3. Adaptation

Main Recommendations

3.0. Implement ecosystem-based adaptation (EbA) strategies through integrated coastal and ocean management institutions at national, regional, and local levels to reduce vulnerability of coastal/ocean ecosystems and of human settlements, and build the management capacity, preparedness, resilience, and adaptive capacities of coastal and island communities.

3.1 Carry out adaptation measures through the integrated coastal and ocean management institutions created at national and local levels in all regions of the world since the 1992 Earth Summit, in close cooperation with disaster risk agencies and affected sectors and communities

3.2. Apply ecosystem-based approaches to adaptation, especially regarding green infrastructure to provide natural system protection for defense against sea level rise, storms, and flooding

3.3 Establish and effectively manage coherent networks of marine protected areas in national and international waters to protect marine biodiversity and to enhance resilience of marine ecosystems to climate change, achieving the Convention on Biological Diversity's Aichi Biodiversity Target of conserving at least 10% of marine and coastal areas by 2020

3.4 Promote and apply Blue Economy approaches with emphasis on low-carbon solutions and economic benefits to developing countries and SIDS (following SDG target 14.7)

Brief History and State of Play Regarding Adaptation in Coastal and Island Areas

Adaptation to climate change progressively emerged as a topic of research, action and negotiation in the 1980s. It was already central to IPCC's first assessment report[140] which underlined that "limitation [of greenhouse gases emissions] and adaptation strategies must be considered as an integrated package and should complement each other to minimize net costs. Strategies that limit greenhouse gas emissions also make it easier to adapt to climate change." Attention then grew from the beginning of the 1990s, reaching a high peak from the mid-2000s.

Adaptation Negotiations under the UNFCCC

As noted by Garnaud (2009), from the outset, the Convention stressed the importance of both mitigation and adaptation[141]. However, adaptation was actually played down initially in the work undertaken under UNFCCC auspices. The Convention does not define adaptation clearly, which made debates on the subject more theoretical than those on mitigation. At the same time, reducing GHG emissions was seen as a matter of urgency, and there was an implicit belief that this would be sufficient to avoid most of the consequences.

Only in the 2000s did the international community fully realize on the one hand that mitigation efforts would not be sufficient to avoid all significant consequences of climate change and, on the other hand, that adaptation needed to be supported, in particular because of the speed of unavoidable changes. On the international negotiation scene, this resulted in pressure from developing countries– generally considered to be the most at risk from the consequences of climate change–and civil society for adaptation to be fully part of the agenda. Starting with the seventh Conference of the Parties (COP 7) in Marrakesh in 2001, three adaptation funds were created and since Bali COP 13 (2007) adaptation and mitigation have been increasingly on an equal footing. In Cancun (COP 16, 2010) Parties adopted the Cancun Adaptation Framework.[142] They reaffirmed that adaptation must be addressed with the same level of priority as mitigation.

Throughout these two decades of international talks on adaptation, the focus has largely been on financial considerations, especially the assessment of adaptation costs and identification of funding sources, which have typically involving bargaining discussions between developing and developed countries on the scope and support of adaptation activities.

At present activities on adaptation under the UNFCCC are multiple and include[143] (see Table 3.1):

- Activities of the Least Developed Countries Expert Group[144] established in 2001 and the Adaptation Committee[145] established under the Cancun Adaptation Framework;
- Approaches to address loss and damage associated with climate change in developing countries that are particularly vulnerable to the adverse effects of climate change,[146] also as part of the Cancun Adaptation Framework and the subsequent Warsaw International Mechanism for Loss and Damage (COP 19, 2013);
- The Cancun Adaptation Framework, including five clusters: implementation, support, institutions, principles and stakeholder engagement;
- Implementing adaptation action through national adaptation plans (NAPs) established under the Cancun Adaptation Framework, and national adaptation programmes of action (NAPA);
- The Nairobi Work Programme[147] on impacts, vulnerability and adaptation to climate change;
- The development and transfer of technologies, research and systematic observation;
- Supporting adaptation through finance, technology and capacity-building.

