UN Environment contribution to Concept Papers for Partnership Dialogues of The Ocean Conference

Theme 1: Addressing marine pollution[1]
a) Status and trends

Marine debris

- Marine debris is present in all marine habitats. It is estimated that the average density of marine debris varies between 13,000 and 18,000 pieces per square kilometre (WOA-1, 2016, Chapter 25).
- Data on plastic accumulation in the North Atlantic and Caribbean from 1986 to 2008 showed that the highest concentrations (more than 200,000 pieces per square kilometre) occurred in the convergence zones between two or more ocean currents (WOA-1, 2016, Chapter 25).
- Approximately 80 per cent of marine debris entering the sea is considered to originate from land-based sources. (WOA-1, 2016, Chapter 25)
- It has been estimated that in 2010 alone, between 4.8-12.7 million metric tons of plastic found their way into the oceans (UNEP, 2016)
- Of the 12 seas surveyed between 2005 and 2007, the South East Pacific, North Pacific, East Asian Sea and Wider Caribbean coasts contained the most marine litter, and the Caspian, Mediterranean and Red Seas the least (GEO5 Report, UNEP 2012).
- Regional studies of the Baltic Sea (HELCOM 2009), Northeast Atlantic (OSPAR 2009), US coastline (Sheavly 2007) and North Atlantic Subtropical Gyre indicated no statistically significant changes in litter quantity between 1986 and 2008, while data from the Mid-Atlantic indicated an increase in land-based and general-source marine litter during 1997–2007 (Ribic et al. 2010) (GEO5 Report, UNEP 2012).
- Modelled estimates of floating plastics, which are in broad agreement with observational data from shipboard measurements and shoreline surveys, vary by more than four orders of magnitude between the lowest value (Antarctic LME) and the highest (Gulf of Thailand LME). Slightly over half of the LMEs with the 'highest' abundances of floating plastics are in east-southeast Asia. Many of the LMEs with high to highest relative abundances of floating plastics are located in east-southeast Asia, with the Gulf of Thailand LME having the highest abundance of both micro- and macro-plastics. Other LMEs with highest abundances of both size categories of floating plastics are the Southeast US Continental Shelf, Mediterranean Sea, Red Sea, Bay of Bengal, South China Sea, SuluCelebes Sea, Indonesian Sea, Southwest Australian Shelf, East China Sea, and Kuroshio Current LMEs (TWAP, 2016).

Nutrients:

- The global trends point to deterioration in terms of nutrient pollution. Regions of greatest concern are south East Asia, Europe and eastern North America (GEO5 Report, UNEP 2012).
- The number of low-oxygen zones in coastal waters has increased exponentially since the 1960s and has reached an area of about 245,000 km^2 worldwide (WOA-1, 2016 Chapter 20). There over 700 eutrophic and hypoxic coastal systems worldwide (Diaz et al., 2010).

[1] The focus placed on the key ocean pollution source categories addressed under the UN Environment: (1) marine litter, (2) nutrients, and (3) wastewater.

- At least 169 coastal areas are considered hypoxic, with dead zones especially prevalent in the seas around South East Asia, Europe and eastern North America. Only 13 coastal areas appear to be recovering (Diaz et al. 2010; Rabalais et al. 2010), most in North America and northern Europe (GEO5 Report, UNEP 2012).
- Global river nutrient export has increased nutrient export has increased by approximately 15% since 1970, by approximately 15%, since 1970, with South Asia accounting for at least half of the increase (Seitzinger et al. 2010) (GEO5 Report, UNEP 2012).
- There has been a 74% increase in algal and macrophyte gross productivity in lakes since 1970 (Lewis 2011), and a dramatic increase in the number of eutrophic coastal areas since 1990 (GEO5 Report, UNEP 2012).
- Whereas phosphorus loads are projected to level off, global river nitrogen loads are likely to increase by an additional 5 per cent by 2030, mostly in South Asia (Seitzinger et al. 2010) (GEO5 Report, UNEP 2012).
- The number of reported outbreaks of paralytic shellfish poison, a harmful algal toxin found in eutrophic waters, increased from fewer than 20 in 1970, to more than 100 in 2009 (Anderson et al. 2010) (GEO5 Report, UNEP 2012).
- Of the 63 LMEs assessed under the TWAP, 16% are in the 'high' or 'highest' risk categories for coastal eutrophication. They are mainly in Western Europe and southern and eastern Asia, and the Gulf of Mexico. Most LMEs, however, are in the 'lowest' or 'low' risk category (TWAP, 2016).
- Based on current trends, the risk of coastal eutrophication will increase in 21% of LMEs by 2050. Most of the projected increase is in LMEs in southern and eastern Asia, but also in some in South America and Africa. Only two LMEs (Iberian Coastal and Northeast US Continental Shelf) are projected to lower their coastal eutrophication risk by 2050 (TWAP, 2016).

