the EU ✓ 2. Creation of virtuous integrated supply chain between agriculture and bio-waste, bringing organic carbon back to the soils and avoiding their	1. **Chemical recycling upscale** Chemical recycling is a novel technology that recycles plastic waste into basic chemicals that can be used for production of new plastics but also other products such as fuels, oils, etc. Unlike conventional mechanical recycling technology, chemical recycling can process many kinds of plastics and avoids degradation of quality of recycled	**1. Chemical recycling** Investment needs: 10bn EUR.	

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
	pollution, thus tackling the key issue of desertification	materials. If the capacity for processing increases substantially most of plastic waste can be processed and recycled in Europe. The EU export of plastic, especially low grade waste, will be significantly reduced and plastic littering will be avoided. **2. Integrated biodegradable bioplastics supply chain** The integration between the bioplastics sector and the organic waste collection is not only a virtuous example of circular economy, but will become a necessity given that, according to the Circular Economy Package, separate collection of bio-waste is set to be mandatory throughout Europe by 2023. The use of biodegradable and compostable bioplastics for those products that are more prone to be mixed with organic content would reduce the contamination of compost and increase the recyclability of specific items. In particular food packaging that are difficult to recycle, if realised in compostable bioplastics (even combined	**2.Biodegradable bioplastics supply chain** Investment needs by 2023: 1bn EUR	**2. Biodegradable bioplastics supply chain** Up to 105.000 jobs and 8,5 billion euro in turnover

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
		with paper) can be disposed of in the organic waste collection or in the paper recycling streams. This integrated supply chain between agriculture and bio-waste, allows to bring organic carbon back to the soils in the form of compost and to avoid their pollution, tackling the key issue of desertification and preserving this key non-renewable resource.		
9. Ocean Education and Culture Programme	✓ At least 50% increase in Ocean Literacy (OL), citizens science and engagement activities in EU ✓ Blue Schools in 10 coastal countries ✓ 25% Increase in media products on the subject ✓ 50% of workforce and 25% of universities incorporate education and activities based on data in programmes to train, reskill and	Creation of a pan-European Ocean Literacy network Provision of Ocean literacy activities / curricula for schools Labelling of Blue schools and awards based on projects completed Youth engagement on connecting Europeans citizens with ocean and waters and Ocean literacy activities Media campaigns and awareness raising actions which include citizens science	**2021: 50m EUR**	

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
	requalify ✓ X initiatives to be launched in all Member States to connect people to our ocean, seas, coasts, and inland waters, which include Blue solidarity corps, blue schools, curricula, teacher training, apprenticeships, and lifelong learning opportunities for all ages. ✓ Creation of a Blue ERASMUS-like programme, a Blue Passport for a Blue citizenship, ✓ Creation of a 'mission specific master programmes' etc. and enhanced Ocean Literacy mainstream	initiatives (e.g. Plastic Pirates Programme) Create/upskill a new blue workforce through a complete review of (blue/green) training and education provision for people of all ages (including a diversified skill and competences framework). This can be done by: ✓ Bringing together new and existing European Marine Universities and Departments, Marine Campuses, to coordinate, support and implement a coherent Europe-wide curriculum and develop harmonized goals for marine science. ✓ Enhancing at local level cooperation with universities, vocational education and training centres, chambers of commerce and innovative SMEs to develop new skills/competences frameworks focusing on	**2021-2025: 500m EUR** [this would need to be increased to also support different cultural and art activities, as outlined]	

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
	actions). ✓ X initiatives to be launched to re – and upskill people in Europe to fully equip them to underpin and take forward all the different actions presented in this outline (through informal and formal lifelong learning/training programmes). ✓ 20% of data collections comes from citizen's science initiatives ✓ X cultural events with a blue dimension (Museum, exhibitions, media campaigns, festivals, competitions etc.) to be organised in all Member States,	preservation and protection of marine biodiversity ocean and human health. This will increase employment opportunities for local and regional communities and alleviate challenges such as social exclusion and brain drain. ✓ Supporting the education and training to promote citizens science activities, including collection and monitoring of relevant 'blue' data. ✓ Working closer in all countries with existing network of science museums, aquariums, and cultural/art centres in general to add a 'blue dimension' to their overall art/culture and cultural heritage activities; Use local cultural traditions and art as a means of building local visions of new economies, social contracts and community identities led by local people;		