Workstreams		**Groups and Committees**		
Loss and Damage	Nairobi Work Programme	Adaptation Committee	LDC Expert Group	Loss and Damage Executive Committee
National Adaptation Plans	National Adaptation Programmes of Action			

Table 3.1. Adaptation workstreams, groups and committees under the UNFCCC
(Source: http://unfccc.int/adaptation/items/4159.php)

Adaptation Practices at National and Local Levels

The international attention to adaptation under the UNFCCC soon translated into the development of adaptation policies, plans and projects at national and local levels. This was initiated in developed countries but expanded to the developing world, often with the support and under the impetus of international development cooperation. In many cases, extreme events such as cyclones or floods have also been important adaptation stimuli, but proactive adaptation is the most commonly reported adaptive response, particularly in developed countries.[148]

Adaptation efforts often take the form of either spatial or sectoral adaptation plans and strategies (e.g. adaptation plans for the agriculture or tourism sector), with National Adaptation Plans (NAPs) in all countries, and National Adaptation Programmes of Action (NAPAs) being prepared in Least Developed Countries. Many applied forms of adaptation have also been tested at the policy/strategy levels as well as through tools and practices to build resilience throughout the sectors and ecosystems. Coastal areas have consistently been among the top priorities for adaptation efforts—as the early effects of climate change and/or the extreme events associated with future changes—are often more visible and tangible in coastal areas (e.g., erosion, saltwater intrusion, floods, storms, coral bleaching etc.).

A key challenge is to assess the extent to which action taken leads to actual adaptation. As Berrang-Ford et al. (2011) find, understanding of the magnitude of the adaptation challenge at a global scale is incomplete, constrained by a limited understanding of whether and how adaptation is taking place. The authors underline that "considerable research on adaptation has been conducted yet the majority of studies report on vulnerability assessments and natural systems (or intentions to act), not adaptation actions."

3.1 Carry out adaptation measures through the integrated coastal and ocean management institutions created at national and local levels in all regions of the world since the 1992 Earth Summit, in close cooperation with disaster risk agencies and affected sectors and communities

Adaptation plans and strategies are being developed at various scales and for the most vulnerable sectors (fisheries, tourism, infrastructures etc.). These need to be implemented urgently and need to converge

with integrated coastal[149] and ocean management (ICM) approaches and be carried out through the integrated coastal and ocean management institutions created at national and local levels in all regions of the world since the 1992 Earth Summit, in close cooperation with disaster risk agencies and affected sectors and coastal communities.

ICM and adaptation to climate change share the same general sustainable development objective—the sustainability of human activities and their underlying ecosystems. Moreover, ICM and adaptation share similar principles: institutional coordination, public participation in decision-making, strong science-policy interfaces, etc. ICM and adaptation are defined as continuous, dynamic and adaptive processes of decision-making and implementation. Neither imply reaching a stable, final and utopian condition: the management of a coastal zone is never totally integrated just like a coastal system can never be totally adapted to climate change.

These shared objectives and principles mean that in practice ICM and adaptation policies, plans and projects typically employ similar tools and instruments. For instance, by contributing to the prevention of coastal erosion and the protection of biodiversity, regulations on the extraction of sand and river sediment contribute to adaptation and to ICM implementation. Land-use, urban development and regional/island plans are fundamental tools for both.

Overall, ICM is key to effective adaptation, and adaptation must be accounted for in ICM planning processes and implementation. There is a need to implement integrated adaptation approaches which focus on reducing community and ecosystem vulnerabilities and enhancing their resilience to the multiple pressures they face, including those related to development and to climate variability, extremes and change. In practice they usually cannot and should not, be disentangled.

As well, ICM institutions should work on adaptation efforts in close coordination with relevant disaster risk and emergency preparedness and response agencies at national, regional, and local levels. An excellent example of such joint action is the recent coming together of efforts on climate change adaptation with efforts on disaster risk reductions in the Pacific Islands region.

Current State of Play of the Issue within the UNFCCC

The push for true integration—that is, ICM—traditionally focused on coral reef, mangrove, estuaries, and beaches—linked systematically to MSP—focused on offshore environments and activities. UNFCCC can help guide countries to do these two types of planning in tandem so as to maximize both adaptation potential, and also to maximize mitigation potential. This also links to conservation finance because innovative financing mechanisms can be identified and then spatial planning (ocean zoning or MPAs) can be established to keep funds flowing from buyers (beneficiaries of ecosystem services) to sellers (communities, NGOs, or government agencies that can protect or manage the habitat providing the ecosystem services). For instance, a marine spatial plan can identify mangrove areas that generate funds from carbon credits (mitigation) and also generate funds from fisheries interests that see benefit in preserving the mangrove as fish nursery habitat, while at the same time protected mangrove can help with shoreline stabilization. When not just coastal areas but also offshore ones are considered in the mix, the mitigation and adaptation potential can be realized, and all the opportunities for generating conservation finance.