Wastewater:

- An estimated 9.5 million cm^3 of human excreta and 900 million m^3 of municipal wastewater is discharged daily (UNEP, SEI, 2015).
- Today, an estimated 80% of global wastewater is being discharged untreated into the world's waterways (UNEP, 2015)
- Only around 10% of populations of some sub-Saharan African countries (including Côte d'Ivoire, Kenya, Lesotho, Madagascar, Malawi and Uganda) are connected to a sewer system (Banerjee and Morella 2011) (UNEP, SEI, 2015).
- Worldwide, about 2.7 billion people are thought to use some kind of on-site sanitation system (e.g. pit latrine, septic tank) requiring faecal sludge management. Users of on-site sanitation are expected to almost double by 2030 (Strande et al. 2014) (UNEP, SEI, 2015).
- Pharmaceuticals and personal care products typically not removed by most sewage systems, enter the environment after use. The long-term risks to aquatic organisms and humans are largely unknown, although it is clear that pharmaceuticals and endocrine disrupting compounds can have biological effects at very low concentrations (Schwarzenbach et al. 2010). Studies have shown that emerging contaminants may have developmental, reproductive and behavioural impacts on fish and other aquatic life (Holeton et al. 2011) (GEO5 Report, UNEP 2012).

b) Challenges and opportunities

1. Challenges

(a) Marine debris

- Absence of adequate scientific research, assessment, and monitoring - few reliable or accurate estimates of the nature and quantities of material involved which poses difficulties in designing and implementing cost-effective measures to reduce inputs to LMEs.
- Gap in scientific research to better understand the sources, amounts, fates, and impacts of marine debris especially plastic
- Scalable, statistically rigorous and, where possible, standardized monitoring protocols are needed to monitor changes in conditions as a result of efforts to prevent and reduce the impacts of marine debris
- Data collection protocols used tend to be very different, preventing comparisons and harmonization of data across regions or timescales
- Gap in information needed to evaluate impacts of marine debris on coastal and marine species, habitats, economic health, human health and safety, and social values
- Information needed to understand status and trends in amounts, distribution and types of marine debris
- Gap in capacity in terms of new technologies and methods to detect and remove accumulations of marine debris
- Need for expanded awareness of the public of the significance of marine debris and the important part they can play in addressing the problem.
- Gaps in knowledge in knowledge of locations where chemical munitions have been dumped; gaps in building capacities to help fishers and other users to draw on such knowledge where exists, in order to reduce risks where dumped munitions may be netted
- Difficult for many countries to assess the SDG 14.1 target indicator floating marine litter
- Lack of effective implementation of UNCLOS, GPA, MARPOL, United Nations Fish Stocks Agreement, Code of Conduct for Responsible Fisheries.

(b) Nutrients, wastewater and other (coastal, riverine and atmospheric inputs from land)

- Lack of sewage systems and waste-water treatment plants is still a major threat to the ocean. This is particularly the case in respect to large urban areas in developing countries
- New technologies and processes have largely been developed which have the ability to avoid these problems, but there can be gaps in capacity to apply these newer processes, often because of costs involved
- Information lacking on status of heavy metals and other hazardous substances
- Information lacking on the extent to which developing industries are able to apply newer, cleaner technologies.
- Information is very scarce on how problems in coastal zones are affecting the open ocean
- Gaps in capacity to ensure that less-polluting pesticides are used, related to educating farmers, accessibility and affordability of newer, safer pesticides, supervising the distribution systems, and monitoring impacts on the oceans
- Need to monitor what is happening to radioactivity in the ocean
- Lack of methods to compare information between various assessment systems
- Absence of any form of regular, systematic assessment of the impact of land-based inputs in many parts of the world
- One-off assessments not in forms which would enable them to be assembled into a wider, continuous assessment

- Many of the Regional Seas programmes have adopted protocols for land-based sources of pollution and related action plans. The level of implementation of these protocols is not well-known in many regions.
- Lack of effective implementation of UNCLOS and GPA.

2. Opportunities

(a) Marine debris

- Enhanced efforts to improve predictive capacity of modelled ocean plastic concentrations, assess potential socio-economic consequences, and target mitigation measures.
- There is huge potential for upscaling fishing gear marking in the development of a global tool (International Guidelines) that will be applicable for worldwide use.
- Regional Seas Programmes will develop regional marine litter action plans in partnership with the GPA within the scope of the Global Partnership on Marine Litter.
- Under OSPAR a Regional Action Plan on Marine Litter is ongoing implementation, including actions on microplastics http://www.ospar.org/work-areas/eiha/marine-litter
- Examine possible measures and best available techniques and environmental practices to prevent its accumulation and minimize its levels in the marine environment. (UNCLOS A/RES/70/235)
- Cooperate in correcting the shortfall in port waste reception facilities in accordance with the action plan to address the inadequacy of port waste reception facilities developed by the International Maritime Organization.
- Further technical cooperation and capacity building via the IMO to promote accession to the London Protocol, and its implementation/compliance, to ensure a universal membership. Acceptance and implementation of the amendments to the London Protocol on carbon capture and sequestration in sub-sea geological formations, and marine geoengineering such as ocean fertilization.

