SDG14 CONSERVE AND SUSTAINABLY USE THE OCEANS, SEAS AND MARINE RESOURCES FOR SUSTAINABLE DEVELOPMENT

Stefanie Schmidt
Barbara Neumann
Yvonne Waweru
Carole Durussel
Sebastian Unger
Martin Visbeck

INTRODUCTION

SDG14 focuses on human interactions with the ocean, seas and marine resources. It is underpinned by targets addressing conservation and sustainable use of the ocean, seas and marine resources including coastal zones, and targets referring to capacity building and ocean governance. Oceans cover more than 70% of the planet's surface and play a crucial role in planetary resilience and the provision of vital ecosystem services. The status of the ocean and several of its resources and functions have been deteriorating over the past century. Oceans, seas and coastal zones are subject to pollution, overexploitation and climate change impacts such as warming, coastal erosion, sea-level rise, ocean acidification and deoxygenation. Several coastal regimes are under noticeable stress, compromising the services they provide. SDG14 and its seven targets and three means of implementation are aimed at an urgent need to transform human behaviour toward sustainable practices when exploiting marine resources, and to taking action to preserve productive and resilient oceans and seas. The seven targets largely reflect commitments under other international frameworks such as the commitment to maintain or restore fish stocks to levels that can produce maximum sustainable yields (made in 2002 under the Johannesburg Plan) or the commitment to conserve at least 10% of marine and coastal areas (provided under the CBD Aichi Target 11). However, the 2030 Agenda for Sustainable Development puts use and conservation of the ocean and its resources, including coastal areas, into the wider sustainable development context for the first time. The ocean space in general and SDG14 in particular have a cross-cutting role in the 2030 Agenda, and SDG14 interacts with all 16 other SDGs. The nature and intensity of these interactions is highly context-specific and differs across the SDGs and their associated targets.

The text that follows provides an overview of interactions at the goal level between SDG14 – the 'entry level goal' for this assessment – and the other 16 SDGs. Taking into account all the underlying targets of this entry goal, a set of key interactions is identified between the SDG14 targets and those of other SDGs, principally interactions within the range of the highest magnitude or strongest impacts based on available scientific literature and expert knowledge. The typology and seven-point scale for characterising the range of positive and negative interactions described in the opening chapter to this report is used to assess the selected target-level interactions and the context in which they *typically* occur. Illustrative examples from different world regions show how these linkages manifest themselves in practice. Policy options are identified for how to maximise positive interactions and minimise negative interactions between now and 2030, and beyond. The chapter concludes with a list of key knowledge gaps related to the interactions studied.

KEY INTERACTIONS AT **GOAL LEVEL**

14 + 1

SDG14 is a critical enabler of poverty alleviation, and environmentally sustainable economic growth and social well-being ('blue growth'), particularly in Small Island Developing States (SIDS) and Least Developed Countries (LDCs). Sustained incomes and economic benefits from fisheries, aquaculture and tourism sectors depend heavily on the health of oceans and coasts. Strengthening the resilience of oceans and coasts, for example through conservation and protection of coastal wetlands, will help reduce shock exposure and enhance the resilience of poor coastal populations to extreme climate-related events. However, blue growth policy interventions aimed at achieving rapid economic growth to lift people out of poverty might impair ocean health and promote overexploitation of marine resources. Also, creating marine protected areas (MPAs) can constrain access to resources and ecosystem services necessary for poverty alleviation. Similarly, prohibiting certain subsidies could limit options for developing fisheries sectors.

14 + 2

Seafood, whether farmed or caught in the wild, is globally important as a source of protein, omega-3 fatty acids, vitamins, calcium, zinc, and iron for one billion people. Sustainable fisheries and aquaculture backed by healthy oceans and coasts are a necessary prerequisite to achieve food security and improved nutrition, and to establish sustainable food production systems in islands and coastal regions, particularly in SIDS and LDCs. However, most stocks are already fished at or beyond sustainable limits and are often subject to wasteful fishing practices. Reducing fishing effort on wild stocks to sustainable levels will improve fish stocks and provide a reliable food source in the long-term. Technology transfer and research capacity building in aquaculture and selective fishing can help enhance productive capacity and income generation for small-scale food producers. Creating MPAs can provide fishery benefits and remove pressure from key fishing areas such as spawning grounds and nurseries, and can enable fish stocks in adjacent areas to rebound. A potential negative side-effect of MPAs however could be that access to fishery resources and areas for aquaculture is limited. Increasing agriculture productivity and production for enhanced food security might also impair ocean health through increased pollution and nutrient run-off.

14 + 3

Many people live in coastal areas and depend on the food resources that the oceans and seas provide. Contamination of coastal zones or seafood with pollutants can cause health problems. Reducing and preventing marine pollution will thus help reduce pollution related deaths and illnesses. In addition, healthy seas and coasts can contribute to the overall health and well-being of coastal communities and tourists. The ocean is a biodiversity hotspot, home to a wide range of animals, plants (algae) and bacteria that are potentially relevant for the research and development of vaccines and medicines. However, exploring marine biodiversity for genetic and biochemical resources ('bioprospecting') as part of marine pharmacology may have negative effects

on ocean sustainability in cases where this causes disturbance or pollution, or triggers overexploitation.

14 + 4

Knowledge and capacity building, and training and awareness programmes on ocean and sea services will positively affect conservation and sustainable use of the oceans, seas and marine resources. This will support the achievement of targets under SDG14, especially those addressing marine pollution, ocean acidification, and resource use including fisheries, as well as ocean governance. Thus, introducing ocean literacy into the curricula of education programmes early and through all levels of education is important to ensure global understanding of ocean issues. Likewise, trained and skilled people are required to support and contribute to sustainable ocean development in all sectors, including the education sector, and across policymaking, society, economy (e.g. in the context of blue growth) and environmental affairs. Investment in capacity building and transfer of knowledge and technology in the marine field, and action taken on quality education and training under SDG4 (essentially all targets) will be especially important for developing countries and SIDS. In return, healthy oceans, sustainable resource use and conservation can contribute to building a culture of sustainable development, globally.