3.2. Apply ecosystem-based approaches to adaptation, especially regarding green infrastructure to provide natural system protection for defense against sea level rise, storms, and flooding

Ecosystem-based Adaptation (EbA) can be defined as follows:[150]

- EbA is the sustainable management, conserveation, and restoration of ecosystems to assure the continued provision of vital services that help people adapt to the adverse effects of climate change;
- EbA increases ecosystem resilience to reduce human vulnerability in the face of climate change and can be applied to coastal and marine ecosystems to ensure that they are able to continue to provide vital services (e.g. storm protection);
- EbA strategies can be more cost-effective than physical infrastructures and engineering projects and are often more accessible to the rural poor.

How Ecosystem-based Adaptation Can and Should be Applied in Coastal and Marine Areas

Coastal flooding, erosion, inundation, and extreme weather events affect hundreds of millions of vulnerable people, important infrastructure, tourism, and trade, causing significant human suffering and losses to national economies. In 2011, insured losses from natural disasters reached an all-time high and impacts are predicted to worsen with climate change and population growth. The proportion of the world's gross domestic product (GDP) annually exposed to tropical cyclones has increased from 3.6 percent in the 1970s to 4.3 percent in the first decade of the 2000s.[151] Insurers have paid out more than $300 billion just for coastal damages from storms in the past 10 years, which often goes toward rebuilding similar coastal infrastructure that is still vulnerable to coastal storms and flooding.

Coastal and marine habitats, particularly coral reefs and mangroves, can substantially reduce exposure and vulnerability, providing natural protection from risk. Yet the value of these systems as "green infrastructure" is still not fully recognized, and they continue to be lost and degraded. The Global Assessment Report on Disaster Risk Reduction highlights that economic loss risk resulting from tropical cyclones and floods is growing as exposure of economic assets increases and the status of ecosystem services degrades,[81] and that societies are excessively discounting risk in development choices, particularly in coastal areas.[152] In terms of habitat loss statistics, 30 to 50 percent of wetlands have already been lost,[153] 19 percent of mangroves were lost from 1980–2005,[154] and 75 percent of the world's coral reefs are now rated as threatened.[155]

The trends in habitat loss and the concomitant loss of coastal adaptation services will continue unless the values of these habitats are accounted for in policy and decisions. The importance of mainstreaming the coastal protection value of mangroves and reefs is great, as there are substantial opportunities and risks that will affect the ecosystems and the communities that rely on their services during the next 5 to 10 years. 60% of the world population is expected to live in urban areas by 2030, with a greater concentration in coastal areas. As coastal development increases, there will be heavy investments in coastal infrastructure and the potential loss of more coastal habitats and their services.

Billions of dollars are being dedicated to reduce risks from disasters and climate change, creating both threats and opportunities for natural systems. Total Fast Start Finance commitments under the United Nations Framework Convention on Climate Change (UNFCCC) through 2012 include roughly $3 billion for climate protection assistance. In the United States, the Federal Emergency Management Agency (FEMA) spends $500 million per year to reduce flooding hazards. Middle-income countries—such as Brazil, China, and Colombia—are making multi-billion dollar investments to address the risks of flooding and other disasters exacerbated by climate change. Most of these funds are destined for the creation and maintenance of "grey infrastructure," such as seawalls, which will further degrade coastal ecosystems, and may not be cost effective for risk reduction when compared to more natural and hybrid alternatives (hybrid approaches combine natural features with built infrastructure to enhance coastal resilience).

Following the 2004 Indian Ocean tsunami and Hurricane Katrina in 2005, there has been substantial scientific focus on recognizing and quantifying the benefits from mangroves and coral reefs. There has also been an increasing focus on identifying the policies needed to encourage ecosystem adaptation and restoration specifically for hazard mitigation and risk reduction.

In many locations, some of the most cost-effective solutions for coastal adaptation will be to reduce threats through improved management of existing mangroves and coral reefs.