(b) Nutrients, wastewater and other (coastal, riverine and atmospheric inputs from land)

- Continued/expanded research on sources of mercury, impacts and policy directives;
- Continued/expanded research on atmospheric inputs of chemicals, impacts and policy directives
- Expanded research on sargassum, other HAB outbreaks related to climate change, impacts on oceans and policy directives
- Expanded research on sand mining, impacts and policy directives
- Expanded research / development and uptake of the SDG14.1 target indicators on nutrient (eutrophication) and floating marine debris
- Enhancing robustness of the Ocean Health Index with improvement in estimation of parameters
- Analysis at sub-LME scale to identify sources and spatial variations of nutrients in order to develop effective nutrient reduction strategies.
- The Regional Seas Programme continue deepened collaboration with the GPA to address pollution from land-based activities
- Enhanced collaboration between Regional Seas Programmes on improvements of port waste reception facilities, issues of liability, corporate social responsibility (tourism sector) - sharing experiences, practices and setting national and regional agenda (with IMO)
- All States urged to ensure that urban and coastal development projects and related land-reclamation activities are carried out in a responsible manner that protects the marine habitat and environment and mitigates the negative consequences of such activities

- States encouraged to increase emphasis on the link between fresh water, the coastal zone and marine resources in the implementation of international development goals.
- Regional Seas: OSPAR is aiming to improve its coverage of monitoring and assessment across all its 5 regions, including in cooperation with other international organisations. Regional cooperation on joint monitoring and toxicity standards in seafood.

Linkages to the SDGs

The issue of pollution has direct linkages to several of the SDGs. In consideration of the connectedness of the terrestrial to marine ecosystems in terms of pollution, the nexus between land-based activities and developmental agendas are highly relevant.

- SDG2 that incorporates elements of sustainable production of food has connections to sustainable nutrient management, use efficiency and reduction of nutrient pollution.
- SDG6 incorporates minimization of pollution of freshwaters which convey pollutants to marine environments.
- SDG12 on sustainable consumption and production is highly relevant to incorporation of circular economy principles and practices that touch on higher resource use efficiency, recycling and minimization of harmful discharges to the environment.
- Climate change influences in the scope of SDG13 are important, as pollution entering the marine environment may introduce compounding challenges to marine ecosystems associated with changes in ocean chemistry in terms of rising acidity and temperatures. The emphasis will be on building more resilient eco-systems based adaptation measures, but also incorporation of mitigation measures.
- SDG17 on building partnerships continues to be of paramount importance. In this area, UN Environment emphasizes south-south cooperation with transfer of relevant technology solutions to areas of need through the myriad of partnerships the agency is engaged with.

c) Existing partnerships

• **Are many existing partnerships covering the theme of the dialogue? Are there identified gaps in coverage**?

- The key global partnerships covering oceans pollution under UN Environment fall within the **Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA**), which itself should be considered to be an effective Partnership. These are:
    - **Global Partnership on Marine Litter** (GPML): is a global partnership of international agencies, governments, NGOs, academia, private sector, civil society and individuals that seeks to protect human health and the global environment by the reduction and management of marine litter as its main goal.
    - **Global Partnership on Nutrient Management** (GPNM): is a multi-stakeholder partnership comprising of governments, the private sector, the scientific community, civil society organizations and UN agencies committed to promoting effective nutrient management (with a focus on nitrogen and phosphorus) to achieve the twin goals of food security through increased productivity and conservation of natural resources and the environment.
    - **Global Wastewater Initiative** (GW2I): is a global multiple stakeholder platform comprised of UN agencies, international organizations, governments, scientists, private sectors and major groups and stakeholders to provide the foundations for partnerships

to initiate comprehensive, effective and sustained programmes addressing wastewater management.

- The **Regional Seas Programme** is comprised of regional seas programmes that are inter-governmental mechanisms for marine resource governance of which several have associated marine pollution protocols. The GPA programme implementation is facilitated through the Regionals Seas programmes.
- The **Global Partnership on Waste Management** (GPWM) is supported under UN Environment's Economy Division and is an open-ended partnership for international organizations, Governments, businesses, academia, local authorities and NGOs to enhance international cooperation among stakeholders, identify and fill information gaps, share information and strengthen awareness, political will, and capacity to promote resource conservation and resource efficiency. There are some common work-themes with the GPA partnerships.