14 + 5

Equal opportunities are an issue in many marine and maritime economy sectors. Activities 'at sea' and leadership positions in fisheries or shipping are traditionally male-dominated, limiting access to opportunities and resources for women. Despite, a significant contribution made by women in some sectors (for example, roughly 50% of employees in the seafood industry are women) their role is often overlooked and underpaid. Sustainable development of marine and maritime sectors can create new opportunities for income and employment opportunities for women. Gender mainstreaming of policies and measures on access to marine resources, seafood markets or maritime sectors can contribute to ensure equal rights to natural and economic resources. Likewise, promoting knowledge, capacity building and technology transfer can contribute to the empowerment of women where attention is paid to related gender issues.

14 + 6

Oceans and seas are major sources of water in the hydrological cycle and therefore require sustainable management through integrated water management that addresses the multiplicity and diversity of water actors. Ocean sustainability directly links to sustainable water management. Preventing marine pollution contributes to improving water quality and vice versa. Conservation of marine and coastal areas can support integrated water resource management and contribute to protecting and restoring water-related ecosystems. Sustainable aquaculture can contribute to water-use efficiency and local water and sanitation management. In return, increasing water-use efficiency may have positive feedbacks on marine and coastal ecosystems and support their conservation and sustainable use. For example, replacing open by closed recirculation systems to reduce water demand would also limit waste water flow to the environment. A potential negative side-effect of strengthening coastal tourism or aquaculture as part of blue growth might be the resulting impact on water quality and availability.

14 + 7

Increasing the share of renewable energy in the global energy mix and improving energy efficiency, reliability and affordability will enhance sustainability and help reduce ocean acidification through reduced carbon dioxide emissions. Different types of ocean energy already contribute to the global renewable energy

supply and have the potential to expand further in the future, particularly in island states and coastal regions. Strengthening marine research and transfer of marine technology in this field could support this expansion and help increase the share of renewable energy in the global energy mix. On the other hand, more energy infrastructure in coastal and marine areas may have negative impacts; for example by increasing spatial competition with other uses (coastal and marine protected areas, fisheries, aquaculture, tourism). But synergies with other uses are also possible, for example by integrating aquaculture and wind farming.

14 + 8

Conservation and sustainable use of oceans, seas and marine resources can directly contribute to promoting sustainable economic growth and opportunities for decent work, particularly in island states and coastal regions. Sustainable growth of marine and maritime sectors such as fisheries, aquaculture and tourism supports employment and economic growth. Capacity building and transfer of marine technology will help create the strengthened professional skills and competences necessary for achieving the SDG14 targets, and will also support youth employment, education and training, job creation and innovation, and enable sustained long-term economic growth. Striving for healthy oceans, coasts and marine resources and the improvement of global resource efficiency in consumption and production and decoupling economic growth from environmental degradation, are mutually supportive. However, trade-offs are possible where conservation and restoration measures limit economic growth, which can in turn impact ocean health.

14 + 9

Sustainable use of marine and coastal ecosystem services for the development of marine and maritime activities (i.e. blue-growth) and equal access to marine resources and trade options can support industrialisation efforts and promote innovation, especially in island states and coastal regions. Likewise, fostering sustainable infrastructure, industrialisation, and research and technologies may support the achievement of conservation and sustainable use of the oceans. Trade-offs may occur where a balance must be found between ocean conservation and restoration measures. For example, reducing pollution or the establishment of MPAs can constrain industrialisation and infrastructure development in coastal regions.

14 + 10

Healthy oceans and coasts provide a sustainable resource base for income growth in low-income populations. For example, blue growth will help achieve greater in-country equality over the long-term when supported by fiscal, wage, and social protection policies. Moreover, providing small-scale artisanal fishers with access to marine resources and markets helps achieve socio- and economic inclusion. Restoring and maintaining ocean health also fosters the achievement of other SDGs aimed at improving livelihoods and well-being, and eliminating extreme poverty which all help to reduce inequalities. However, improving ocean health and conserving coastal and marine resources also has the potential to limit options for economic and income growth. Promoting the representation of developing countries in decision-making within global economic and financial institutions can help strengthen the engagement of LDCs and SIDS in the World Trade Organization fisheries subsidies negotiations, which may support the elimination of certain fisheries subsidies. Directing official development assistance,

and foreign direct investment towards the sustainable use of marine resources can also provide greater economic benefits especially for SIDS that rely on these resources for their economic growth.

14 + 11

Coasts are an attractive zone for human settlement and urban development, often driven by the opportunities for economic activities and natural resources provided by coasts and coastal zones. About 65% of all megacities worldwide are located in coastal areas, and as a result coastal areas generally show higher population densities, growth and urbanisation trends than inland areas, which implies a direct relation between ocean sustainability and sustainable cities and communities. This expansive and intensified utilisation and change in coastal areas, which is also related to new uses such as aquaculture, coastal protection infrastructure or port construction, has many negative impacts on coastal ecosystems. Synergies are likely between the reduction in marine pollution and the development of safe housing and environmentally friendly cities that aim at reducing energy consumption, improving sewer management and minimising the degradation of oceans and seas at large. Similar bi-directional benefits occur between sustainable management practices and conservation efforts in the coastal and marine environment and the development of safe, resilient and sustainable settlements. Conflicts may occur where ocean and coastal conservation and restoration limit options for urbanisation, housing, infrastructure or transport upgrading. Promoting the construction of new buildings using local materials may have negative impacts on coastal ecosystems from which the building materials are removed, and on their conservation and restoration.

14 + 12

Sustainable consumption and production, such as sustainable management of natural resources or the reduction of wastes, are critical for ending overfishing, sustainably managing marine and coastal ecosystems and reducing marine pollution. Halving per capita global food waste at the retail and consumer level, for example, will have positive impacts on ecosystem protection, sustainable fisheries, and marine pollution through reduced nutrient inputs from agriculture. Achieving sound management of chemicals throughout their lifecycle will also help minimise marine pollution; from land-based and offshore industries. Recycling and prevention of waste from land-based sources is a prerequisite for reducing marine litter. Improving ocean literacy and understanding of the drivers of ocean decline could support transformations towards sustainable consumption and production. More directly, conserving and sustainably using the oceans, seas and marine resources has the potential to support sustainable consumption and production patterns in ocean-based industries (fisheries, tourism, maritime transportation, among others).