McLeod (2015) identifies a number of measures to apply ecosystem-based adaptation for coastal and island adaptation, focusing especially on the central roles of coral reefs and mangrove forests as a major ways to defend the coast. As offshore breakwaters, the basic engineering models of how reefs provide coastal adaptation are well known. Engineering models and field demonstrations of the role of mangroves in flood and erosion reduction have been developed over the past several decades and clearly demonstrate effectiveness.

McLeod (2015) puts forward a set of recommendations for consideration within both the UNFCCC process and outside the UNFCCC:

- *Develop national coastal risk maps*. This is a critical first step for overall risk reduction and coastal adaptation. Many countries are moving toward developing these maps, creating opportunities to include natural adaptation benefits in planning. These national risk maps should identify where and how much risk reduction value is currently provided by reefs and mangroves, and then prioritize where coastal habitat adaptation and restoration offer the greatest risk reduction.

- *Develop guidelines or best practices for restoration of mangroves and reefs for coastal adaptation*. There is a growing body of guidance on mangrove restoration, which, while very good, can still be enhanced. There is little-to-no guidance on best practices for reef restoration for coastal adaptation.

- *Develop large scale commitments to conserve and to restore degraded mangroves and coral reefs*. In Vietnam, for example, the amount (hectares) of mangrove conservation and restoration has been at the same scale as the past loss of these habitats. Few other countries have made such commitments.

- *Include coral reefs and mangroves in national adaptation plans (NAPs). Include coral reefs and mangroves in support programs for adaptation and risk reduction.*

- *Identify sustainable financing options for mapping coastal ecosystems, large scale reef and wetland restoration and development of strategic plans for the related systems that support natural infrastructure investment* (specific possibilities are noted in Section 5).

3.3 Establish and effectively manage networks of marine protected areas in national and international waters to protect marine biodiversity and to enhance resilience of marine ecosystems to climate change, achieving the Convention on Biological Diversity's Aichi Biodiversity Target of conserving at least 10% of marine and coastal areas by 2020

Marine protected areas (MPAs), along with strictly protected zones within marine spatial plans have been shown to boost productivity, safeguard vulnerable biodiversity, and enhance the values that humans derive from the marine and coastal environment. While networks of MPAs cannot halt climate change, they are key components of climate change and resilience and can ultimately help maintain the ocean's biodiversity and ecosystem services.

Despite several thousand MPA designations that now exist the world over, MPAs have not been used to their full potential to mitigate climate change, facilitate adaptation, or heighten the resilience of natural systems–and the human communities that depend on them–in the wake of inevitable climate change.

When MPAs are embedded in a wider and more holistic marine spatial planning (MSP) regime, the investments made in protection can be safeguarded as environmental conditions deteriorate, or as uses of the marine environment intensify.

The process of developing an integrated management system for coastal and offshore areas and establishing MPAs, has been impeded by a number of factors—i.e., limited knowledge of how our oceans will function in a rapidly changing climate; the challenges of competing political and socio-economic interests; the need to act at different levels (national, regional and global); and the need to work with communities and sectors who both benefit from but also impact the coastal and ocean ecosystems. These trends have had serious consequences on the investments devoted to the development of MPAs.

MPAs are most effective when planned within the broader context of marine planning for the blue economy. This way, protected areas can help meet biodiversity targets and maintain nature's values, while other places are provided for expanding ocean use and maritime revenues. Countries would do well to commit to systematic planning within their jurisdictions, as well as working cooperatively to ensure that shared waters/resources are effectively managed. MPAs and marine management outside MPAs (including ICM) should be done in a coordinated manner at a variety of levels: local or community-based, regional, national, and trans-boundary or international. UNFCCC should work

with UNEP Regional Seas to achieve both standardization of management approaches and monitoring, and to ensure that the expanding blue economies within any ocean basin or region do not lead to biodiversity loss or conflict.