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
	starting with the most affected ones (virtually and physically from 2021 onwards. ✓ As of 2021 every country to organise a blue week every year with focus also on blue/water cultural heritage and Art.			
10. Digital Twin of the Ocean	✓ European digital twin pilot of European oceans and waters is operational (all available observation data is pooled in an open-source, real-time, easily accessible and understandable interface and matching application) by 2025. ✓ Establish digital platforms for science-	As a mainstream action we need to ensure that every citizen in Europe becomes 'a shareholder of the Mission' is fully involved in decision-making, becomes co-owner but also co-responsible for the success of the implementation and deliverables of the mission. Develop trusted (as it is) fit for purpose science data (map; Observation System; Modelling Capacity) for Predictive services to underpin all other elements (Nature Proofing Assurance) & bankable service products for the Insurance Industry and Investors (risk management). This will act	**2021:** **60m EUR** **2021-25:** **225m EUR**	

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	society interaction (e.g. real time/early warning applications) for purpose X. ✓ Bridge the major gaps in science observation and forecasting capacity to underpin & support the regeneration of the ocean and waters and track the pollution (plastics, nutrients, chemicals and contaminants) of EU oceans and waters in real-time. ✓ The North Atlantic Seabed is mapped in high-resolution ✓ X countries have a full functioning fit for purpose predictive capability and early warning systems in	as a key enabling intervention to underpin major economic recovery developments as well as provide the necessary information to monitor, observe and enable the actions on pollution, climate areas of priority and enduring sustainability credentials. The action will: • close the remaining gaps in observation and governance of marine science and Gaps related to predict extreme weather/events/sea level rise; • encourage and enable the infusion of 'non-scientific data streams' through citizens engaged data gathering, and through joint efforts from a community composed of users • make society aware of what we know and need to know to better understand the vital role oceans and seas play for our survival and of how the marine environment		

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Destination	Targets 2025[22]	Description of actions	Investment Needed 2021; 2021-2025 (5 years)	Jobs Creation Potential
	place ✓ X citizens have downloaded early warning apps, and co-manage the risks of extreme weather events ✓ EU oceans and waters in real-time. ✓ European marine and freshwater observation is streamlined: all data collected by EU MS is pooled centrally and made accessible to all. ✓ Fully sequenced X% of DNA of life in Seas / Waters in XY by 2025	functions and interrelates with human activities; • contribute to significantly increase the observation capacity of coastal and marine waters, the sharing, availability and visualisation of data, and its purposeful uses; • integrate existing European data, technology, infrastructures; • allow for fact-based decision-making and greater economic operators and citizen engagement towards healthy seas and oceans by enabling their understanding of the dynamics, interactions and evolution of seas and oceans and facilitate faster implementation of legal requirements (MSFD, WFD)		

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In this interim report, the Mission Board on Healthy Oceans, Seas, Coastal and Inland Waters propose a Mission to regenerate our ocean and waters by 2030.

Protecting and restoring our ocean and waters is one of the defining endeavours of our time, as human existence and all life on this planet depend on them. Decades of pollution and harmful uses have severely degraded their health. Climate change and ocean acidification come as additional pressures, with more and more measurable impacts.

By cleaning our marine and fresh waters, restoring their rich biodiversity and decarbonising our blue economy, the Mission aims at the full recovery and regeneration of European marine and freshwater ecosystems by 2030.

The proposed Mission will celebrate Europe's most precious resource – its life-giving waters; create a sense of awe and wonder around Europe's inland waters, coastlines, seas and ocean; champion new exploration through science, research and innovation, excite through the surprise of new discoveries and solutions; help citizens want to protect what they still have, and to recover what's been lost; lead citizens towards meaningful actions, demonstrating how small everyday choices can make big impacts; make the whole water system – from source to sink – an understandable, reliable and vitally relevant topic, thus creating the basis for delivering a common public good.

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