CCICED

SPECIAL POLICY REPORT

# Global Ocean Governance and Ecological Civilization

## *Ocean Into the Future - Seamap*

2021

September, 2021

# China Council for International Cooperation on Environment and Development

## Special Policy Studies on Global Ocean Governance

## *Ocean Into the Future*

## Seamap

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* The co-leaders and members of this SPS serve in their personal capacities. The views and opinions expressed in this SPS report are those of the individual experts participating in the SPS Team and do not represent those of their organizations and CCICED.

## CONTENT

## 1. THE OCEAN IN THE FRAMEWORK OF THE CCICED

The ocean is fundamentally important for humankind. The ocean is also vital for the world's economic development. However, a healthy ocean environment is a prerequisite for drawing on these direct and indirect benefits that the ocean provides—and the oceans and the ecosystem services they provide are under ever more serious threat than before.

China, like many other coastal nations, is facing the reality of seeing its own coastal seas declining in quality, caused by both terrestrial and marine development and activities, such as increasing discharge of terrestrial pollutants into the ocean, land reclamation, overfishing, pollutants from mariculture, and so on.

At the same time, global ocean conditions are being seriously affected by large-scale environmental pressures such as global warming, increased ocean acidification under a continuously higher atmospheric carbon dioxide level, microplastics pollution, and overexploitation of natural resources.

Clear and directed actions are needed to limit the threats and minimize the impacts to the oceans, and thereby lay the foundation for the oceans' ability to continue to serve as the basis of human life. Dedicated efforts are required to ensure the further development of current and emerging industries in a sustainable manner. The principle of ecosystem-based integrated ocean management needs to weave through ocean management like a red thread in order to achieve these goals.

CCICED is well placed, by drawing on both national and international experience and competence, to identify and highlight relevant policy actions that could be taken by China's administration to ensure healthy oceans domestically and to contribute to sustainable oceans globally.

The SPS for Ocean Governance and Ecological Civilization, in its first phase (2017–2020), focused its efforts on the central theme and concept of an integrated ecosystem-based marine management. In the context of this work, the SPS initiated work on a number of interlinked and relevant issues: integrated ocean management, marine living resources and biodiversity, marine pollution (plastics in particular), green maritime operations, renewable energy systems and mineral resource extraction. Climate change, technology, ocean economy, and gender issues were a common thread through the various themes.

The work of the SPS clearly demonstrated that now is the time for China and the world at large to ensure that the ocean environment plays a critical role in the national and international efforts toward developing an ecological civilization and securing our own future. **It also identified that there is a continued need to focus on ocean governance issues and, in particular, to further explore specific issues to provide a clear path forward.**

This current policy study on ocean governance concludes and recommends that:

- ***The CCICED should continue to take a proactive approach in providing advice to the Chinese Government to support a national effort to safeguard the health of the global oceans and the world's food supply by securing a sustainable ocean economy.***

- ***While all policy areas and topics that have been identified through this study are important and should be scrutinized further, it is suggested that CCICED in the next phase pay particular attention to the following topics:***

  ***(1) The ocean's role as a tool for carbon-neutrality goals***

  ***(2) Safeguarding the ocean's continued/growing role as a major source of food***

  ***(3) Ocean knowledge-supporting ocean management***

  ***(4) Marine tourism.***

- ***CCICED should note that the topics covered by the Ocean SPS favour cross-cutting connection/interaction with the River-Basin SPS and nature-based solutions (NbS) process, and that it would be beneficial to take this into account when organizing the work of the next phase of CCICED policy studies.***

## 2. INTERNATIONAL FRAMING OF FUTURE CCICED OCEAN EFFORTS

Over a period now there has been a rising societal awareness and understanding of the overarching global importance of the ocean system as a basis for civilization. As a result, there have been and continues to be several key global efforts and initiatives that provide a clear framework for global, regional, and national efforts. These processes could and should provide a solid basis for policy recommendations framing national and international ocean actions and engagement by China. While there are many relevant ongoing overarching and all-encompassing ocean undertakings, three key initiatives are highlighted here, noting their relevance in guiding development of future ocean policies.

The **UN Sustainable Development Goals**[1] are a universal call to action to end poverty, protect the planet and improve the lives and prospects of everyone, everywhere. The 17 Goals were adopted by all UN Member States in 2015 as part of the 2030 Agenda for Sustainable Development, which set out a 15-year plan to achieve the Goals. SDG 14 aims to sustainably manage and protect marine and coastal ecosystems from pollution, as well as address the impacts of ocean acidification. Enhancing conservation and the sustainable use of ocean-based resources through international law is also aimed to help mitigate some of the challenges facing the global oceans.

The **High Level Panel for a Sustainable Ocean Economy**[2] has consisted of a unique group of world leaders from around the globe committed to developing, catalyzing, and supporting solutions for ocean health and wealth in policy, governance, technology, and finance. The objective of the High Level Panel has been to build a new, shared understanding of the current and potential future state of ocean economy and ecology, and generate a set of policy, governance, technology, and investment solutions aimed at catalyzing a truly sustainable ocean economy. The Panel delivered its report at the end of 2020, putting forth a transformative set of recommendations and actions to advance a sustainable ocean economy, prioritizing a healthy ocean alongside sustainable production to benefit people everywhere. The Panel emphasized that sound management of marine resources will allow the oceans to sustainably yield greater benefits for society but also noted that—while investments in the protection of the marine environment and the development of ocean industries often have significant economic benefits—it will require incentives and a good framework. A cornerstone of the Ocean Panel's recommendations is that coastal states aim to sustainably manage 100 % of the ocean area under national jurisdictions, guided by Sustainable Ocean Plans, by 2025. The Ocean Panel's final report identifies five key areas of transformation:

- **Ocean Wealth**, stressing the need to ensure that the ocean can continue to produce sustainably for future generations, be it sustainable ocean food,

[1] https://sdgs.un.org/goals
[2] https://www.oceanpanel.org/

sustainable ocean energy, sustainable ocean-based tourism, sustainable ocean transport or otherwise.

- **Ocean Health**, underscoring that the global community must act urgently to reduce greenhouse gas emissions, prevent biodiversity loss, restore and protect coastal and marine ecosystems, reduce pollution and take a precautionary approach to economic activity on the ocean floor.

- **Ocean Equity**, where a sustainable ocean economy puts people at its centre, works for everyone, enables human rights, facilitates the equitable distribution of ocean wealth, and ensures equality of opportunity for all.

- **Ocean Knowledge**, in which it is it stressed that we need to build literacy and skills, and share and apply knowledge of how ocean ecosystems work, and how they respond to stressors to better inform decision making, and furthermore underscoring that accounting that captures the full value of ocean assets and the ocean economy is critical to guiding the sustainable development of ocean industries.

- **Ocean Finance**, ensuring that access to finance is equitable and supports sustainability, recognizing the needs of developing countries, particularly Small Island Developing States and Least Developed Countries and furthermore noting that public sector finance can help unlock private sector financing.

The Ocean Panel will now be developed into a broader international partnership, and more countries and partners will be invited to join forces to implement the Panel's action agenda.

The **UN Decade of Ocean Science for Sustainable Development 2021–2030**[3] (the Ocean Decade) aims to provide an international framework for continued focus on research and innovation in ensuring better use of the oceans and ocean resources. This is fundamental for reaching the targets set for UN SDG Goal 14, for reaching the goals and implementing the actions recommended by the Ocean Panel, and to support other global, regional, and national ocean governance efforts. The vision of the Ocean Decade is "the science we need for the ocean we want." The Ocean Decade—which started on January 1, 2021—provides a convening framework for scientists and stakeholders from diverse sectors to develop the scientific knowledge and the partnerships needed to accelerate and harness advances in ocean science to achieve a better understanding of the ocean system and deliver science-based solutions to achieve the 2030 Agenda for sustainable development. The UN General Assembly mandated UNESCO's Intergovernmental Oceanographic Commission (IOC – UNESCO) to coordinate the preparations and implementation of the Ocean Decade.