- **Who are the main actors involved in existing partnerships?**
  - The GPML is the front-line avenue for UN Environment for bridging the science-policy interface and assist catalyze innovation in addressing marine litter. The GPA-GPML will continue to assist in the formation of national and regional action plans for marine litter embedded within the Regional Seas Programmes that will augment land-based sources of pollution protocols where they exist. Cooperation between UNEP and FAO in respect to addressing ALDFG worldwide will continue. Wider partners and partnerships and will include IMO and Global Ghost Gear Initiative (GGGI) among others. Cooperation will continue with IOC-UNESCO in the development of methodologies of associated with the SDG target 14.1 indicator on floating marine debris particularly at the LME scale in transboundary waters to augment existing national measures such as indices of washed-up marine debris.
  - The GPNM will continue support work on the fate of reactive nitrogen and phosphorus in the marine environment through its consortium of stakeholders and technical support agencies such as IOC-UNESCO and IMO with contribution to the development of the SDG14.1 target indicator on eutrophication potential at the LME scale.
  - The GW2I will continue to enhance collaborations and partnerships primarily through the UN Water consortium around assisting countries meet the SDG6.3 target supported by the Global Enhanced Monitoring Mechanism (GEMI). In all aspects of mitigation of marine pollution, opportunities will be linked to wider partnerships around UNEP's 10-year framework of programmes on SCP patterns (10YFP).

- **Do we know how well existing partnerships are performing?**

What have been success factors?

- Strong investment among the engaged partners given vested interests in their respective fields. The three partnerships under the GPA have contributed to bridging cooperation at the global level and strengthening linkages to UN Environment's programme of work. Nesting of the partnerships within the GPA as secretariat has mainstreamed their work within that of the wider agency, thereby enhancing sustainability.
- There is increasing momentum among governments to address the issue of marine plastic debris that is being driven by a substantial lobby at the global level. This has contributed positively to the role of the GPML and its contributions through UN Environment. The GPML is at the centre of a recently launched Clean Seas campaign to combat marine litter.

- The partnerships are now all fairly well established with defined governance structures and recognized as providing a forum for exchange of knowledge and best practices. A key success factor is the composition of the partnerships which span broad stakeholder representation.

What are the main challenges identified with existing partnerships?

- Limited translation of the work of the partnerships into influential areas of government policy. There is some level of knowledge and best practice transfer in both technical and policy arenas, but could be substantially strengthened. Part of this issue is related to the fact that there is insufficient representation by governmental entities on the partnerships.
- Limited awareness of the partnerships and their work within countries. There are no specific protocols regarding establishment of national counterparts or affiliations to extend the work of the partnerships to the national level. Regional 'hubs' and action plans associated to the partnerships are being developed in conjunction with the Regional Seas Programmes which are linked to national obligations, mainly under pollution protocols (that are binding agreements).
- Resource and capacity limitations within the GPA to fully support the partnerships at the national level.
- Limited private sector engagement in terms of using the partnerships as conduits for knowledge uptake and incorporation of best practices in business practice.

Have successful partnerships on the theme been narrowly focused in scope, or more holistic, encompassing several related areas?

- The three pollution partnerships under the GPA have been relatively narrowly focused on the respective themes (nutrients, marine litter and wastewater) although there is more substantial overlap between the GPNM and the GW2I in the area of nutrients pollution.
- The relationship between the GPML (marine litter) and the GW2I (wastewater) in terms of microbeads/microfibers and marine micro-plastics pollution is converging in relation to issues associated with addressing these contaminants in wastewater streams.

d) Possible areas for new partnerships

- **Given challenges, opportunities and gaps, how could new partnerships help with implementation?**
    - Strengthened private sector partnerships in the work of UN Environment on marine pollution is a major priority area. The emphasis is on securing commitment from the private sector to more sustainable practices, innovation in manufacturing and processing, waste stream diversion and other related areas.

- **What actors would need to be involved for new partnerships to succeed?**
    - The following are sectoral interests that should become increasingly engaged in the GPA partnerships:
        - Private sector with global/regional reach – product supply
            - Textile/garment manufacturers
            - Large industrial wastewater generators
            - Pharmaceutical manufacturers
            - Plastic manufacturers; manufacturers in relation to plastics incorporated into packaging
            - Retailers (in relation to corporate and consumer responsibility)
            - Food production – supply and distribution

        - Fertilizer manufacture and distribution
        - Recreational/tourism
        - Maritime transport
    - Investment sector – private and public
        - Banks and other credit mechanisms
        - Investment facilitation agencies
    - Government/intergovernmental/ conventions
        - Regional Seas Programmes
        - Environment/agriculture/natural resources ministries
        - Marine affairs ministries
        - Finance ministries
        - Basel, Rotterdam and Stockholm Convention Secretariat
        - Other international and regional agencies with common agendas

- **What would be critical success factors?**
    - Ability of partnerships to effectively assist with addressing needs identified by countries
    - Strengthened communication and ease of knowledge exchange among partners and to target audiences
    - Strong commitment from governments to development and implementation of needed national policy reforms
    - Strong commitment from key private sector in addressing challenges, recognizing and using the partnerships as viable options for delivery on commitments
    - Viable resource streams to support the work of the partnerships
    - Strong commitment from governments to strengthening the effectiveness of the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA)

e) Guiding questions for the dialogue

- How might we strengthen and make more effective the multi-sectoral partnerships on marine pollution under the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA), and how to blend this within the inter-governmental process that governs the GPA?