Benefits of and Priorities for MPAs

MPAs provide many benefits, not the least of which is raising public awareness about the global ocean, and the special marine places that still exist, and the opportunities we have to safeguard the seas. Protected areas can enhance fisheries production, protect habitat from degradation, and help reduce risks to property and livelihoods. MPAs also serve an important function as sentinel places, providing control sites for scientific study that enhances our understanding of marine ecology and marine management. Effectively placed MPAs can not only protect coastal communities, livelihoods, and national economies, but also improve resilience to impending climate changes such as sea level rise, ocean warming, changes to ocean circulation, and ocean acidification. MPAs, when encompassing carbon-sequestering habitats such as mangroves, seagrasses, and salt marshes, can not only mitigate against climate change–they can do so while delivering a host of other valuable ecosystem services as well.

The priority for MPAs should be protecting Key Biodiversity Areas (KBAs) and supporting the resilience of biodiversity and ecosystem services, especially vulnerable marine habitats with high societal value such as coral reefs, mangroves, estuaries, and deep-sea habitats, such as canyons, and seamounts, which contribute to climate change mitigation.

Ecosystem services are the natural by-products of healthy, well-functioning environments and in all environments include provisioning for food and water resources, as well as regulating and supporting.

Networks of MPAs can be seen as and relied upon as part of conservation strategies for poverty reduction and environmental sustainability, particularly with respect to climate change. Networks of MPAs respond better to climate change and other stressors when effectively managed; MPA management effectiveness should be enhanced. In order to effectively adapt to climate change, zonation schemes and adaptive management should be flexible. The response to climate change by networks of MPAs is enhanced if other stressors and the cumulative impacts of stressors are reduced.

Management effectiveness can be enhanced through governance schemes that incorporate design, access and benefit-sharing by local communities; education and training; inter-sectoral coordination; continued communication; and transparency. Gaps in the distribution of current networks of MPAs do exist and tend to be mostly coastal. Networks of MPAs must be representative and distributed consistently to be effective.

The Usefulness of Marine Spatial Planning

Marine Spatial Planning (MSP) can be used to promote sustainable use of ocean space and resources, while at the same time meeting social and conservation objectives. In some scenarios, MSP is used primarily to reduce conflict between big, industrial users. However, effective MSP can do much more: it can link to coastal planning to create truly effective ecosystem-based management, in which degradation of important ecosystems is prevented by focusing management on drivers of degradation (even if those drivers do not trace back to ocean use but rather have their base in land and freshwater use).

This sort of holistic planning also creates opportunities for transboundary collaboration to effectively manage shared resources. MSP and related ocean zoning can ensure that ecologically important areas are fully represented in a mosaic of use and protection. Finally, the planning process can ensure that the needs of local communities, and the safeguarding of values that extend beyond those captured by large maritime industries, are considered in decisions on how to allocate space and resources in an equitable way, while promoting economic growth.

UNFCCC

The UNFCCC is perfectly poised to assist countries in utilizing these valuable tools to their full potential. Countries that are already committed to establishing MPAs, as for example those that have signed and ratified the Convention on Biological Diversity and support the Aichi Targets, can and should do more

than establishing protected and managed areas in least-used areas in order to fulfill their international commitments. Instead, protected areas, as well as zones of highly regulated use within a matrix of ocean zones derived from marine spatial planning, should be established in ecologically important areas that are under the most threat from human activity. By directing the use of the MPA tool toward the most valuable areas, and by designing the management regime to address the real and present threats that these ecosystems face, MPAs will prove to enhance resilience so that ocean uses can continue, and ocean values will not diminish.

Bottom Line

Ultimately the role of networks of MPAs is to ensure biological and ecological connectivity and enhance resilience of marine ecosystems to climate change and thus maintaining ecosystem services. There is the opportunity to use them as sentinel (research) sites to help track the effects of climate change but as well at the same time as key component of any climate change strategy.

We have the opportunity to re-assess existing conservation and sector management strategies at national, regional and international levels by using the best knowledge at hand to protect the ecosystems that provide critical ecosystem services through the creation of large, coherent and resilient networks of MPAs.