The Ocean Decade aims to turn the scientific knowledge and understanding of the oceans into effective actions supporting improved ocean management, stewardship, and sustainable development, procuring the following societal benefits:

[3] https://www.oceandecade.org/

- **A clean ocean** whereby sources of pollution are identified, quantified, and reduced, and pollutants removed.

- **A healthy and resilient ocean** whereby marine ecosystems are mapped and protected, multiple impacts (including climate change) are measured and reduced, and provision of ocean ecosystem services is maintained.

- **A predicted ocean** whereby society has the capacity to understand current and future ocean conditions, forecast their change and impact on human well-being and livelihoods.

- **A safe ocean** whereby human communities are protected from ocean hazards and where safety of operations at sea and on the coast is ensured.

- **A sustainably harvested and productive ocean** ensuring the provision of food supply and alternative livelihoods.

- **A transparent and accessible ocean** whereby all nations, stakeholders and citizens have access to ocean data and information, technologies, and have the capacities to inform their decisions.

- **An inspiring and engaging ocean** where society understands and values the ocean**.**

## 3. IDENTIFYING AND PRIORITIZING OCEAN ISSUES FOR THE FUTURE

The SPS for Ocean Governance and Ecological Civilization, in the first phase of its work, addressed several key aspects and provided a suite of policy recommendations in key areas. However, the SPS also emphasized that ocean studies need to continue within the framework of CCICED to fully reflect the importance of the ocean to society, and in particular, to China's national strategy of revitalizing the blue economy and reaching carbon neutrality. Already during the initial work, a number of relevant issues that seemed to merit further consideration were identified.

Consequently, the second phase of the Ocean SPS has focused on the two most pressing issues that have the greatest impact on the coastal marine ecosystems in China, namely Loss of Marine Living Resource and Biodiversity, and Marine Pollution.

As a major global marine fishery country, China has played an important role in promoting industrial development and maintaining world food security; on the other hand, it also shoulders a major responsibility in protecting the marine ecological environment, conserving fishery resources, and ensuring the sustainable development of the fisheries industry. Due to continuous overfishing for decades, as well as the alarming loss of coastal wetlands as important habitats for many fish species, China's coastal fishery resources have severely declined. In recent years, China has continuously improved and perfected its fisheries policy, and has continuously explored more effective management policies and modes in terms of fishing capacity control, attempts to promote quota fishing management, and the development of green aquaculture. These attempts are positive and beneficial, and have achieved certain results and experience. However, China's marine fisheries have a huge volume and a large number of employees, involving a complex and diversified range of fishery operations, fishing species, and fishing waters, which prove to be highly challenging to manage and regulate. The current management systems and mechanisms, measures, and strategies still need improvement. The full analysis conducted on this topic is contained in the report from the expert task force which was established for this purpose. Their report[4] is put forward as a supporting document to this report, while the key recommendations identified through the analysis are incorporated as recommendations for further work in this ocean futures report.

A healthy ocean is the premise and foundation of a healthy China and is the "Blue Road" to a carbon-neutral future. Over the past 40 years of reform and opening up, China's economy has made remarkable achievements, but the rapid economic and social development has brought tremendous pressure and impact on the coastal and offshore marine ecosystems, resulting in a large number of pollutants entering the marine environment, causing a series of ecological problems such as increased eutrophication, deterioration of environmental quality and ecological service

[4] China Council for International Cooperation on Environment and Development (CCICED). Special Policy Study on Global Ocean Governance and Ecological Civilization (2020-2021). Task Team 1: Establishing China's sustainable fisheries policy – Final Report (2021).

function. Eutrophication caused by nutrient pollution is undoubtedly the most prominent marine pollution problem in China's offshore, resulting in many ecological disasters such as harmful algal blooms and hypoxia. Emerging environmental problems (such as marine debris and microplastics), which are generally persistent, bio-accumulative, and toxic, are also gradually emerging in China's coastal waters as a result of their entry into the sea. Marine pollution is a common problem and challenge worldwide, and an environmental priority for China. The full analysis conducted on this topic is contained in the report from the expert task force established for this purpose. Its report[5] is put forward as a supporting document to this report, while the key recommendations identified through the analysis are incorporated as recommendations for further work in this ocean futures report.

In addition to the focus on these two priority topics, it was considered desirable, in this final stage of the current SPS, to develop a seamap for "ocean into the future"—in essence pointing out directions for the CCICED to focus its work in areas where China should pay special attention with regard to ocean issues in the future. As part of this effort the SPS team engaged with stakeholders through a suite of scoping and dialogue meetings where relevant experts from other CCICED SPSs and externally have been invited to discuss and suggest what and how ocean issues can and should be taken further in the next 5-year period of CCICED.

[5] China Council for International Cooperation on Environment and Development (CCICED). Special Policy Study on Global Ocean Governance and Ecological Civilization (2020–2021). Task Team 2: Marine Pollution (2021)

# 4. SEAMAP FOR THE OCEAN FUTURE

The Seamap for Future Ocean Work in the CCICED has been organized around the seven societal needs identified as the motivation for the Ocean Decade (see Chapter 2), preceded by an identification of ocean actions that may contribute to select key overarching policy areas in the current priorities of the Chinese government.

**The list of topics included under the various policy areas is not exhaustive, but rather reflects topics that have been flagged during discussions with various stakeholders. The descriptions provided for the different topics are neither comprehensive nor detailed, but are rather provided to give an indication of potential directions for future policy relevant discussions.**

**Furthermore, it should be recognized that the various policy areas and topics listed are to a large degree interlinked with and connected to each other and could easily be cross-listed throughout this seamap.**

**Finally, the suite of policy areas and topics contained in this seamap connect to a number of policy areas already under consideration and discussion by existing CCICED Special Policy Studies or can easily be incorporated as relevant items in upcoming and future CCICED Special Policy Studies (in particular any SPS looking at river basis issues or NbS). Some items might best be kept in the context of a separate ocean study. Regardless of approach, it will be important to ensure an appropriate interaction between relevant policy studies with respect to the ocean relevant aspects of their scope.**

## 4.0. The Ocean's Contributions to Key Overarching Policy Areas

**POLICY AREA 1: Policy actions utilizing the ocean's role as a tool for the carbon-neutrality goal**

The ocean plays a fundamental role in mitigating climate change by serving as a major heat and carbon sink. Coastal ecosystems like mangroves, salt marshes, seagrass beds and tidal flats play a vital role in carbon storage and sequestration. Per unit of area, they sequester carbon dioxide ($CO_2$) faster and far more efficiently than terrestrial forests. When these ecosystems are degraded, lost, or converted, massive amounts of $CO_2$ are released into the atmosphere or ocean, adding to the atmospheric greenhouse gas increase and the acidification of the oceans. Coastal ecosystems like these are often referred to as "Blue forests" (or "blue carbon")

ecosystems. These ecosystems are also vitally important to coastal and island communities around the world through the many important ecosystem services they provide. Developing active policy actions utilizing this knowledge will be an important contribution toward reaching China's aim to have $CO_2$ emissions peak before 2030 and achieve carbon neutrality before 2060. To this end, it will also be important to educate the public and raise awareness about the ocean's role as a tool for the carbon-neutrality goal.

In developing climate policies, it could be important to take into account the ocean-related opportunities offered by such things as:

- **Safeguarding and rebuilding "Blue forests" for $CO_2$ capturing through NbS[6])**. Restoring mangroves, seagrass beds, tidal marshes, and tidal flats and other key coastal ecosystems means reducing the pressure on those ecosystems so that they can recover, both naturally and by reseeding or transplanting key species. It also means understanding how to make both ecosystems and communities more resilient in the face of global change. In this context, it is relevant to note the recommendation from the CCICED Sub-Committee on NbS, which suggests conducting a CCICED analysis to identify a comprehensive list of eligible economic sectors, ecosystem services, and geographic regions with promising NbS opportunities, including agriculture, infrastructure, and resource extraction, where ocean opportunities should also be included. NbS represent another way of looking at ecosystem-based management.