- What are the key sectors that have potential for making major contributions to controlling oceans pollution and how to deepen engagement in existing and new partnerships?

- What emerging innovative partnerships, particularly those that involve the private sector and civil society, may be more closely linked to the work of UN Environment in addressing marine pollution?

THEME 2: Managing, protecting, conserving and restoring marine and coastal ecosystems

Theme 2 of the Thematic Partnership Dialogues is addressing SDG 14 Target 2 and 5:
14.2: *By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans*
14.5: *By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information*

a) Status and trends

The world oceans and coasts are being severally impacted from multiple stressors. We now understand that these include clear effects of ocean warming, ocean acidification and deoxygenation), alongside impacts of longstanding concerns, such like unsustainable fishing and pollution from various sources. Key ecosystems with high values of ecosystem services are being lost due to various stressors for their degradation. These ecosystems include coral reefs, cold corals, mangroves, seagrass beds, tidal marshes, sea mounts, thermal vents and sea sponge beds. The loss and degradation of these ecosystems have been reported in many assessment reports, such as World Ocean Assessment 1, Transboundary Water Assessment Programme Report, Atlas of Mangroves, Atlas of Coral Reefs, Atlas of Seagrass, etc. The values of the services associated with these ecosystems being lost of degraded appear to be substantial.

Many of the challenges that ocean planners and managers face today are caused by the cumulative and complex effect of different issues and drivers, involving environmental, social, and economic aspects at many levels. For example, intensive ocean-based resource extraction and fisheries is driven by increasing population growth, as are land-based impacts like pollution from intensive agriculture or urban development. In turn, these well-known impacts are amplified by climate change effects.

A holistic approach is needed to effectively address these issues. Area-based planning and management measures, including integrated coastal management, marine spatial planning and Marine Protected Areas (MPAs), are a key tools to implement ecosystem-based management addressing cumulative human impacts and build resilience to change, thereby maintain oceans and coasts healthy and productive a prerequisite for sustainable development. Effective ocean governance through cross-sectoral cooperation and coordination at regional to national levels is another important approach to enable sustainable oceans and coasts.

MPA coverage at global/regional/national level: The world has made some progress towards protecting the Earth's oceans. There are now 14,688 marine protected areas covering almost 15 million

square kilometers, or 4.12%[2] of the oceans overall – up from 3.4% per cent in 2014. The level of management effectiveness however is not known for some MPAs. Only 1% is strongly protected in no-take marine reserves. Further details are available in *Protected Planet Report 2016*[3].

Some main points on MPA coverage:

- While MPA coverage has grown significantly over the last decade, the geographical distribution of MPAs is very biased with a small number of countries making up the majority of the area of MPAs.
- There is a trend towards larger MPAs in light of scientific studies demonstrating the conservation benefits of scale in MPA establishment.[4]
- Many developing regions of the world have minimal MPA coverage in national waters.
- Coastal MPAs are underrepresented with implications for ecological representativity and sharing of benefits
- Out of 232 marine ecoregions, 84 have 10% or more coverage under existing protected areas[5]
- No agreed or standardised methodology yet to track progress on equitable management of MPAs

b) Challenges and opportunities

In order to maximize and optimize benefits of the ecosystem services for human benefits and welfare, involved marine sectors need to work together. Essentially the ecosystem approach requires addressing all human activities that impact the functioning of ecosystems and which benefits goods and services of coastal and marine ecosystems. However, there is a clear gap in setting up cross-sectoral cooperation and management through the area-based management measures, such as integrated coastal zone management, integrated ocean management, ecosystem approach to management. One typical good example is the cooperation between regional seas programmes and regional fisheries bodies, based on the ecosystem approach, which proves to be useful in advancing the ecosystem approach, such as OSPAR-NEAFC collective arrangement and MAP-GFCM Memorandum of Understanding.

Opportunities: Opportunities exist for setting up a proper inter-sectoral marine governance and management frameworks at local, national and regional levels. Further application of area-based management measures, such as integrated coastal zone management, marine protected areas, fishery closure will enhance such cross sectoral cooperation and create synergies in achieving other SDG14 targets (for example, 14.3 and 14.5) and relevant SDGs (such as SDG2 on food security).

Marine Protected Areas are regarded an important management instrument to ensure healthy and well-functioning oceans and coasts. They can be particularly effective when planned and implemented within wider integrated marine and coastal planning and resource management systems. Cleverly designed

[2] Note: current % coverage is being updated to account for recent MPA designations to inform CBD COP13

[3] https://www.protectedplanet.net/c/protected-planet-report-2016

[4] Graham J. Edgar et al., "Global Conservation Outcomes Depend on Marine Protected Areas With Five Key Features," Nature 506, no. 7487 (2014): 216–220, doi:10.1038/nature13022.