Recommendations

- *MPAs should (1) be based on an ecosystem approach, including human well-being; (2) be able to identify systems of governance for sustainable MSP processes; (3) boast a new agenda for scientific research; and (4) take into account existing relevant processes including the development of criteria for identification and selection of new MPAs*

- *Provide technical assistance for countries to perform and use ecosystem services assessments to determine where protected and managed areas and zones should be implemented.*

- *Innovative and appropriate financial mechanisms, including the use of carbon credits/offset (as a way to pay for ecosystem services) and fiduciary trusts or debt/nature exchanges. The Green Climate Fund (GCF) is an opportunity for developing countries to receive support for mitigation and adaptation efforts, including support for MPA networks.*

- *Global networks and coordinated efforts to monitor the role and performance of networks of MPAs to achieve greater climate resilience are needed such as the International Marine Protected Areas Agenda of the IUCN Global Marine and Polar Programme, the Sustainable Ocean Initiative (SOI) of the Convention on Biological Diversity (CBD).*

3.4 Promote and apply Blue Economy approaches with emphasis on low-carbon solutions and economic benefits to developing countries and SIDS (following SDG target 14.7)

The ocean currently provides food, livelihoods, and economic opportunities for a large portion of the world's population, yet recent projections suggest that demand may grow much faster in the coming decades as this population climbs to 9.6 billion, with greater purchasing power and need for additional supplies of food and energy. [156] As this new phase of growth begins, more and more the term 'industrialization' is being used to describe the scale of economic activity in and around the ocean.[157] However, as countries increasingly look to the ocean for new sources of growth, the ecosystems upon which it depends are changing at an unprecedented rate.[158] In June 2015 the G7 Science Academies issued a statement of scientific consensus that human activities are leading to changes in the ocean that will significantly impact societies and well-being.[159]

As consensus grows that human activities are significantly changing ocean ecosystems, and at the same time projections suggest that many of these activities will rapidly accelerate in the coming decades, the concept of a '**blue economy**' has emerged in policy conversations around the globe. The conversation began in Rio+20 in 2012, as countries articulated the concept of a 'green economy' to align their development aspirations to environmental health.[160] From that discussion, the focus shifted seaward to the 'blue economy' and 'blue growth', as illustrated in the recent formation of FAO's 'Blue Growth network'[161] and the June 2015 World Ocean Summit focused on the blue economy, convened in Lisbon by the Economist.

With the adoption by the UN General Assembly of a **Sustainable Development Goal (14)** to conserve and sustainbly use the ocean—and notably to increase the economic benefits to small island developing states and least developed countries from sustainable use of ocean resources—the concept is being adopted as policy by a growing number of countries. For example, coastal governments with large ocean economies such as China, the E.U. Portugal, South Africa, and Indonesia have already started to put in place policy frameworks to achieve blue growth, as have small island states such as Grenada, Mauritius, and Seychelles.

The Baseline: The Ocean Economy

Despite the importance and unique role that the ocean plays in providing food, livelihoods, and economic growth, this contribution often remains undervalued and poorly measured. Indeed, Park and Kildow (2014)[162] note that 14 countries have 14 different definitions, but suggest the following definition: The ocean economy is the economic activities that take place in the ocean, receive outputs from the ocean, and provide [inputs] to the ocean.

Box 3.1 Defining the Blue Economy: A Working Definition

From the Economist (June, 2015):
"What is the difference between the ocean economy and the blue or sustainable ocean economy? Is it simply that a sustainable ocean economy is one where the environmental risks of, and ecological damage from, economic activity are mitigated, or significantly reduced? Is it enough that future economic activity minimizes harm to the ocean, or rather, should the aim be to restore its health?

The following is an adapted working definition: A sustainable ocean economy emerges when economic activity is in balance with the long-term capacity of ocean ecosystems to support this activity and remain resilient and healthy."

Source: Economist Intelligence Unit, 2015

Because the ocean is a unique environment, understanding and measuring the economic activity related to it, and dependent upon it, is essential for growing coastal economies—or the ocean economy. Measuring the ocean economy is challenging, due in part to: (i) the number of non-market goods and services produced by the ocean (such as the role of natural habitats in sequestering carbon to help mitigate for climate change or in protecting coastal towns and communities, i.e. 'green infrastructure'—see Figure 3.1 below, discussed in Part 4. Adaptation), (ii) the inability of national processes to account for depletion of natural resources supporting economic activity, and (iii) the difficulty in drawing the line between coastal and ocean economic activity (see Table 3.2 below). At the same time, even where efforts have been made to measure the ocean economy, information on its carbon intensity or footprint is often not available.