- **Utilizing the Emission Trading Scheme (ETS)**. China's national ETS allows up to 5% of offset through the China Certificated Emission Reduction (CCER), providing new opportunities to finance coastal NbS projects (the so-called co-benefit market participants of the carbon market).

- **Consider the potential of ocean-based $CO_2$ capture and storage (CCS).** CCS is a technology that is used to stop large amounts of $CO_2$ from being released into the atmosphere, by separating it from emissions and injecting it into geological formations. Storage must be safe, environmentally sustainable, and cost-effective. The ocean can potentially offer suitable storage opportunities. Other means of capturing $CO_2$, like biomass draining (i.e., biomass that sinks down to the sea floor and is captured at depth) could be explored.

- **Carbon capture and reuse**. There are ongoing efforts to develop solutions that capture carbon emissions and reuse them as a raw material. Production of $CO_2$-based bioplastics, fuel, and even rock and carbon fibre, has been tested. It may be relevant to explore opportunities in which carbon emissions are captured from ocean-based industries and/or to are reutilized for ocean-based industries (e.g., aquaculture-based production).

[6] Actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits (IUCN).

- **$CO_2$ avoidance through increased use of ocean renewable energy (ORE)**. Ocean-based renewable energy—such as offshore wind, floating solar, tidal, and wave power—can meet a fairly high portion of the annual greenhouse gas emission reductions desired by 2050. Most of this climate change mitigation potential is expected to come from offshore wind. ORE technologies offer opportunities for China to develop a new blue economy, create jobs, and take advantage of opportunities within its competency to global markets. The SPS Ocean Governance, through its specific study on offshore renewables[7] has identified a number of recommendations in this area that could merit further consideration.

The following CCICED Special Policy Studies are particularly relevant in the context of this policy area: *SPS Climate*, *SPS Green Technology*.

**POLICY AREA 2: Policy actions utilizing the ocean's role as climate regulator**

The oceans regulate the global climate; they mediate temperature and drive the weather, determining rainfall, droughts, and floods. They are also the world's largest store of carbon. There are two important aspects: the risk that carbon emissions and warming have for the oceans and the solutions that the ocean can provide for climate change mitigation. The narrative that the ocean is part of the solution, rather than the victim of climate change, is important.

Looking to *quantify* the effect of measures' contribution to the Paris Agreement could be a useful contribution to lay the foundation for future policy actions, for example looking at the effects of specific marine protected areas (MPA) as case studies. For this purpose, it could be relevant to use the approach taken by the High Level Panel for a Sustainable Ocean Economy (see Chapter 2) in their report *The Ocean as a Solution to Climate Change: Five Opportunities for Action*[8] as a starting point for a similar approach in selected MPAs in China. The five opportunities in this case are ocean-based renewable energy (primarily wind); ocean-based transport ("green shipping"); coastal and marine ecosystems; fisheries, aquaculture, and dietary shifts (from meat to seafood); and carbon storage in seabeds (noting here the overlap with the carbon-neutrality policy area describe above).

In conducting such a case study, it could be relevant to consider and take into account such things as:

- What and how the five opportunities identified above can be implemented domestically, and how this can give China an opportunity to help with equity in developing countries.

[7] China Council for International Cooperation on Environment and Development (CCICED) Special Policy Study on Global Ocean Governance and Ecological Civilization. CCICED Task Force Report Offshore Renewable (2020) (https://cciced.eco/wp-content/uploads/2020/09/2021-SPS-Ocean-TT5-Final-Report-English.pdf)

[8] http://live-oceanpanel.pantheonsite.io/sites/default/files/2019-10/19_4PAGER_HLP_web.pdf

The following CCICED Special Policy Studies are particularly relevant in the context of this policy area: *SPS Climate*, *SPS Green Technology*, *SPS Biodiversity*.

### 4.1. A Clean Ocean

Human activities are increasingly polluting the local and, subsequently, the global environment. Coastal marine pollution is one of the main environmental challenges of recent decades, so its prevention and control is a key objective. Even though the oceans are vast and seemingly able to process any amount of input, the cumulative effect of various types of pollution has tangible impacts on the marine environment. The most challenging ocean pollutants include agricultural fertilizers; untreated wastewater; invasive species; and micro- and macro-plastics. The relationship between upstream pressures and downstream effects highlights the importance of coordinating efforts on the management of freshwater and oceans. A "source-to-sea" approach is crucial to addressing land-based activities and pollution.

Relevant policy areas for CCICED consideration include:

**POLICY AREA 3: Policy actions to reduce terrestrial transportation of pollutants to the sea – connecting land, river, and ocean management to support a clean ocean**

Over the past two centuries, with the increase of global population, human needs are also increasing: in order to meet the requirements of the necessities of life, industry and agriculture are developing rapidly, and a large number of industrial and agricultural wastes (along with domestic garbage) are discharged into the environment. The cost is the serious degradation of important parts of the earth, including many marine environments, especially coastal areas. Although production and emissions are largely land-based, the marine environment is the ultimate recipient of human-made pollution. In addition to the well-known problem of eutrophication caused by excessive input of terrestrial nutrients, the growing global pollution of plastics is another example of this land–sea interaction.

Developing active policy actions to counter these ocean-related challenges will be important to safeguard both human and ocean health.

In developing policies in this area, it could be relevant to include in future policy research consideration of (among other things):

- **Runoff of nutrients**. The main pollutants in China's coastal waters are inorganic nitrogen and active phosphate due to the excessive input of land-based nutrients into the sea, which leads to the eutrophication of China's coastal waters. Policies and strategies that encourage and enforce practices reducing runoff (from agricultural activities, for example) may be relevant to consider further.

- **Establish a sound marine environmental protection framework**. Strengthening the organization and implementation of the fight against pollution will provide an opportunity to further improve the central coordination and clarify the responsibilities of provinces, cities and counties in implementing marine ecological environmental protection mechanisms.

- **Integrated water management at basin level**. Much land-based pollution ends up in the river systems and is carried on to the ocean. Basin-wide integrated governance provides opportunities to promote land–ocean coordination with respect to pollution of coastal marine areas. Further efforts to harmonize/align initiatives (including legal measures and governance) on land and at sea are also relevant in this regard. In this context, consideration could be given to promoting the formation of a joint prevention and control mechanism for ecological environmental protection in watersheds, estuaries, and nearshore waters. It is also recommended to further consider how to enact an improved and integrated land and sea ecological and environmental monitoring system.

- **Improve waste management systems on land**. Waste management is a complex task. It has a multidimensional focus to address—social, environmental, financial, and technical. Institutional capacity and financial management, transparency, and accountability of the system, public attitude and awareness, strong political will, and commitment all play a role in ensuring an efficient waste management system. The attention to and improvement of weaknesses in the system will have repercussions for waste entering the ocean through, for example, atmospheric and river transport.

- **Reducing waste reaching the ocean through a focus on gender issues**. How can coastal marine pollution be prevented and controlled with careful consideration for gender equality and human rights issues? Women are major consumers and users of plastic goods. They are also disproportionately affected by plastic pollution. As such, they may be exposed to greater risks, but they can also act as important agents of change when it comes to preventing and controlling marine plastic pollution, including in the areas of responsible consumption and waste disposal practices.

- **Establish and improve a joint science and technology research mechanism**. There is a need to enhance the scientific knowledge of marine pollution problems, and consideration should be given to how to strengthen the major national science and technology projects on key sea areas to fight the battle of pollution prevention and control of the scientific and technological support role. Sea-related universities, research institutes, and other joint scientific and technological research cooperation to accelerate the solution of technology bottlenecks and other difficult issues.

The following CCICED Special Policy Studies are particularly relevant in the context of this policy area: *SPS River-basin*, *SPS Green Urbanization*, *SPS Green transformation*.