14 + 13

Ocean and coastal ecosystems are essential climate regulators, but are also directly affected by climate change. Restoring and protecting the health of oceans, coasts and marine resources contributes to strengthening the resilience and adaptive capacity of both the natural and human systems to climate change. Coastal ecosystems such as mangroves, saltmarshes and seagrass meadows contribute both to climate adaptation (e.g. protection from coastal hazards) and climate mitigation (through carbon sequestration). Further co-benefits arise from reducing risks and vulnerabilities and strengthening the resilience of coastal communities to climate-related hazards (such as by promoting poverty eradication, food security, sustainable livelihoods,

capacity building or biodiversity). Where sustainable ocean management is included as a topic in education, training and technology transfer in relation to climate change, it will contribute to raising capacity on climate change adaptation and mitigation and ensure more effective climate change planning and management. In turn, achieving action on climate change will help limit ocean acidification, already well underway owing to increased levels of carbon dioxide in seawater, and will positively affect ocean management and conservation efforts. The potential for trade-offs is limited but possible. Offshore installations for renewable energy production may have negative impacts on the marine environment, particularly on marine mammals. On the other hand, failing to mitigate climate change and reduce global warming will increase climate related impacts on coastal ecosystems, such as through warming and ocean acidification, but also through sea-level rise and related effects. This may further constrain the protection and restoration of coastal ecosystems and reduce resilience and adaptive capacity towards climate change.

14 + 15

Ocean and coastal systems are hotspots for biodiversity, both in areas within and beyond national jurisdiction. Halting loss of biodiversity improves the resilience of ecosystems and supports healthy and productive oceans. Issues such as wildlife trafficking, benefit sharing of genetic resources or invasive species also concern marine and coastal habitats and species, while ocean conservation and sustainable use of marine resources contributes to the reduction of habitat degradation, biodiversity loss and species protection. Conservation, restoration and protection of terrestrial and freshwater ecosystems will also benefit the health of oceans and seas: benefits derived through reduced impacts from land-based sources, such as non-point source pollution, erosion and sedimentation.

14 + 16

Ocean governance, building on effective, accountable and transparent institutions and responsive, inclusive, participatory and representative decision-making, will be essential to achieve SDG14. Likewise, it will contribute to delivering peace, justice and strong institutions. Specific synergies exist between tackling illegal, unregulated and unreported (IUU) fisheries and the reduction of corruption and bribery. Implementing international law as reflected by the UN Convention on the Law of the Sea (UNCLOS) and related agreements, such as the UN Fish Stocks Agreement, would enhance the conservation and sustainable use of oceans and their resources. Aiming for accountable and transparent institutions, as well as inclusive, participatory and representative decision-making is fully consistent with aiming to improve capacities of marine management organisations to end unsustainable fishing practices or to protect marine ecosystems. In the reverse direction, improving ocean governance for sustainability will be important to achieve SDG16 with regard to the oceans.

14 + 17

SDG17 is an important building block for the 2030 Agenda, aiming at strengthening the means of implementation for all SDGs. Global partnerships for sustainable development are especially important in the context of oceans, seas and marine resources, owing to the global connectivity of marine ecosystems and the cross-cutting and often far-reaching effects of marine resource use. Achievement of SDG14 will benefit particularly from the mobilisation of financial aid, strengthened technology exchange, capacity building, better policy coherence and multi-stakeholder partnerships.

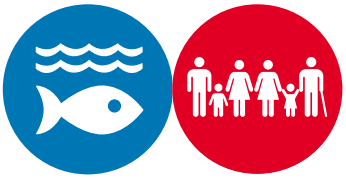
KEY INTERACTIONS AT **TARGET-LEVEL**

SDG14 is an integral part of the 2030 Agenda, linking to all 16 other SDGs. This section analyses some of these interactions with a selected set of SDGs in detail at the target-level. SDGs were selected based on the strength of their interlinkages with SDG14 and the magnitude and scale of impact in relation to the overall objective of the 2030 Agenda, while ensuring a balanced consideration of the economic, social and environmental dimensions. Target-level interactions are judged to fall within one of seven categories and are scored accordingly: indivisible (+3), reinforcing (+2), enabling (+1), consistent (0), constraining (-1), counteracting (-2), and cancelling (-3). Following a generic analysis of the selected interactions, specific examples are provided to illustrate how interactions unfold in different geographical and policy contexts. As oceans are highly interconnected ecosystems not confined by national boundaries, national, regional and global examples are provided.

Six goals were selected for detailed analysis, each accompanied by an illustrative example:

SDG1
Western Indian Ocean
SDG2
Kenya and Tanzania
SDG8
Baltic Sea
SDG11
Australia
SDG12
G7 Action Plan to combat Marine Litter
SDG13
Paris Agreement

SDG 14 + SDG 1



TARGETS	KEY INTERACTIONS	SCORE	POLICY OPTIONS
14.2 ⟶ 1.1, 1.2	Healthy and productive oceans benefit small-scale fishers, improve tourism revenue and increase potential for blue carbon markets	+2	Raise awareness of local communities on the importance of healthy oceans, and sustainable use of coastal and marine resources for their livelihoods and sustained income
14.2 ⟶ 1.5	Healthy oceans and coasts help reduce vulnerability to climate hazards	+2	Strengthen the role of marine and coastal ecosystems in climate change adaptation in national and regional adaptation strategies and policies
14.3 ⟶ 1.1, 1.2	Minimising and addressing the impacts of ocean acidification will improve fish stocks, livelihoods and incomes	+2	
14.4 ⟶ 1.1, 1.2	Sustainable fisheries stabilise income and create opportunities for value-addition	+2	Invest proceeds from fishing in produced capital (e.g. fishing and transport vessels, ports, roads) and human and institutional capacities Develop recording and reporting methods whereby artisanal and recreational fishers are engaged in data collection and assessment of catch trends
14.4 ⟶ 1.1, 1.2	Higher value-added economic activities may displace livelihoods and increase poverty	-1	
14.4 ⟶ 1.4	Sustainable fisheries stabilise income and create opportunities for value-addition	+2	
14.5 ⟶ 1.1, 1.2	MPAs restrict access and can create competition for scarce resources and so constrain poverty reduction efforts	-1	
14.7 ⟶ 1.1, 1.2	Sustainable tourism, fisheries, coastal agriculture, mining, and mariculture can create jobs and reduce income poverty	+3	Establish the social, economic and environmental baselines for blue growth and develop roadmaps for key sectors with trackable milestones backed with environmental protection goals Designate marine spaces for different social, economic and environmental uses and objectives and identify the trade-offs between competing uses Create sovereign wealth funds to ensure flow of benefits after non-renewable resources are exhausted, avoid crowding out other economic sectors, and develop measures to avoid the impacts of inflation on the poor and vulnerable
14.7 ⟶ 1.1, 1.2	Increased economic activity creates more pressure on coastal and marine resources and more environmental harm	-1	
14.7 ⟶ 1.3	Creating jobs in sustainable tourism, fisheries, coastal agriculture, mining, and mariculture can enable social protection programmes	+2	Develop social protection policies and invest proceeds from blue growth in social protection programmes for the poor and most vulnerable. For example, old-age pensions, health insurance, and unemployment insurance