[5] As per analysis carried out by the European Commission's Joint Research Centre (JRC) based on the April 2016 WDPA release

and well-implemented MPAs can potentially become vehicles toward sustainable development, as they generate ecological benefits when protecting species, habitats, and ecosystem functions; social benefits when engaging stakeholders in MPA planning and benefit-sharing; and economic benefits when ensuring long-term natural resources or tourism incomes, among other blue economy assets.

However, taking-stock of recent and current practices and experiences in using MPAs for sustainable marine management, a set of challenges and opportunities can be identified strengthening the utility, effectiveness and long-term impact of MPAs. Some of challenges and opportunities of MPA are listed below:

Challenges:

- MPA designations may not reflect the actual management or impact of an MPA, or how it contributes to environmental, social and economic sustainability, including on short- and long term food security and livelihoods.
- Large MPAs are being created to ensure percentage coverage is achieved, but without actually placing the protection in areas where they are most strategic from a food and livelihoods point of view.
- Insufficient coordination of MPAs across sectors and between government agencies responsible for biodiversity/environment and fisheries, respectively.
- MPAs are not integrated into broader governance and management frameworks (e.g., fisheries management, ICZM, MSP).
- Need more equitable sharing of social and economic benefits derived from MPAs.
- General gap in understanding of benefits of MPAs for food security, livelihoods and regional stability.
- Limited connectivity among MPAs is halting ecosystems processes, functions and productivity
- Insufficient representativity and ecological coherence of MPA systems in areas with larger gaps
- There is a lack of sustainable financing tools for MPAs at local, national, regional and international levels

Opportunities:

- Support countries to ensure that all MPAs have robust management plans, which are being implemented and regularly revised in order to adapt management decisions: support the completion of management plans in progress and promote the development of these plans in MPAs which still have none.
- 5. Ensure that MPA planning considers economic and social issues and values related to MPA establishment - both positive and negative in short and long-term.
- Explore effective ways for implementation of integrated ocean and coastal management, including through networks of MPAs, at a regional scale, to achieve good ocean health.
- Develop cross-departmental arrangements to ensure that multiple-objective MPAs are implemented effectively.
- Demonstrate the economic and social value of MPAs and rake into account socio-economic aspects as prerequisite for effective management.

- Develop national and regional databases of MPA habitats, species and socio-economic data are established and used as a tool for MPA planning and management
- 5. Where possible and appropriate, encourage the equitable sharing of social and economic benefits derived from MPAs, Including for poverty alleviation and improving the standard of living of local populations based on rigorous evaluations of various cost-benefits associated with MPAs.
- Enhance understanding of how marine connectivity is ensure using tools such as marine spatial planning and ocean zoning, integrated coastal zone management, and environmental impact assessment.
- Strengthen coverage, quality and reliability of habitat and species inventories and quality mapping to improve the representativity and connectivity and consolidate the monitoring.
- Identify and incorporate under-represented ecosystems and other components of marine biodiversity in existing MPA systems (on a national and regional level).
- Link MPAs with the EBSA process to ensure that new MPAs are considering relevant ecological/biological significance.
- Develop public-private partnerships to support MPA management. Train key stakeholders on a local and national level as well as influential national institutions on sustainable financing systems for MPAs and on the links between business plans and management performance, including training on the implementation of existing or known financial systems.
- Develop new national and regional trust funds for MPAs. Establish national experiments for innovative financing mechanisms, which will contribute to funding the national system of MPAs and/or individual MPAs.
- Develop sustainable and innovative financing mechanisms in support of regional networking activities dedicated to strengthening knowledge, capacity and policies on a local and national level on MPA issues (regional taxes, payment for environmental services, private contributions, and compensation measures.
- Reinforce ecological, social economic information as well as knowledge of the usages and pressures found in MPAs and their surrounding areas, as well as the anticipation of the development of future activities or pressures to develop co-management processes, establishing baselines and elaborating/revising management plans.
- Evaluate ecosystems services provided by MPAs.

c) Existing partnerships

Under the UN Environment framework, the following partnerships are noted relevant to achievement of SDG 14.2 and 14.5:

- Regional Seas Programme, covering 18 regional seas programmes targeting regional scale ecosystems.
- Global Programme of Action for the Protection of the Marine Environment from Land-based Activities with the UN member States.