## POLICY AREA 4: Global control of plastic and microplastic pollution

In recent years, the research on visible plastics, microplastics and nanoplastics, antibiotics and other new pollutants has increased dramatically. Micro- and nanoplastics are persistent in the marine ecosystem and due to their micron sized particle nature, these fragments are mistaken as food and ingested by a range of marine biota which includes coral, phytoplankton, zooplankton, sea urchins, lobsters, fish etc. and ultimately get transferred to higher tropic levels. Marine litter and microplastic pollution have become one of the world's high-level environmental issues with far-reaching impacts. The problem involves the management of the marine ecological environment as well as the economic behaviour of terrestrial plastics and waste management. Marine litter and microplastics not only come from land-based waste management systems and riverine input, but also come from a wide range of sources including discarded fishing gear, mariculture, and surreptitious discharge at sea. At the same time, a large number of studies have shown that marine plastic and microplastic pollution directly or indirectly affects the safety of marine biodiversity, fisheries resources, tourism, and shipping. Therefore, global governance of marine litter and microplastics pollution should be one of the themes of special concern, to support China's continued dominance on this issue, and to fight for the right to speak in future potential negotiations.

In developing policies in this area, it could be relevant to include in future policy research consideration of such things as:

- **Strengthen the source control of marine plastic and microplastic pollution.** Various regions and countries around the world have launched a series of land–sea plastic governance policies and actions. The United Nations Environment Assembly has even called for the establishment of a new convention on marine litter and microplastic pollution and will decide whether to start the negotiation agenda at the UNEA5.2 meeting next year.[9] In recent years, China has done a lot of work on land-based plastic pollution control and treatment, marine plastic/microplastic monitoring, and methodological research. There is a need to consider how to further strengthen the source control of marine plastic and microplastic pollution, improve waste management and disposal capacity, promote the recycling level of plastic waste, and vigorously develop plastic recycling economy.

- **Improve waste management and disposal capabilities**. Strengthen technological innovation, improve the ability to reduce, harmlessly treat and recycle plastic waste, accelerate the construction of waste recycling and management infrastructure; promote the pilot of zero plastic discharge in coastal areas, coordinate river basin-wide actions, build garbage recycling infrastructure, and raise public awareness; link the zero-plastic goal to the broader carbon-neutrality goals.

[9] http://plasticdeclaration.aosis.org/

The following CCICED Special Policy Studies are particularly relevant in the context of this policy area: *SPS River-basin*, *SPS Green Urbanization*, *SPS Green transformation*.

**POLICY AREA 5: Policy actions to combat the accumulation of legacy infrastructure and ghost gear**

Decommissioned and abandoned oil and gas infrastructure (legacy infrastructure) can pose threats to local environment, as can other upcoming ocean infrastructures such as wind farms, seabed mining etc. A strong regulatory foundation for end-of-life handling of such infrastructure is required to minimize impacts on the ocean environment and ecosystems. Derelict fishing gear ("ghost gear") refers to any discarded, lost, or abandoned fishing gear in the marine environment. This gear continues to fish and trap animals, entangle and potentially kill marine life, and smother habitat. Derelict fishing gear is one of the main types of debris affecting the marine environment today. Developing active policy actions to minimize the potential negative impacts of legacy activities on the ocean environment will be important.

In developing policies in this area, it could be relevant to include in future policy research consideration of such things as:

- **Framing legacy infrastructure ambitions.** In China, a large number of oil and gas wells are expected to become uneconomical within a decade or two. It will be important to determine the ambition for decommissioning performance, including the goal for reducing abandonment, uniform standards for capping wells, the need for ongoing, real-time monitoring, and the role of marine liability, compensation, and dedicated clean-up financing before site closure. This issue is also relevant in the context of framing infrastructure initiatives along the ocean path of the Belt and Road Initiative (BRI). Furthermore, consider financial mechanisms that enable the implementation of the ambitions.

- **Financial incentives and technical initiatives to reduce ghost gear**. Before considering specific policies for the management of ghost fishing gear, it is necessary to conduct a scientific and systematic baseline survey to understand the actual situation and distribution area of ghost fishing gear in China. Financial instruments/mechanisms that would encourage waste retrieval, such as paid recycling of waste fishing nets, may be relevant to consider. Furthermore, consider if and how to implement tracking systems (chips in fishing gear/equipment) to monitor for follow-up actions.

The following CCICED Special Policy Studies are particularly relevant in the context of this policy area: *SPS Green Finance, SPS BRI*.

### 4.2. A Healthy and Resilient Ocean

For oceans, seas, and marine resources to successfully contribute to human well-being, ecosystem integrity, with properly functioning biogeochemical and physical processes, is required. This does not require unperturbed systems, but systems that have not suffered serious or irreversible harm. Marine ecosystem degradation has greatly accelerated during the last five decades due to the multitude of stressors affecting the ocean. All nations will benefit from a healthy and resilient ocean and from preserving its capacity to deliver food, income, support transportation and many other elements of sustainable development.

Relevant policy areas for CCICED consideration include:

**POLICY AREA 6: Policy actions promoting a Blue Economy supporting a healthy ocean**

Both ships and ports contribute heavily to $CO_2$ emissions and to the larger climate issue, while they also present additional pollution challenges. Pollution from ships and platforms includes release of oil, fuel, plastic, and human waste. Ships also cause noise pollution, disrupting the balance of life for marine animals. The fisheries have the potential to impact the marine environment in several ways in addition to pollution, including overfishing, habitat destruction and by-catch. Both shipping and the fishery industry have the potential to be pathways for the introduction of non-native species. Ports contribute to local water pollution, including widespread contamination of sediments. The emerging seabed mining industry has the potential to become a major source of pollution. Sulfide deposits created when these substances are drilled can have environmental impacts that are not fully understood. Material leaks and corrosion of equipment exacerbate the problem.

Greening the maritime industries is an attempt to attain an acceptable environmental performance in the maritime industries while at the same time respecting traditional economic performance criteria. Moving in this direction will substantially increase the industries' ability to contribute to a healthy ocean environment.

A combination of legislation, consumer demand, and economic incentives from financiers stimulate integration of environmental and social responsibility into the development of ocean industries. Governments may play a crucial role in both providing a regulatory context and in creating incentives for inducing a change toward a green blue economy.

Opportunities lie in promoting policies that encourage the development of green maritime industries, both nationally and internationally. It seems particularly relevant to consider how looking within this policy area reveals opportunities to promote a Green Ocean BRI and build capacity enabling export green solutions to the maritime industries of the world.

In developing policies in this area, it could be relevant to include in future policy research consideration of such things as:

- **Arctic green shipping**. In 2018 the Chinese Government established the concept of the Polar Silk Road, integrated and aligned with the BRI. Chinese companies are encouraged to invest in building infrastructure along the routes and conduct commercial trial voyages to gauge feasibility. At the same time, it is well-established that the Arctic Ocean is unique and vulnerable. Arctic seas hold a multitude of unique life forms highly adapted in their life history, ecology, and physiology to the extreme and seasonal conditions of this environment. Maritime operations in the Arctic are exposed to numerous risks, associated with such things as the cold climate, ice and icing, darkness, and atmospheric communication and navigation disturbances, and through this carry potential risks to the environment. New and additional risks may arise when these operations expand in scope, particularly when they move into new uncharted areas. The importance of ensuring green operations with the highest standards available to minimize risks and limit impacts on this environment is crucial.

- **Best practices and policy frameworks for green ports and green shipping**. Relevant in this regard are technical and logistical solutions, legal frameworks, ports in areas of high ocean value (environmental values), ocean-land interactions securing green/sustainable supply chains in ports, etc. The SPS Ocean Governance, through its specific study on green maritime operations[10] has identified a number of recommendations in this area that could merit further consideration.

- **Best practices and policy frameworks for ocean renewable energy (ORE)**. The projected expansion of energy activities at sea raises reasonable concerns about their impact on the oceans. Marine renewable energy generation had been regarded as benign to the marine environment. Nonetheless, the projected expansion of the marine renewable industry has recently drawn the attention of scientists concerning their potential effects, including noise pollution, the alteration of electromagnetic fields, changes in water quality and disturbance of the habitat structure of fish, mammals, and birds or even their deaths. In developing a national policy for ORE as part of national energy strategy it will be important to draw on lessons learned about the environmental aspects of such technologies around the world.