KEY POINTS

Poor coastal communities in low income countries are likely to suffer the most from changes in the coastal and marine environments that directly and indirectly support their livelihoods. Protection, restoration and management of critical coastal and marine habitats have the most direct links to poverty eradication, improving their livelihoods and reducing their vulnerability related to extreme climate events

Sustainable tourism, fisheries and coastal agriculture in SIDS and LDCs can create decent jobs that reduce income poverty. To promote a more inclusive pattern of growth and development, simultaneous expansion and development of social protection programmes for the poor and most vulnerable is necessary

Higher economic activities aimed at poverty alleviation can create more pressure on coastal and marine resources and environmental harms and can lead to long-term costs to the local economy

KEY INTERACTIONS

SDG14 targets interact with SDG1 targets in the context of ending income poverty and multidimensional poverty (deprivation of non-monetary factors including ecosystem services, education, training, sanitation and health) (Liu et al., 2015; ILO, 2016). Protection, restoration and management of critical coastal and marine habitats **(14.2)** maintain biodiversity and rebuild fish stocks and are therefore inextricably linked to improved livelihoods and eradicating poverty **(1.1, 1.2)**. The net benefits of **target 14.2** include improved revenue from tourism, enhanced biodiversity and fish stocks, and increased potential for income from blue carbon markets. At the same time, coastal habitats protect homes, communities, and businesses from extreme climate-related events such as coastal flooding and storm surges, and can help reduce the vulnerability of poor people (often with no insurance) **(1.5)** and the associated economic impacts **(1.1, 1.2)**.

Adapting fisheries to sustainable levels and eradicating IUU fisheries **(14.4)** has a direct link to stabilising and/or increasing productivity, profitability, and net economic benefits from fisheries (World Bank, 2009), and to reducing poverty **(1.1, 1.2)**. For example, addressing IUU fishing will provide up to US$ 1.5–2 billion per year for Sub-Saharan African countries. However, certain fish stocks may recover slowly and this may delay poverty reduction efforts. Increasing value-addition also has a direct link to reducing fishing effort (Kelleher, 2015) **(14.4)** and can create jobs in the post-harvest sectors (processing and marketing) for women in Africa who have little or no access to natural and economic resources (UNECA, 2016) **(1.4)**. Value-addition also has potential to create business opportunities in expanding access to credit, processing technology, storage facilities, and training **(1.4)**. However, replacing indigenous technologies by imported technologies, and deploying newer advanced technologies from higher value-added economic activities may threaten livelihoods and increase poverty.

The creation of MPAs **(14.5)** in order to conserve degraded and threatened species, ecosystems, habitats and biodiversity is an important factor in the alleviation of long-term poverty (Fisher and Christopher, 2007) **(1.1, 1.2)**. However, MPAs can conflict with the social and economic objectives of populations who may lose access to the

resources therein and can thus constrain poverty reduction goals. Their success therefore depends on how they are developed and managed and how the costs and benefits of lost fishing opportunities are shared, for example.

There are many linkages between **target 14.7** and poverty eradication in SIDS and LDCs, which are highly dependent on coastal and marine resources for economic development. Sustainable development of tourism, fisheries, coastal agriculture, mining, and mariculture can create jobs for many coastal populations **(1.1, 1.2)**. While these sectors have the potential to increase income, maximising synergies requires the simultaneous development and expansion of social protection programmes. Depending on the available resources in each country, design options can include social insurance, old-age pensions, disability pensions, unemployment insurance and skills training **(1.3)**. However, increased economic activity can create more pressure on coastal and marine resources and more environmental harm from pollution, and can lead to decreased economic activity, job losses and long-term costs to the local economy (Kelleher, 2015).

While climate change impacts on the health of marine ecosystems, habitats and species are not fully understood, minimising and addressing the impacts of ocean acidification **(14.3)** will reduce the negative consequences on commercial species like shellfish, loss of coral reefs, and on the size, productivity and stability of fish stocks and associated livelihoods and incomes **(1.1, 1.2)**. On the other hand, significant changes in local weather patterns and sea-level rise may make poverty reduction more difficult; prolonging existing poverty and creating new poverty traps (Olsson et al., 2014).

KEY UNCERTAINTIES

(1) The main uncertainty relates to maintaining fish biomass and fishing effort to levels that can produce maximum sustainable yield and at the same time ensure profitability to support livelihoods. (2) The overall effects of MPAs are difficult to establish: while limiting access to resources, protected areas support the regeneration of degraded habitats and stocks, which could in turn benefit coastal livelihoods. (3) The impact of ocean acidification it is highly species specific which makes it difficult to extrapolate from one species, habitat or area to another.

KEY DIMENSIONS

Time: The time needed to restore natural resources and ecosystems depends on their status and dynamics. Building infrastructure and establishing support programmes takes time, as does restoration of degraded habitats or fish stocks.

Geography: (1) Geographical context is mainly a concern for rural island and coastal communities, but also for urban areas and informal settlements of coastal cities in less developed regions. (2) There may be spill-over effects to adjacent hinterland communities through trading of fish or other coastal and marine products.