- Blue solutions with GIZ of Germany, GRID Arendal and IUCN focusing on solution based good practices in ecosystem-based management and development of the online knowledge-platform '*PANORAMA – Solutions for a healthy planet',* with support from the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), Germany.
- Blue Carbon and Forests with Conservation International, Global Environment Facility, Blue Venture, US Government, Indonesian Government, GRID Arendal and others.
- Global Coral Reef Partnership with regional seas programmes closely linked with International Coral Reef Initiative and Global Coral Reef Monitoring Network.
- Partnership for Regional Ocean Governance with Institute of Advanced Sustainability Studies and institute du développement durable et des relations internationals.
- Regional Sea's networks of MPA planners, decision-makers and practitioners, for example the Caribbean MPA Managers (CaMPAM) network and the Mediterranean MPA Network (MedPAN). Similar networks are being developed and supported in other regions.
- UN Environment co-sponsors the "10X20 Initiative", established and supported by group of countries (Italy, Palau, Bahamas, Kenya, Poland, others), the Ocean Sanctuary Alliance, other partners and MPA experts, to help achieve SDG 14.5 through capacity building for effective and holistic MPA development and implementation.

d) Areas for Possible New partnerships

1. A new, interdisciplinary partnerships among UN agencies, civil society, academia, Regional organisations and projects, private sectors, focusing on area-based solutions and synergies to support ocean and coastal governance and management within wider sustainable development processes. Such a partnership can: (a) develop practical tools and solutions to support integrated area-based management (e.g. Integrated Coastal Zone Management, marine spatial planning, MPAs) at regional and national level joining up marine and coastal management objectives with sustainable development planning and decision-making; (b) provide advice, training and pilot-application of new tools; and (c) share practical experiences and lessons across countries, regions and globally.

2. A global ocean data and knowledge-sharing mechanism to support SDG implementation – integrating environmental, social, economic information for policy-making and spatial planning. Link existing efforts, including regional data sharing infrastructures and capacities, it would make this information readily available to countries, regions, as well as facilitate collaboration between scientists, decision-makers, managers at regional level to realize the socio-economic benefits of integrated area-based management (i.e. MPAs, ICZM, MSP).

3. Support to MPA integration into national strategies related to sustainable development. There is a need to support collaboration that integrate policies, build institutional bridges and clarify governance frameworks between sector-specific policies and policies relevant to MPAs at national level. Such initiative would support institutional agreements between fisheries and MPA institutions, as well as other sector such as tourism, at national and regional levels promoting synergies and/or clarifying shared responsibilities. Develop new regional cooperation at scientific knowledge and management levels to reinforce the role of MPAs towards climate change adaptation and mitigation.

4. Support coordination of different Regional MPA networks in the world to enhance capacity-building mechanisms and tools, to capitalize, develop and replicate such tools. Regional MPA networks (e.g. MedPAN, CAMPAM, RAMPAO) can promote MPAs as tools for addressing climate change mitigation and adaptation, as well as support monitoring of the state and effectiveness of MPAs through more harmonized monitoring systems including comparable sets of natural, socioeconomic and management effectiveness indicators at national and regional levels.

5. Partnerships for international sustainable financing mechanisms for long-term MPA networking (to support permanent platforms of MPA managers at regional level (such as MedPAN, CaMPAM, RAMPAO, others) as well as MPA management.

e) Guiding questions for the dialogue

1: What partnerships would ensure stakeholder engagement that best contributes to managing, protecting, conserving and restoring marine and coastal ecosystems? Particularly role of civil society, private sector, women's groups?

2: What are the roles of science, indigenous knowledge, available management/restoration technologies and experiences for management and conservation of ecosystems?

3. What are the contributing factors of good ocean governance at the national, regional and global levels in managing, protecting, conserving and restoring marine and coastal ecosystems?

4. How best the Marine Protected Areas can be used for the purpose of managing, protecting, conserving and restoring marine and coastal ecosystems?

14.3 Minimizing and addressing ocean acidification

a) Status and trends

- Oceans are a very significant carbon dioxide sink and play an important role in the climate system. Ocean acidification has emerged as one of the most significant global threats to marine organisms, ecosystems, services, and resources. Since the industrial revolution, mean surface ocean pH has dropped by 0.1 units, corresponding to an increase in acidity of 26%. If carbon dioxide emissions continue at the present rate, mean surface pH is predicted to fall by another 0.3 to 0.4 units (equivalent to a 100-150% increase in acidity) by the end of this century. This has potentially dramatic ecological and socio-economic consequences.
- Since 2006, the United Nations General Assembly has addressed issues related to climate change and oceans in its resolutions on oceans and the law of the sea, including identifying key scientific gaps and management needs.

- IPCC is addressing ocean acidification in some detail, e.g. in AR 5 and in the Special Report on Climate Change, oceans and the cryosphere currently under development. The Subsidiary Body for Scientific and Technological Advice has recognized ocean acidification as an emerging issue relevant to the UNFCCC, with research as a priority need, and encouraged consideration of ocean acidification in the global climate observation system. UNFCCC CoP-17 recognized the need for greater effort to better understand and reduce the loss and damage associated with the impacts of slow-onset events, including ocean acidification.
- The report on the structured expert dialogue on the 2013–2015 review (FCCC/SB/2015/INF.1) notes that there is a high likelihood of meaningful differences between 1.5 and 2 degrees of warming regarding the level of risk from ocean acidification, implying that the 2-degree temperature target of the Paris Agreement may not avoid significant risk associated with ocean acidification.