- **Sustainable ocean-based tourism**. Healthy marine and coastal ecosystems are vital to a thriving tourist economy. However, as the economic and tourism value of the marine environment increases, so does the pressure on the natural resources on which it depends. The tourism industry will need to move toward encompassing sustainability at its core. There is also room to consider how

[10] China Council for International Cooperation on Environment and Development (CCICED) Special Policy Study on Global Ocean Governance and Ecological Civilization. Topic 4: Green Maritime Operations (2020) (https://cciced.eco/wp-content/uploads/2020/12/cciced-2020-en-tt4-green-maritime-operations.pdf)

tourism can engage with conservation initiatives (e.g., through active participation in concrete initiatives, financial support, communication).

- **Adoption of innovative sustainable investment approaches.** Riding on the blue economy development trend in China, it is a good opportunity to leverage financial tools to both speed up the adjustment of the marine industry structure and transform the businesses with sustainable profits. It will also support restoration and the protection of natural habitats while improving local community livelihoods.

- **Promoting carbon trade credit in ocean industries.** Because of its large fuel consumption, the carbon footprint of the marine industry (shipping and fisheries in particular) is significant. Carbon trading in the maritime industry allows shipping companies to bear their share of environmental responsibility.

- **Spearheading new technologies in ocean industries**. Greening the ocean industries provides opportunities to encourage technological innovations in aquaculture (e.g., offshore, closed systems), fisheries (e.g., large-scale cages for wild fish capture, sensors, etc.), renewable energy, ship design and performance, etc.

- **Women's role in greening the blue economy.** Women are often excluded and underestimated in the blue economy. They are often found as part of the informal blue economy, and infrequently thought of as leaders and innovators. It may be fruitful to consider what role women can play in promoting a sustainable blue economy and how their participation in decision making can be strengthened.

The following CCICED Special Policy Studies are particularly relevant in the context of this policy area: *SPS Green Technology*, *SPS BRI*, *SPS Green Finance*.

**POLICY AREA 7: Policy actions safeguarding the ocean's continued/growing role as a major source of food**

The ocean plays an important role in global food provision and has the potential to play a much more significant role. The potential for increased production and consumption of food from the sea will depend on physical factors, policy, technology, and institutions. Ocean, climate, and biodiversity are connected issues where the core issue is food—the one issue cannot be seen independent of the others. Opportunities lie in promoting policies that take these aspects into account both nationally and internationally. It seems particularly relevant to consider how this policy area presents opportunities to build policies that would encourage safeguarding the ocean's food value in the context of investment initiatives in the international sphere, such as along the Ocean BRI.

In developing policies in this area, it could be relevant to include in future policy research consideration of such things as:

- **Framing a sustainable marine food industry**. Sustainability in the catch fisheries and aquaculture systems is a key issue for the oceans' ability to provide a solution to global food challenges. The challenge of overfishing needs to be overcome. Also, full utilization of the biomass sustainably should be aimed for.

- **Spatial management and protection.** Strict, strategic, and sophisticated ocean management and protection, e.g., through ecosystem- and life-history-based spatial zoning plans, and active use of the marine ecological redlining system, can contribute to a more abundant supply of healthy seafood and provide a cheap, natural solution to address climate change, in addition to protecting embattled species and habitats.

- **Species management and protection**. Efforts to maintain marine biodiversity to support a productive ecosystem for food production will also be necessary. In this context, it will be important to look to the recommendations and findings from the coming/planned COP 15 of the Convention of Biological Biodiversity (CBD). In China, there is an ongoing revision process of the Wildlife Protection Law. However, the attention paid to marine species is still relatively low, so the mainstreaming of ocean wildlife protection by law could be considered and promoted in the future. It will also be necessary to sort out and coordinate different departments (such as the Ministry of Agriculture and Rural Affairs, and the Ministry of Natural Resources) in charge of the functional relationship between the protection of marine species and the delineation and management of MPA, so as to more effectively protect the biodiversity of marine species.

- **Recovery and restoration**. Actions taken to recover and restore key coastal habitats will have positive consequences for biodiversity and climate, providing for healthy coastal ecosystems, which again supports food production.

- **Biodiversity beyond national jurisdiction.** The fisheries operating in areas beyond national jurisdiction are large-scale commercial fisheries. Global fish stocks are currently at risk of being fished beyond sustainable limits. Overfishing disrupts marine communities and creates an imbalance between species, with commercially important fishes unable to replenish their stocks, thereby undermining the food provision service of the oceans. In this context it is relevant to consider framing the management of distant water fleets globally, in which China can have an important role to play. Of relevance here is potential signing of the Agreement on Port State Measures (PSMA) which aims to prevent, deter, and eliminate illegal, unreported and unregulated (IUU) fishing by preventing vessels engaged in IUU fishing from using ports and landing their catches.

The following CCICED Special Policy Studies are particularly relevant in the context of this policy area: *SPS Biodiversity*.

**POLICY AREA 8: Policy actions to enhance and build the foundation for an integrated approach to ocean management**

Integrated ocean management (IOM) is considered an appropriate approach for ensuring protection and the sustainable use of coasts and oceans, taking sufficiently into account knowledge and the particularities of the ecosystems to be managed. Fully integrated ocean management strikes the balance between the environment, economy, and society, and between short-term economic gains and long-term prosperity of the ecosystem services.

In developing policies in this area, it could be relevant to include in future policy research consideration of such things as:

- **Identify ecological hotspots**. Understanding the ecosystems is a key factor for ecosystem-based integrated ocean planning and management. Consideration could be given to the question of how to identify the marine ecological hotspots in Chinese waters, especially to scientifically describe the important habitats and endangered/threatened species as the foundation of long-term ocean planning and management.

- **Institutional integration.** Integration means not only ecosystem integration, but also includes institutional integration in the governance systems, which may cover cross-agency and regional-level coordination, and more importantly, coordination of governmental and public (including coastal communities) efforts in ocean governance. The SPS Ocean Governance, through its specific study on IOM[11] has identified a number of recommendations in this area that could merit further consideration.

- **Adopting a holistic river area-based management approach.** As also highlighted in the scoping study for a potential SPS on river basis management,[12] acknowledging the critical role of water for development and integrating climate change, socio-economic and urban developments, and the interaction with the oceans is highly relevant and should be taken into consideration in developing an integrated approach to ocean management. Relevant aspects to explore further relating to the interface between rivers and oceans include aligning the requirements for high-quality river areas, coastal seas, and the oceans, and supporting a long-term safe development of deltas in the face of sea level rise, land subsidence, further urbanization and economic development and changing freshwater and sediment flows.

The following CCICED Special Policy Studies are particularly relevant in the context of this policy area: *SPS Biodiversity*, *SPS River-basin*.

[11] China Council for International Cooperation on Environment and Development (CCICED) Special Policy Study on Global Ocean Governance and Ecological Civilization. Report Integrated and Ecosystem-based Ocean Management (2020) (https://cciced.eco/wp-content/uploads/2020/12/cciced-2020-en-tt1-integrated-ecosystem-based-ocean-management.pdf)

[12] Managing river areas in times of climate change. Scoping study for a CCICED Special Policy Study (2021).

**POLICY AREA 9: Policy actions to contribute to a sustained and healthy global ocean system into the future**

While there is general agreement in international policy that an ecosystem approach is needed to improve ocean governance, its application in practice is still limited. This is due in large part to the considerable practical difficulties of implementation, including the availability of suitable information and lack of analytical and scientific tools to support the process.

In developing policies in this area, it could be relevant to include in future policy research consideration of such things as:

- **Polar regions (Arctic and Antarctica).** The inclusion of polar regional policies within China's 5-year-plan represents an acknowledgement of the emerging importance of the two poles to China. This provides a platform for taking on a leadership role in international efforts framing management for sustained and healthy polar oceans, among other things with respect to establishment of spatial management (e.g., MPAs), long-range pollution, mining, shipping, sustainable fisheries, etc.

- **Development of blue partnerships.** China has been building blue partnerships with different countries and unions, which is an innovative way to mainstream sustainable ocean development internationally. It is worthwhile to look deeper into the mechanisms and outcomes of these blue partnerships and suggest improvements or evolution of the partnerships.