Governance: (1) Policies and strategies are needed to ensure that investments are made with a focus on addressing the needs of the poor and to tackle spatial competition. Policies and strategies directed at reducing poverty should acknowledge the importance of natural capital for poverty alleviation and promote sustainable use of natural coastal and marine resources. Integrated governance across scales and sectors is essential. (2) As the transition to a blue economy may lead to job losses in some traditional sectors and the replacement of indigenous technologies by imported technologies,

policy measures aimed at job creation in other non-marine sectors may be needed to provide alternative livelihoods.

Technology: Building sustainable fisheries, aquaculture and tourism may need context specific innovations in gear, monitoring, control and facility technology.

Directionality: Interlinkages are bi-directional. Healthy oceans and sustainable use of marine resources are a prerequisite for ocean ecosystem services to contribute to poverty alleviation. At the same time, poverty alleviation will strengthen capacities and possibilities to conserve and sustainably use ocean and coasts.

ILLUSTRATIVE EXAMPLE
THE WESTERN INDIAN OCEAN REGION

The Western Indian Ocean region includes Somalia, Kenya, Tanzania, Mozambique, South Africa and the island states of Mauritius, Comoros, Seychelles, Madagascar and Réunion (France). It has a combined coastline exceeding 15,000 km (including island states) and a total continental shelf area of about 450,000 km² (UNEP/Nairobi Convention Secretariat, 2009). Except for the Seychelles, Mauritius and South Africa, over 50% of coastal populations have low Human Development Index (HDI) values and live below the poverty line (Gössling, 2006; UNDP, 2006). Ensuring that the regions' critical habitats (coastal lowland forests, mangroves, seagrass beds and coral reefs) are protected, restored and managed **(14.1, 14.2, 14.5)** is crucial to reducing poverty and increasing income for the 65 million people that live within 10 km of the coast (Burke et al., 2011).

Sustainable fisheries **(14.4)** are crucial for sustainable economic development of the countries that together generate about 4.8% of the global fish catch; equivalent to about 4.5 million tonnes of fish per year (FAO, 2009). Failure to address IUU fishing for example, which is common in artisanal (nearshore) and industrial (further offshore) fisheries (UNEP/Nairobi Convention Secretariat and WIOMSA, 2015) is expected to cost the South-West Indian Ocean region around US$ 400 million per year (Harris and Gove, 2005).

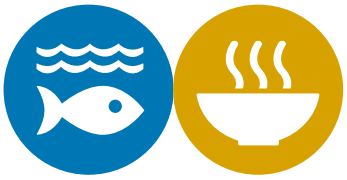
An estimated US$ 25 billion per year is derived from the coastal and marine resources in this region (UNEP/Nairobi Convention Secretariat, 2009), mainly from tourism, fisheries, coastal agriculture, mining, mariculture, and ports and coastal transport. There is enormous potential to grow these sectors and to create jobs, including within associated non-marine sectors **(14.7)**, with the value of Western Indian Ocean assets estimated at US$ 333.8 billion (Obura et al., 2017). For example, tourism – the largest contributor to GDP at over US$ 11 billion per year, equivalent to 40% of the total from marine and coastal resources (UNEP/Nairobi Convention Secretariat and WIOMSA, 2015) – can create jobs in hotels, restaurants, housing and residential activities, agriculture and fisheries and so provide quick revenue to alleviate poverty **(1.1, 1.2)**. Investment in infrastructure such as road networks, airport facilities, amenities in the coastal and beach zones, and ports for cruise tourism can also provide high revenue for the economy and so benefit poor populations **(1.1, 1.2)**.

Marine extractive industries are expanding, with Kenya, Tanzania and Mozambique beginning to explore for offshore oil and gas which could provide economic benefits from income and saving on fuel imports that could be directed to poverty reduction programmes. Investing the proceeds from these non-renewable resources into long-term sustainable economic opportunities for poor populations, creating sovereign wealth funds, and building human and institutional capacities will reduce long-term poverty **(1.2)**.

There are currently 83 MPAs in the region. Enhanced conservation measures in existing MPAs, and the creation of new MPAs (14.5) can encourage fee increases in marine parks and reserves and for licences (where they exist) and can increase revenue from the tourism industry to coastal communities **(1.1, 1.2)** (UNEP/Nairobi Convention Secretariat and WIOMSA, 2015). Some countries have already set ambitious targets in this regard: Seychelles aims to establish MPAs covering 30% of its 1.4 million km² of its exclusive economic zone (EEZ) by 2020 and Zanzibar aims to establish 15% of its coastal and marine ecosystems as MPAs.

Investment in climate change adaptation **(14.3)** has great potential to reduce poverty in coastal populations **(1.1, 1.2)** while also reducing their vulnerability to natural disasters **(1.5)**. In Kenya and Madagascar, blue carbon projects have been developed to generate revenue from carbon credits to coastal communities from the sustainable management of mangroves.

SDG 14 + SDG 2



TARGETS	KEY INTERACTIONS	SCORE	POLICY OPTIONS
14.2 ⟶ 2.1	Healthy oceans will enhance fisheries yields	+1	Raise awareness of artisanal fishers and local communities to the importance of critical habitats and ecosystems for their food security and nutrition
14.4 ⟶ 2.1	Sustainable fisheries are inextricably linked to fish availability and food security	+3	Strengthen and implement existing laws and policies to ensure responsible and sustainable fisheries and where possible develop co-management approaches with local communities
14.4 ⟶ 2.2	Fish and fishery products directly enable the provision of micronutrients	+2	Strengthen and implement existing laws and policies to ensure responsible and sustainable fisheries and where possible develop co-management approaches with local communities Encourage the use of voluntary mechanisms such as ecolabels to encourage safety of fish and long-term sustainability
14.5 ⟶ 2.1, 2.2	MPAs enhance fish recruitment in areas adjacent to them	+1	
14.5 ⟶ 2.1, 2.2	MPAs may limit access to food resources and areas for aquaculture	-1	
14.5 ⟶ 2.5	Depending on their size, MPAs can maintain genetic diversity within species	+1	

KEY POINTS

Sustainable fishing and aquaculture and healthy ocean ecosystems and habitats are key to providing food security and meeting nutritional needs in many developing and developed countries

Increased agricultural productivity to provide food might constrain efforts to reduce marine pollution from agricultural run-off and nutrients