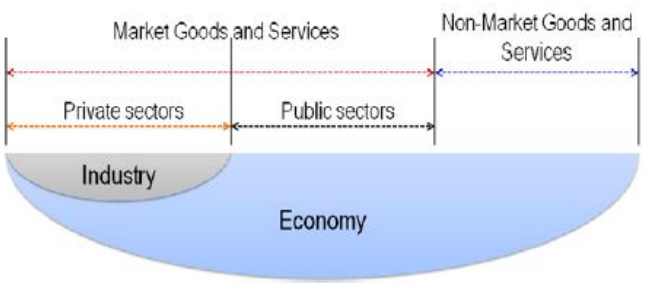

Figure 3.1. Measuring economic benefits from the ocean, with and without markets.
Source: Park and Kildow (2014)

Table 3.2. Components of the ocean economy Source: Economist Intelligence Unit, 2015

Type of Activity	Ocean Service	Economic Sector/Industry
Harvesting of living resources	Seafood	Fisheries
		Aquaculture
	Marine biotechnology	Pharmaceuticals, chemicals
Extraction of non-living resources, generation of new resources	Minerals	Seabed mining
	Energy	Oil and gas
		Renewables
	Freshwater	Desalination
Commerce, tourism and trade	Transport and trade	Shipping
		Port infrastructure and services
	Tourism and recreation	Tourism (including eco-tourism)
		Coastal development
Responses to ocean health challenges	Ocean monitoring and surveillance	Technology and R&D
	Carbon sequestration	Blue carbon (i.e. coastal vegetated habitats)
	Coastal protection	Habitat protection, restoration
	Waste disposal for land-based industry	Assimilation of nutrients, solid waste

Transitioning to a Blue Economy

The global ocean economy is growing, while at the same time global indicators of the status of the ocean environment, e.g. "ocean health," show significant changes from human activities. For this reason, the sustainable use and conservation of the ocean and coasts was articulated specifically among the global SDGs. To achieve SDG 14 and increase the benefits from sustainable ocean use for developing coastal and island states (indicator 14.7), policies will be needed to decouple economic growth from environmental degradation in the ocean, and achieve a low-carbon, sustainable "blue economy." It is important to note that the health of the oceans and its resources supports the successful achievement of many of the SDGs in addition to SDG 14, such as SDGs 1, 2, 3, 6, 7, and 8.

There are few guides to defining such policies in the ocean space, however much of the work on 'the green economy' is instructive. The OECD developed a global green growth strategy that defines the concept as a policy agenda to "*foster economic growth and development, while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies*."[163] The strategy provided guidelines for policies to achieve a green economy, including those that demonstrate measurable progress in:

- Enhancing efficiency in the use of resources and natural assets, and reducing waste;
- Spurring innovation to simultaneously create value and help solve environmental problems;
- Creating new markets by stimulating demand for green technologies, goods and services; and
- Boosting investor confidence through greater predictability and continuity in addressing environmental issues.

Similarly, FAO has defined the growth of a blue economy, or blue growth, as a coherent approach for the sustainable and integrated management of oceans and wetlands that is appropriate for the specific social context.[164] Investments in blue growth would focus on the sustainable management of aquatic resources and the adoption of approaches to ensure continued and improved contributions to food and livelihood security and economic growth from the aquatic systems. FAO emphasizes that a blue economy recognizes and addresses the rights of those dependent on fisheries and aquaculture for their livelihoods—some 12% of the world's population.

The action and leadership taken by African nations in implementing Blue Economy strategies must be recognized. The UN Economic Commission for Africa (ECA) created a Blue Economy Policy Handbook for Africa, a comprehensive and practical document which is already being effectively utilized. African leaders have seen Blue Economy policies as

a particularly useful method of integrating climate adaptation and mitigation within their development goals.[165] The growing sustainable management and utilization of fisheries and aquaculture has been a transformational strategy for many African economies.

Applying these types of policies to the ocean economy would essentially define the 'rules of the game' for a low-carbon blue economy. While no two situations are the same, there are some important tools that countries might use to develop policies for the transition to a blue economy, such as:

- *Better accounting for the ocean's natural capital, particularly given that some of the goods and services are not exchanged in the marketplace;*
- *Utilizing some form of coastal and marine spatial planning to help assess competing uses in the same space and provide clearer 'rules of the game;' and*
- *Developing metrics to measure the transition to a blue economy and specifically the benefits to coastal and island communities and economies, as well as carbon intensity and sequestration.*