b) Challenges and opportunities

- The characterization of ocean acidification and its system-level impacts in regional and local environments is challenging, and data are lacking in many locations, especially in coastal areas where natural variability can be large.
- Ocean acidification affects systems under pressure from warming, oxygen depletion, pollution, over fishing etc. but interactions between ocean acidification and such stressors and cumulative ecosystem impacts are not well understood.
- Social and economic impacts of OA, in particular improved damage estimates of OA, are needed to support climate policy decisions, including mitigation and adaptation planning.
- The top level SDG 14.3 indicator ("Average marine acidity (pH) measured at agreed suite of representative sampling stations") cannot quantify minimized impacts of ocean acidification. The acidity of seawater will, local and natural fluctuations notwithstanding, continue to increase at relatively predictable rates in the coming century. Aragonite saturation state is arguably a more ecologically relevant measurement than marine acidity. Three-dimensional mapping of the distribution of sensitive species in ocean space may be as crucial as the measurement of acidity itself. However, implementation of the indicator would entail enhanced scientific cooperation.
- Particularly valuable indicator systems are tropical coral reefs including mesophotic reefs; cold water coral ecosystems; polar seas; and carbonate plankton based trophic chains. Emphasis may be placed especially where such systems support human communities and economic activity, including in many Small Island Developing States and areas with high dependence on fisheries and aquaculture.
- Redefining the top level SDG indicator 14.2.1 and/or developing a proper indicator framework for target 14.2 will improve tracking of progress as well as implementation of actions. This could, as possible, encompass water quality parameters (e.g. aragonite saturation, pH); physiological parameters (e.g. calcification, skeletal density, growth of indicator species); and ecosystem parameters (benthic composition and production/erosion rates). The "agreed suite of sampling stations" should include vertical profiles.

- An analysis of the implications of ocean acidification for implementation of the 2030 agenda is warranted, to identify under which goals and targets ocean acidification is likely complicate or undermine efforts; to identify how implementation of the agenda can address ocean acidification by reducing CO2 emissions; enhancing ecosystem resilience to ocean acidification; locally mitigating its impacts or otherwise reducing economic and social vulnerability; and as appropriate to explore establishment of further targets at the global level.
- Strengthened communication that addresses the needs of different stakeholders, including policy-makers, environmental planners and managers and the private sector, can support and enable action across sectors.

c) Existing partnerships

- The Global Coral Reef Monitoring Network (GCRMN) works through a global network to strengthen the provision of best available scientific information on and communication of the status and trends of coral reef ecosystems, for their conservation and management. GCRMN is a network of the International Coral Reef Initiative, recognized by UNGA for its contribution in aggregating coral reef data and reporting on it at national, regional and global levels. Partners in GCRMN include governments, UN Agencies, academic and research institutions as well as civil society. GCRMN has prepared or is preparing regional reports in the Caribbean, Western Indian Ocean, Pacific Islands, and is initiating the preparation of a report in the and Eastern Tropical Pacific. Regional reports will support the preparation of a global report for launch in 2020. A process has been initiated to strengthen GCRMN as an ocean observation network, including network coordination and data and reporting services. Financial and institutional support towards GCRMN's global and regional coordination, development of a data portal/data service, and establishment of regional networks and preparation of regional data inventories and reports, are high priorities. Enhanced engagement in and contributions to monitoring and reporting by a range of entities spanning public and private sectors as well as civil society would enhance its impact.
- The Global Ocean Acidification Observing Network (GOA-ON) aims to expand coverage of ocean acidification measurements to areas where there is currently little or no data, in order to provide a global understanding of ocean acidification conditions and ecosystem response, inform modeling efforts and ultimately policy development. GOA-ON involves more than 300 members from 45 countries and organizations, and has contributed to advancing ocean acidification monitoring worldwide, including by engaging scientists from low-income countries and providing training and guidance. A Data Portal is currently in development. Broader country participation in and data submissions through the network would strengthen it. Establishment of supporting regional OA networks is important to identify opportunities for scientific collaboration, foster data sharing and promote access to global ocean acidification data.

d) Possible areas for new partnerships

- Strengthening GOA-ON and GCRMN as indicated above, in particular financial and institutional support towards the development of regional networks under these partnerships, would greatly enhance their utility and improve implementation.
- Enhanced alignment and interfacing between GOA-ON and GCRMN would improve research and monitoring of ocean acidification as well as its socio-economic impacts, thereby concretely and directly enabling better SDG 14.3 related planning, implementation and tracking.
- Broadened engagement with the private sector, e.g. in relation to technology including automation, remote sensing and data management services, as well as in relation to vulnerability assessments and building business

e. Possible panelists and moderators

- Ove Hoegh-Guldberg, Global Change Institute
- Ruth Gates, International Society for Reef Studies
- Jamaluddin Jompa, Secretary General of Indonesian Coral Reef Society
- Mark Eakin, NOAA