KEY INTERACTIONS

SDG14 is inextricably linked with enhancing food security **(2.1)** and nutritional needs **(2.2)** in developed and developing countries (Thilsted et al., 2016), and mainly interacts with SDG2 through sustainable fishing and aquaculture **(14.4, 14.6)**, safeguarding the health of ocean ecosystems and habitats **(14.1, 14.2, 14.3)**, and the creation of MPAs **(14.5)**. In 2010, fish provided more than 2.9 billion people with almost 20% of their average per capita intake of animal protein and 4.3 billion people with about 15% (FAO, 2014). A significant proportion of the food security of nutritionally vulnerable people **(2.1)** comes from fish and exceeds that of most of terrestrial animal foods (Béné et al., 2016). However, stocks of the most important species are fully fished and/or overfished and rebuilding them to biologically sustainable levels **(14.4)** could increase fisheries yields **(2.1)** by 16.5 million tonnes (FAO, 2014) to meet the global demand for fish and fishery products.

Responsible and sustainable fisheries (14.4) also reinforce target 2.2 by providing long-chain polyunsaturated fatty acids and essential micronutrients – vitamins D and B and a range of minerals (calcium, phosphorus, iodine, zinc, iron, selenium) (Thilsted et al., 2016) for more than 10% of the global population, especially in developing nations in the equatorial region **(2.2)** (Golden, 2016). If the degradation of ocean ecosystems **(14.1, 14.2, 14.3)** and decline in fish catches are not addressed **(14.4, 14.6)** 845 million people (11% of the current global population) may become micronutrient deficient (Golden, 2016). Fish is also essential for growth, brain function and maintaining the nervous system (Thilsted et al., 2016). This can play a critical enabling role for brain development and growth in children **(2.2)** and the nutrition of the nearly one-fifth of pregnant women worldwide that have iron-deficiency anaemia and the one-third that are vitamin-A deficient **(2.2)** (Golden, 2016). Protein and trace elements derived from aquatic sources are added to animal feeds to enhance agricultural productivity **(2.3, 2.4)** and can increase income for small-scale food producers. However, without adequate pollution prevention measures, marine pollution **(14.1)** from agricultural run-off of nutrients (nitrogen, phosphorus) can adversely affect fish availability **(2.1, 2.2)**. While creating MPAs **(14.5)** can enhance fish recruitment and productivity for better food security and nutrition, and can increase fish production in adjacent areas **(2.1, 2.2)**, they may limit access to food resources for coastal communities and may limit areas available for aquaculture **(1.1, 1.2)**. Depending on their size (large or isolated), MPAs can preserve genetic diversity within species (Munguía-Vega et al., 2015) **(2.5)**.

KEY UNCERTAINTIES

(1) While the link between fisheries and aquaculture and food security is well established, long-term food security and nutrition depends on the status of stocks, and the health of the associated ecosystem. (2) A key uncertainty relates to achieving total food security where access and distribution of harvested fish is limited due to post-harvest losses.

KEY DIMENSIONS

Time: (1) The period required for wild stocks to recover depends on the stock status after collapse. (2) Building infrastructure and establishing support programmes takes time.

Geography: (1) It is mainly rural island and coastal communities that are affected, and urban areas and informal settlements of coastal cities in less developed regions. (2) There may be spill-over effects to adjacent hinterland communities through trading of fish or other coastal and marine products.

Governance: Adopting a nexus approach to fisheries management, marine ecosystem conservation and agriculture can help overcome trade-offs and maximise synergies.

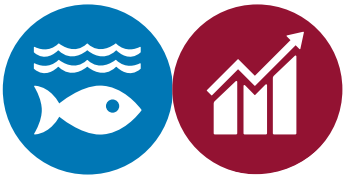
Technology: Ensuring sustainable fisheries and aquaculture may need context specific innovations for monitoring and control of activities, among others.

Directionality: Bi-directional. Sustainable seafood is essential to ensure food security, especially in coastal areas and islands. At the same time, establishing food security risks increasing pressure on fish stocks and marine ecosystems beyond sustainability.

ILLUSTRATIVE EXAMPLE
BEACH MANAGEMENT UNITS IN KENYA AND TANZANIA

Coastal communities in Kenya and Tanzania rely heavily on fisheries for food security **(2.1)** and nutrition **(2.2).** In Tanzania, 70% of the population relies on fish (freshwater and marine) for protein (UNEP/Nairobi Convention Secretariat and WIOMSA, 2015). For the last ten years, beach management units (BMUs) have been established in Kenya and Tanzania as a co-management approach between government and local communities to share responsibilities for resource management and the conservation of fish stocks **(14.4)** for enhanced food security **(2.1)** and sustainable livelihoods. BMUs are currently governed by the Kenya Fisheries Management and Development Act 2016 and the Tanzania Fisheries Act 2003 and Fisheries Regulations 2009, and draw their membership from a wide range of sources (fishers, boat owners, boat crew, traders, processors, boat builders and repairers, net repairers) with jurisdiction over distinct geographical areas to manage fish landing stations on behalf of fisheries departments and are empowered to levy fees (UNEP/ Nairobi Convention Secretariat and WIOMSA, 2015). BMUs are now considered a central element of artisanal fisheries co-management in Tanzania (over 170 BMUs) and Kenya (73 BMUs) (Kanyange et al., 2014). The shift from a top-down centralised fisheries governance approach has also proved useful for addressing the lack of government staff to manage fisheries and continued budget cuts (Kanyange et al., 2014), as well as to reduce conflict between and among stakeholders. The BMU approach can play a critical enabling role to address threats from deteriorating aquatic habitats **(14.2)** and declining fish stocks **(14.4)** and to enhance food security.