- **Mineral exploration framework.** Many questions and uncertainties surround deep-sea mining, including those stemming from the complexity and scale of the proposed operations, and those arising from legal uncertainties relating to proposed exploitation. Discussions are underway to develop the legal framework to regulate exploitation, including issues of environmental protection, accountability, interactions across international and national boundaries, and between claims, with input from marine scientists, legal specialists, and non-governmental organizations. China has an active interest in deep-sea mining and could purposefully be at the forefront of establishing policies that ensure sustainability in the industry. The SPS Ocean Governance, through its specific study on integrated mineral resource extraction[13] identified several recommendations in this area that could merit further consideration.

The following CCICED Special Policy Studies are particularly relevant in the context of this policy area: *SPS BRI*.

[13] China Council for International Cooperation on Environment and Development (CCICED) Special Policy Study on Global Ocean Governance and Ecological Civilization. CCICED Task Force Report Mineral Resources Extraction (2020) (https://cciced.eco/wp-content/uploads/2020/12/cciced-2020-en-tt6-mineral-resources-extraction.pdf)

**POLICY AREA 10: Policy actions looking at how to account for the value of a healthy ocean**

The ocean and coastal ecosystems are extremely important in terms of ecosystem services and economic values. Accounting for these values is one approach to tally the costs and savings associated with decisions we take that affect ocean health. There is a need to balance a number of components, such as market and non-market values, living and non-living resources, and uses now and in the future.

In developing policies in this area, it could be relevant to include in future policy research consideration of such things as:

- **Establishing an ocean accounting system.** Natural capital accounting[14] is an important tool for the estimation of the value of marine biodiversity and ecosystem service, including blue carbon and coastal wetland's protection for communities on municipal and regional levels. It is important to evaluate the economic value of the ocean including the ecosystem services, while apparently there are no mature methodologies and limited case studies in China or even worldwide at the moment. However, the trials of accounting for the ocean assets as well as gross environmental product (GEP) in Shenzhen[15] are important references. Promoting this practice nationwide and making GEP a key indicator to evaluate the performance of local governments could potentially be a good new policy approach in the future. In March 2021, the UN adopted a revised *System of Environmental- Economic Accounting- Ecosystem Accounting* (SEEA-EA) to better measure natural capital assets[16]. Together with the Dasgupta report,[17] there is a good foundation for more work comparing international and Chinese practices. As the first international partnership dedicated to ocean accounting, the Global Ocean Accounts Partnership (GOAP) is also constantly advancing the establishment and improvement of an international ocean accounting system.[18]

- **Develop sustainable blue economy and financial standards**. China has issued the "Green Industry Catalog" (2019, National Development and Reform Commission) and "China Green Bond Support Project Catalog (2021 Edition)" (2021, the People's Bank of China, National Development and Reform Commission, and China Securities Regulatory Commission), both of which involve ocean content, but the granularity is not sufficient. It is appropriate to combine various specific aspects of the marine economy and its sustainability to compile and publish standard tools for sustainable blue finance.

[14] Natural capital accounting (NCA) is an umbrella term covering efforts to use of an accounting framework to provide a systematic way to measure and report on stocks and flows of natural capital (UN)
[15] See e.g., https://www.chinanewsweb.com/index.php/2021/03/24/shenzhen-issued-gep-accounting-13-system/
[16] See https://unstats.un.org/unsd/statcom/52nd-session/documents/BG-3f-SEEA-EA_Final_draft-E.pdf
[17] See e.g., https://www.cam.ac.uk/stories/dasguptareview
[18] See https://www.oceanaccounts.org/

- **Including the ocean in developing principles for the financing of green services.** The challenge of ensuring enough sustainable green investment in the ocean generally arises due to institutional and political framework conditions, inadequate regulations, taxes and subsidies that give wrong or weak incentives, weak property rights to resources in the sea, and ineffective enforcement of laws and regulations. Together, this contributes to high financial risk. Some relevant issues to consider are how ocean climate and biodiversity can be appropriately valued in investment portfolios and blue bonds; criteria and requirements for identifying good marine industries from environmentally unsound activities; the ability to link subsidies to biodiversity protection; and to look at how financial institutions can play a role in changing investors' view of biodiversity.

The following CCICED Special Policy Studies are particularly relevant in the context of this policy area: *SPS Green Finance, SPS Green Supply Chain*.

### 4.3. A Predicted Ocean

Understanding the relationships between the ocean systems and human activities that take place in or impact on it gives us a better foundation for predicting its future and provides important knowledge to inform decisions and actions that shape ocean sustainability. Sustained ocean observations are vital to enabling a predicted ocean. New technologies, both for observing remote and hostile parts of the ocean, such as the deep ocean and the ice zone, and the development of cheaper modular sensors and equipment, will enable broader participation in ocean observing. Such information is increasingly needed by nations and the ocean business community operating within or beyond national jurisdictions. Improved access to understanding present and future ocean conditions will be a prerequisite to the development of sustainable ocean economic policies and ecosystem-based management and will lead to more efficient shipping, mitigate storm damage and flooding of coastal cities, sustain healthy fisheries, protect coral reefs and other key marine ecosystems from degradation, and improve climate forecasting, to name but a few.

Relevant policy areas for CCICED consideration include:

**POLICY AREA 11: Policy actions to maintain/increase China's contribution to ocean knowledge-supporting ocean management**

The vast volume of the ocean and its complex coastlines are neither fully observed nor adequately understood. In particular, the deep sea is a frontier of ocean science. Sustained and systematic ocean observations are needed to document ocean change, initialize ocean system models, and provide critical information for improved ocean understanding—and through this, the basis for managing the ocean for the future.

In developing policies in this area, it could be relevant to include in future policy research consideration of such things as:

- **Support and actively invest and engage in the UN Decade of Ocean Science for Sustainable Development.** The Decade of Ocean Science (see Chapter 2) will encourage actions toward a more integrated and sustainable ocean observing system to facilitate ocean discovery and environmental monitoring. Consideration could be given to how China could be a spearhead for the international effort.

- **Leverage the opportunities new technology provides in achieving a known and predicted ocean.** Autonomous platforms already make observations over a wide range of temporal and spatial scales in the ocean. However, the observations are still not comprehensive enough. To boost ocean data collection, future autonomous systems need to be more affordable, more modular, more capable, and easier to operate. The opportunities to contribute to the development and contribution in this area may be relevant to explore.

### 4.4. A Safe Ocean

The rush for coastal recreation and economic expansion in the maritime domain has increased access to the sea to a multitude of users, producing newly built infrastructure that is increasingly vulnerable to ocean extreme events. Some of the hazards include movement of barrier islands, sea level rise, hurricanes, storms, earthquakes, flooding, erosion, pollution, and human development along the coast. Marine hazards such as these can be devastating for the coasts and their communities. They can also have lasting and damaging effects on both the coastal landscape (long-term coastal erosion) and on marine ecosystems. There is a pressing need to focus on implementing adaptation measures to strengthen the resilience of vulnerable coastal communities, their infrastructure, and service-providing ecosystems.

Relevant policy areas for CCICED consideration include:

**POLICY AREA 12: Policy actions to reduce ocean hazards**

Reducing the risks from tsunamis, storm surges, harmful algal blooms, and other coastal hazards needs to focus on implementing adaptation measures to strengthen the resilience of vulnerable coastal communities, their infrastructure, and service-providing ecosystems.

In developing policies in this area, it could be relevant to include in future policy research consideration of such things as:

- **Investing in science and technology.** The ocean is not “safe” or “unsafe” in itself; human beings rely on the safety of the oceans for a living. Therefore, we need to make the ocean predictable through risk assessments and forecasts—and mitigate hazards as these are identified. Consideration should be given to

how science and technology within this area can contribute to policy actions toward a safer coastal human environment.

- **Quick-response system.** Considering the connectivity and dynamic nature of the ocean, consideration should also be given to what institutional systems are needed at the national level for early warning and quick response to ocean hazards, either natural or human-made. This is most critical for preventing the dispersion and multiplication of local hazards, such as oil spills etc.