SDG 14 + SDG 8



TARGETS	KEY INTERACTIONS	SCORE	POLICY OPTIONS
14.1, 14.3, 14.4 ⟶ 8.4	Tackling marine pollution, ocean acidification and unsustainable fisheries all reinforce the efficient and sustainable consumption and production of resources	+2	Establish product lifecycle monitoring schemes to identify opportunities to improve resource efficiency and provide incentives and support for respective innovation Identify sources and pathways for marine pollution and improve production policies and waste management accordingly
14.2, 14.5 ⟷ 8.1, 8.3	Taking measures to protect and restore marine and coastal ecosystems (e.g. establishing MPAs) might entail restrictions for economic activities and therefore limit opportunities for economic growth and job creation and vice versa	-2	Develop and adopt regional/sea-basin based marine spatial plans to coordinate conservation, economic uses and impacts in line with sustainable development criteria
14.4, 14.7 ⟷ 8.1, 8.5	Sustainable fisheries, aqua-culture and tourism will contribute to economic growth and to achieving full employ-ment and vice versa	+2	Ensure policies for marine resource uses like fisheries include sustainable exploitation limits and that these are implemented, followed-up and reviewed Promote job diversification and development in green/blue growth sectors in coastal areas
14.7 ⟷ 8.9.	Increasing economic benefits through sustainable coastal and marine tourism forms part of promoting sustainable tourism as such	-1/ +1	Ensure policies to manage and develop tourism include provisions on pollution and waste management and respect conservation needs of sensitive habitats and species Build capacities and raise awareness among actors and stakeholders on sustainable practices Create incentives for sustainable tourism development

KEY POINTS

Protection and restoration of marine ecosystems and fisheries resources and options for short-term economic growth, productivity and job creation policies and measures might constrain each other

Healthy oceans and fisheries resources provide the necessary basis for sustainable job and growth policies for maritime sectors and coastal areas

Coastal tourism is a key contributor to promoting sustainable tourism as a driver for local employment, cultures and products

KEY INTERACTIONS

SDG14 and SDG8 mostly interact through their targets for conservation and sustainable resource use with the nature of the interaction highly context-specific. In general terms, oceans are important for the global economy and employment; among others, they provide natural resources and space for business development and are essential for climate regulation. About 30% of mineral oil is extracted from the ocean, and shipping routes are the most important transport lanes for global trade (Maribus, 2015). Ocean-based activities are estimated to generate global revenue in the range US$ 3–5 trillion per year (FAO, 2014). While designating parts of marine and coastal areas for protection might constrain options for growth and jobs in some cases, they may help generate jobs and growth opportunities in others. Tackling marine pollution through improving waste management and increasing recycling can enable a shift to circular economies, create 'green' jobs, and improve tourism. However, measures such as taxes and levies on plastic bags and fertilisers, may conflict with other important poverty-reduction sectors, such as coastal agriculture.

Although economic growth and job creation focused on short-term developments or entailing negative environmental impacts might be restricted by conservation policies and measures aimed at maintaining marine ecosystem health and resources, Russi et al. (2016) demonstrated that protecting marine and coastal ecosystems is vital for a sustainable blue-green economy in Europe, providing livelihood and income opportunities and helping climate change adaptation in coastal communities.

Ensuring sustainable exploitation of marine resources and restoring ocean health will lead to an overall benefit for sustainable economic development and employment. For example, it is estimated that ending overfishing and achieving sustainable fisheries **(14.4)** would generate EUR 3188 billion annually, which could support the equivalent of 32,000 full-time fishing jobs and 69,000 (full- and part-time) processing jobs every year in the EU alone (NEF, 2012). Increasing economic benefits through sustainable use of marine resources to reinforce economic growth and employment development **(8.1, 8.5)** can be especially important in SIDS and LDCs **(14.7)**. For example, capture fisheries and aquaculture often play a major role in national economies of SIDS, particularly in the Pacific where they can contribute as much as 10% of GDP. Fisheries and aquaculture production in this region were valued at US$ 3.2 billion in 2014 (Gillett, 2016). Deep-sea mining for minerals is an emerging economic activity that could provide new income sources to SIDS and LDCs, and generate jobs and growth in the domestic private sector (UNEP, 2012). However, guidelines and policies for their sustainable extraction must first be adopted. Increasing economic benefits through sustainable marine and coastal tourism **(14.7)** forms part of promoting

sustainable tourism **(8.9)** in coastal areas and islands. Tourism has increased over the past 40 years with coastal tourism now one of the main components in some areas, especially small island states (United Nations, 2016). Tourism represents 5% of world GDP and contributes up to 7% to employment (UNEP, 2012). Almost half of all international tourists travel to coastal areas, in some SIDS accounting for up to 25% of GDP (Ramsar and UNWTO, 2012). The oceanic island characteristics of SIDS provide large potential for marine tourism development, as demonstrated in Fiji where tourist resort development has been combined with traditional coastal fishing villages (FAO, 2014). In Europe, coastal and marine tourism is the largest maritime activity, employing almost 3.2 million people and generating EUR 183 billion in gross value added in 2011 (ECORYS, 2013). However, coastal tourism can also have negative effects on ocean health and sustainable resource use that need to be addressed to ensure sustainable development and to avoid conflict with other SDG targets **(14.1, 14.2, 14.4)**. These include: seasonal increase in consumption, pollution and waste; development of infrastructure such as hotels or airports often in or near sensitive habitats like coral reefs; malpractice in recreational activities such as diving, snorkelling or wildlife watching (WWF, no date); and modifications of beaches and coastal waters to increase their attractiveness (United Nations, 2016).

KEY UNCERTAINTIES

Interactions are context-specific and depend on national and local conditions, cultures and policies.

KEY DIMENSIONS

Time: Short-term growth and employment opportunities risk being unsustainable and thus undermining the achievement of SDG14 and SDG8. Generating sustainable growth and employment opportunities will be a long-term investment and in most cases will depend on a comprehensive strategic approach to sustainability of economic development, natural resource productivity and maintenance of ecosystem services.

Geography: Concerns mainly island and coastal communities. There may be spill-over effects into the coastal hinterland.

Governance: Cross-sectoral coordination in regulatory and enabling policies and programmes is needed. Integrated governance across scales and sectors is essential, especially to ensure synergies are utilised. For example, the success of MPAs can depend on how the costs and benefits of lost fishing opportunities and MPA effects are shared.

Technology: Technology and its transfer are central to various aspects of ocean sustainability. For example to improve selectivity of fishing gear or minimise marine pollution from land and sea-based sources in order to contribute to sustainable economic growth and employment.