- **Combating sea level rise:** The average sea level rise along China's coasts in the last year has been above the global average. The Intergovernmental Panel on Climate Change (IPCC) (2019) estimates that by the year 2100, sea levels will rise by 0.39 metres to 0.84 metres, depending on future emissions and other factors. Already, China has experienced several effects of sea level rise. Shorelines have eroded, drinking water sources have come under threat, and storm surges have devastated coastal areas. The effect of sea level rise on economic growth merits attention. While the efforts toward carbon neutrality can mitigate some of the expected sea level rise, policy actions are urgently required to meet the expected consequences of ongoing sea level rise.

### 4.5. A Sustainably Harvested and Productive Ocean

The ocean is a vital source of nourishment, directly supporting the livelihood of about 500 million people. Ocean economies are among the most rapidly growing and promising in the world, providing benefits to many sectors of great economic value, such as fisheries, biotechnologies, energy production, tourism, and transport, and many others. Safe and sustainable economic operations in the ocean will help policy-makers and stakeholders implement a truly sustainable blue economy.

Relevant policy areas for CCICED consideration include:

**POLICY AREA 13: Policy actions to build sustainability in the domestic and distant water fisheries**

Overfishing results in a decrease in biodiversity. The decline of top biological communities (e.g., fish) results in ecological degradation. Healthy fishery resources will be an important indicator for the health of marine ecosystems: the conditions supporting the healthy structure of fishery resources include moderate fishing intensity, good larval and juvenile habitats etc. In China, ecosystem-based fisheries management has appeared in a series of systems and measures, such as the summer moratorium, "dual control" of the number and power of fishing boats, enhanced release, sea ranch construction, "zero growth" in marine catch fisheries and "total output control," as well as the construction of aquatic genetic resources reserves, etc.

In further developing policies in this area, it could be relevant to include in future policy research consideration of such things as:

- **Consider the role of sustainable supply chains.** Sustainable supply chain management involves integrating environmentally and financially viable practices into the complete supply chain life cycle, from product design and development, to material selection, manufacturing, packaging, transportation, warehousing, distribution, consumption, return, and disposal. Environmentally sustainable supply chain management practices can assist organizations in not only reducing their total carbon footprint, but also with regard to environmental stewardship, conservation of resources, financial savings and viability and social responsibility (including gender equity). CCICED's SPS on green supply chains has mainly focused efforts on terrestrial commodities so far, while recognizing that the concept may be as relevant and important for ocean-based commodities, e.g., climate proofing the seafood chain. There is ample room for taking a more responsible role in this area.

- **NbS in the fisheries**. NbS restore the ecological environment with natural structure and strength, maintain the balance of the ecosystem, and reduce the cost of operation and maintenance. In the process of promoting sustainable fisheries development, China can encourage NbS from many aspects, including key fish habitat restoration and fish stock enhancement by relying more on nature than human interference. This can be done by exploring relevant scientific foundations and technologies, designing clear indicators, standards, and management mechanisms, promoting large-scale applications of pilots, and supporting development of long-term and income-generating business models, etc.

- **Community participation**. Explore the fishery resource protection model of community participation and joint management. Until now, the protection of fishery resources has mostly been promoted through a top-down approach, which requires significant government resources but shows limited management effectiveness. Integrating community and social resources to explore a common management model for fishery resource protection could be valuable. In this context, it is important to also consider the role of gender and how women interact with the issue and can play a constructive role.

- **Climate change and fisheries**. Strengthen scientific research on climate change and fisheries, and incorporate addressing climate change in medium- to long-term plans for fishery development. Climate change's effects on the production and distribution of marine fishery resources, fishers' livelihoods, social stability, and other fishing-related industries cannot be ignored. China can support scientific research, data collection, and monitoring on climate-related topics, and in-depth research of climate change's effects on marine living resources, as well as the social and economic effects of climate-related disruptions to the supply chain. This research, together with analysis of climate adaptation and mitigation of fisheries, may help inform the development of national strategies and plans for climate change mitigation for fisheries.

- **Implementation of a total allowable catch (TAC) policy in China**. Based on the experience of the nine pilots of quota control in coastal provinces (cities), strengthening the single species resources survey and TAC assessment of major

economic species in China's coastal oceans. Explore ways to gradually expand the total catching control to all major economic species. China can also explore a new mode of TAC suitable for multi-species fisheries. Improve the catch monitoring system of coastal fisheries by integrating the supervisory power of fishery, maritime affairs, and market affairs administrations to provide a guarantee for the orderly and continuous implementation of TAC.

- **Promoting sustainable fishery development by green finance**. At present, China has incorporated marine protection into the green financial system. For example, the Green Industry Catalog issued by the National Development and Reform Commission in 2019 has listed marine eco-friendly projects and technologies (seawater pollution control and marine ecosystem restoration) as key support objects. In the context of the rapid development of global green finance, China's sustainable fishery development also needs to use green financial tools to innovate financing models to provide more financial incentives for naturally active fishery projects. For example, constructing fishery financial institutions, issuing special loans without a mortgage for sustainable fishery production, or subsidizing fishery loan interest from financial institutions; establishing a fishery guarantee insurance system to solve the problem of insufficient guarantees for fishery producers' loans; strengthening financial institutions reputational risk supervision by reminding them of the potential reputational risks that may be caused by illegal fisheries and providing technical guidelines; learning from international protection experience, to use innovative mechanisms to absorb social capital into sustainable ocean projects, promote green financial tools, and expand funding sources.

The following CCICED Special Policy Studies are particularly relevant in the context of this policy area: *SPS Green Finance, SPS Green Supply Chain, SPS Climate*.

### 4.6. A Transparent and Accessible Ocean

A healthy, safe, sustainable ocean very much depends on global capacity building and resource-sharing between countries. There is an enormous need for more ocean information at the scientific, governmental, private sector, and public levels. New technologies and the digital revolution are transforming ocean science.

Relevant policy areas for CCICED consideration include:

**POLICY AREA 14: Policy actions to promote data access and use**

Data and information play an essential role in connecting knowledge generators and end users, but many challenges and disparities still exist in the access, sharing, and use of ocean data across regions.

In developing policies in this area, it could be relevant to include in future policy research consideration of such things as:

- **Consider contributions to global ocean data initiatives**. Considerations could be given to policies supporting this or other global ocean data initiatives that aim to collect ocean data and make these accessible for global use. One such initiative is the Action Coalition on Ocean Data,[19] where the Centre for the Fourth Industrial Revolution and the Ocean (C4IR Ocean), in cooperation with the World Economic Forum and Microsoft, aims to bring industry, academia, government, and the public together to create new and better ways of harnessing rapidly emerging data technologies to heal and restore the ocean so it can be resilient and economically productive. Efforts to ensure that data in such initiatives are open and accessible and available free of charge is a relevant aspect in this context, e.g., through the establishment of central data platform(s).

- **Develop the use of big ocean data**. There is currently an exponential growth of information technology and advances in ocean observatories. Given the huge volume, diverse types, sustained measurement, and potential uses of ocean observing data, it is a typical kind of Big Data, namely marine Big Data. The traditional data-centric infrastructure is insufficient to deal with new challenges arising in ocean science. These challenges are relevant to explore as an aspect of future ocean policies. Efforts to provide education supporting data management and data use are relevant in this context.

- **Involving the public in data gathering**: Citizen science typically involves data collection by members of the public who pass their information along to researchers. Volunteer monitoring has contributed for many years to diverse fields and can also provide an important contribution to ocean knowledge while at the same time contribute to increased ocean understanding and literacy. It may be beneficial to give consideration about how to draw upon the opportunities of citizen science.

### 4.7. An Inspiring and Engaging Ocean

Open access to ocean information and ocean literacy for all should capacitate all citizens and stakeholders to have a more responsible and informed behaviour toward the ocean and its resources, be key in raising ocean awareness and promote better solutions.

[19] https://foundation.oceandata.earth/perspectives/c4ir-ocean-to-lead-action-coalition-on-ocean-data

Relevant policy areas for CCICED consideration include:

**POLICY AREA 15: Policy actions to promote the public as Ocean Ambassadors**

Empowering ordinary people to understand the role of the ocean in our society—and thereby themselves becoming ambassadors bringing knowledge out to others—will be important to raise general awareness of and support for implementing actions.

In developing policies in this area, it could be relevant to include in future policy research consideration of such things as:

- **Education and literacy.** Marine science and ocean literacy topics are poorly represented in school curricula around the world. Consideration could be given to enhancing ocean literacy through strengthening ocean-related topics in school curricula. Governments at all levels—especially the local ocean and fisheries administrations—should also play a more active role in ocean education and literacy, e.g., all coastal provincial and municipal government websites should open Popular Science Columns for propagating ocean science, ecosystem services of the ocean and their conservation measures.

- **Building narratives for the understanding of ocean conservation's importance.** Exposing the population to narratives or display methods highlights the interconnection of various ocean policies (MPA, ocean accounting, blue investment, restoration) to deliver a clear message on how ocean conservation is important to all stakeholders.

- **Inclusion of local communities in conservation partnerships.** Low awareness of ocean protection and low involvement in conservation activities result in ineffectiveness of conservation overall. Increased social participation (including social capital) in sustainable ocean management, protection, restoration etc. will improve conservation outcomes while allow all stakeholders to enjoy the wealth of ocean together. In this context, it is important to also consider opportunities to consider gender-related aspects of ocean activities and management.

## 5. CONCLUDING REMARKS AND RECOMMENDATION

The SPS for Ocean Governance and Ecological Civilization emphasizes that ocean studies need to continue within the framework of CCICED to fully reflect the importance of the ocean to society. For this reason, this seamap for "ocean into the future" has been developed—in essence, it points out directions for the CCICED to focus its work in areas where China should pay special attention with regard to ocean issues in the future.

The list of topics included under the various policy areas is not exhaustive but rather reflects topics that have been flagged during discussions with various stakeholders. The descriptions provided for the different topics are neither comprehensive nor detailed, but are rather provided to give an indication of potential directions for future policy relevant discussions.

The suite of policy areas and topics contained in this seamap connect to a number of policy areas already under consideration and discussion by existing CCICED Special Policy Studies or can easily be incorporated as relevant items in upcoming and future CCICED Special Policy Studies. Some items might best be kept in the context of a separate ocean study. Regardless of the approach, it will be important to ensure an appropriate interaction between relevant policy studies with respect to the ocean relevant aspects of their scope.

***Recommendation***

- ***The CCICED should continue to take a proactive approach in providing advice to the Chinese government to support a national effort to safeguard the health of the global oceans and the world's food supply by securing a sustainable ocean economy.***

- ***While all policy areas and topics that have been identified through this study are important and should be scrutinized further, it is suggested that CCICED in the next phase pay particular attention to the following topics:***

  ***(1) The ocean's role as a tool for carbon-neutrality goals;***

  ***(2) Safeguarding the ocean's continued/growing role as a major source of food;***

  ***(3) Ocean knowledge-supporting ocean management; and***

  ***(4) Marine tourism.***

- ***CCICED should note that the topics covered by the Ocean SPS favour cross-cutting connection/interaction with the River-Basin SPS and NbS process, and that it would be beneficial to take this into account when organizing the work of the next phase of CCICED policy studies.***

# CCICED Special Policy Study on Global Ocean Governance (2017–2021)

## Overview of SPS work and deliveries

| Phase 1 (2017–2020) | Phase 2 (2020–2021) |
|---|---|
| **Detailed studies** | |
| **1. Integrated and Ecosystem-based Ocean Management**<br>Globally, Integrated Ocean Management (IOM) is accepted as the appropriate approach for ensuring protection and the sustainable use of coasts and oceans, taking sufficiently into account knowledge and the particularities of the ecosystems to be managed. A fully integrated ocean management strikes a balance between the environment, economy, and society, and between short-term economic gains and long-term prosperity of ecosystem services. The report captures key findings from five other detailed studies conducted in this phase. In addition, this report addresses integrated ocean management in general and in a Chinese context. | |
| **2. Living Marine Resources and Biodiversity**<br>China's challenges in managing its living marine resources are similar to those facing other countries. However, the scale of China's economy makes its situation more extreme. This Task Team conducts research on China's marine living resources and their ecological value; its current status, development trends, and challenges; then proposes several recommendations based on comparison of domestic and foreign management policies, to guide China's next steps as it endeavours to create an ecological civilization domestically and abroad for living marine resources. | **A. Establishing China's sustainable fisheries policy**<br>Due to continuous overfishing for decades, as well as environmental pollution, climate change, and other factors, China's coastal fishery resources have severely declined. This study compares and analyzes the implementation of China's marine fishery policies, providing an important reference for China to improve fisheries policy and management, better balance ecological protection and fishery development, and to enhance its ocean governance capabilities during the "14th Five-Year Plan" period. |
| **3. Marine Pollution**<br>This Task Team aims to review the current status and policies on marine pollution in China, evaluate existing global and national ocean initiatives, and provide policy recommendations to support China's effort in reducing marine pollution. Special focus was put on nutrients, marine litter, short-chain chlorinated paraffins (SCCPs), polybrominated diphenyl ethers (PBDEs), organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs) and antibiotics, in order to determine the status and sources of China's marine pollution and its impact on the ecosystem, analyze China's existing coastal and marine pollution control policies, and make policy recommendations in the context of international marine governance structures, as well as emerging marine pollution concepts and measures. | **B. Marine Pollution**<br>This study analyzes the pollution sources of marine plastic litter; introduces the change of nutrient distribution in the Bohai Sea (as an example), and eutrophication and its mitigation actions in China's coastal sea; and discusses the source, pollution, prevention, and control of mercury pollution in coastal waters. A number of policy recommendations were proposed in this report, so as to promote the healthy development of marine ecosystem. |
| **4. Green Maritime Operations**<br>This Task Team reviews developments in China's ports and shipping industry, with a focus on the size of ports and fleets as well as the present situation of pollution prevention and control. It analyzes the problems and sources of marine pollution, existing policies, and requirements. Drawing from international experience, the report concludes with policy recommendations for the next phase of green maritime operations for the purpose of ecological protection and sustainable development of China's seas. | |

| Phase 1 (2017–2020) | Phase 2 (2020–2021) |
|---|---|
| **Detailed studies** | |
| **5. Offshore Renewable Energy**<br>This report looks at how China, the world's biggest energy consumer, is stepping up its push into renewable energy, proposing higher green power consumption targets, also in the ocean renewable energy (ORE) area. The Task Team conducts in-depth research on ORE and its related technologies such as wind power, wave energy, tidal range energy etc., their status and future development trends, technical requirements and standards, related environmental issues and governance systems, then provides policy recommendations in this context. | |
| **6. Mineral Resource Extraction**<br>The Task Team discusses the economic, technical and environmental challenges of seabed mineral exploration and exploitation as well as exploration and exploitation for gas hydrates. The report provides a set of recommendations to facilitate the development of seabed mineral resources and gas hydrates in an environmentally sustainable way. | |
| **Overarching reports** | |
| • **Global Ocean Governance and Ecological Civilization: Building a Sustainable Ocean Economy for China**<br>This report summarizes the key elements of the six detailed studies. This report looks at the opportunities that the ocean provides and the challenges it faces in continuing to provide benefits. It highlights that clear and directed actions are needed to limit the threats and minimize the impacts to the oceans, and thereby lay the foundation for the oceans' ability to continue to serve as the basis of human life. | • **Ocean into the Future – Seamap**<br>The report from the first phase of the Ocean SPS emphasized that ocean studies need to continue within the framework of CCICED to fully reflect the importance of the ocean to society, and in particular, to China's national strategy of vitalizing the blue economy and reaching carbon neutrality. This seamap, in essence, points out directions for the CCICED to focus its work in areas where China should pay special attention with regard to ocean issues in the future. |