Directionality: Bi-directional. Sustainability of policies and measures to promote economic growth and employment will be directly relevant for conservation and sustainable use of oceans, seas, and marine resources while their health status will affect growth and job opportunities.

ILLUSTRATIVE EXAMPLE
THE BALTIC SEA

The Baltic Sea is a semi-enclosed inland sea with around 85 million people within its catchment area (Ahtiainen et al., 2013). Its resources provide multiple ecosystem services that can contribute to economic growth, and to increasing and diversifying employment in many sectors including seafood, sand and gravel extraction, shipping, recreation and tourism (Ahtiainen and Öhman, 2014). The three largest maritime economic activities – fisheries for human consumption, shipping and ship-building – provided 360,000 jobs and EUR 16.6 billion gross value added in 2010 (EUNETMAR, 2013). The maritime sector is central to the economy and employment in the coastal regions of all Baltic States. Several segments of the maritime sector have potential to help develop economic productivity **(8.2)** and full employment **(8.5)**, and to reduce youth unemployment **(8.6)**. In the period 2008–2010, energy generation by offshore wind farming in the region increased by 20%, cruise tourism by 11% and marine aquaculture by 13%. Short-sea shipping, coastal tourism, yachting and marinas, and environmental monitoring are considered to have high growth potential in the Baltic Sea (Brodzicki and Zaucha, 2013). Tourism and fisheries are the two most important sectors for employment, providing 244,000 of 360,000 jobs in the EU maritime sectors (Brodzicki and Zaucha, 2013). However, the potential of the blue economy, especially sectors such as tourism or marine aquaculture, depends on healthy oceans and marine resources. The Baltic Sea is severely affected by eutrophication, pollution and unsustainable fishing practices, which threaten ecosystems and ecosystem services and associated economic activities such as fisheries and tourism (HELCOM, 2010). Failing to restore the Baltic Sea to good ecological health will impair its ability by 2030 to add an additional 550,000 jobs and EUR 32 billion in annual value in tourism, agriculture and fisheries alone (BCG, 2013). Building on these findings, the EU has launched a Baltic Sea agenda identifying options and instruments for the support of sustainable blue growth in the region (European Commission, 2014).

SDG 14 + SDG 11

TARGETS	KEY INTERACTIONS	SCORE	POLICY OPTIONS
14.1 ⟷ 11.1, 11.3, 11.6	Tackling marine pollution reinforces the provisioning of safe housing and quality of basic services, sustainable urbanisation and integrated settlement planning and management, and reducing the environmental impact of cities such as in the context of waste management, and vice versa	+2	Ensure integrated planning and management in coastal areas; include integrated coastal management, marine spatial planning and harmonise with urban planning and regional development policies; ensure coherent policymaking across administrative boundaries including upstream catchment areas (applies to all target interactions) Develop and monitor implementation of effluent discharge and waste management standards and of litter control and litter prevention measures in coastal areas as well as in upstream catchment areas Ensure participation of societal actors and stakeholders from different groups in planning and decision-making together with coastal and marine managers, where relevant (applies to all target interactions) Increase public awareness of the role and importance of coastal and marine ecosystems (applies to all target interactions) and sensitise stakeholders on pollution prevention Provide training and capacity building for practitioners on integrated planning and management (applies to all target interactions
14.2 ⟷ 11.1, 11.3, 11.4, 11.5, 11.6	Sustainable coastal zone management and protection of coastal ecosystems reinforces the achievement of various SDG11 targets, including the safeguarding of coastal natural heritage (e.g. coastal wetlands), and vice versa	+2	Ensure that coastal ecosystems are sustainably managed, protected or restored, within as well as around coastal settlements

14.2 ⟷ 11.1, 11.2, 11.3	Fostering sustainable coastal zone management and increased protection efforts for coastal ecosystems may result in constraints for or even counteract the achievement of several SDG11 targets, depending on the strength of integration of approaches and policies. Interactions may also work in the opposite direction	-1/ -2	Ensure ecological connectivity between offshore ecosystems, coastal ecosystems and coastal urban ecosystems and ensure their protection Promote nature-based solutions to integrate coastal protection, urban development and coastal conservation
14.2, 14.5 ⟷ 11.c	The construction of new buildings using local materials possibly receives constraints, counteracting or even cancelling from sustainable ecosystem management and conservation depending on the strategies and measures taken under these, and vice versa	-1/ -2/ -3	Ensure that construction recommendations and policies do not counteract policies set up to sustainably manage, protect, restore and conserve coastal ecosystems
14.3 ⟶ 11.4	Tackling ocean acidification reinforces the protection and safeguarding of coastal natural heritage such as coral reefs	+2	Enforce climate mitigation and adaptation measures Ensure conservation of critical coastal ecosystems and integrated coastal management to build resilience
14.5 ⟷ 11.1, 11.2, 11.3	Constraints or counteracting of SDG11 targets concerning settlements and transport systems in the coastal zone could arise from increased conservation efforts in the coastal zone, depending on the conservation status applied or of measures intended	-1/ -2	Ensure that sufficient representative coastal ecosystems are conserved and protected from human influence Improve education and increase awareness of the role and importance of coastal and marine ecosystems and the multiple benefits from sustainable use and conservation

KEY POINTS

The key linkages are through pollution, coastal and marine management including settlement planning and infrastructure development (onshore and offshore), and restoration and conservation of coastal ecosystems

Conservation is explicitly addressed in both SDGs

The strong land-sea nexus of interactions is especially relevant for settlement planning, development and infrastructure, due to a potentially long reach between upstream catchments and downstream coastal areas and marine waters

Most linkages have potential for bi-directional effects and include synergies and trade-offs. Avoiding negative effects requires integrated approaches cognisant of the transboundary nature of interactions in coastal zones

Coordinated actions and integrated approaches have potential to support both SDGs

KEY INTERACTIONS

Geographically, most interactions between SDG14 and SDG11 occur in coastal areas (Agardy et al., 2005; Duxbury and Dickinson, 2007; Stojanovic and Farmer, 2013; Barragán and de Andrés, 2015) but due to the land-sea nexus and long reach of land-based activities, interactions may span from upstream catchment areas out into marine waters, especially for pollution (Agardy et al., 2005; Crossland et al., 2005). A strong land-sea nexus around human settlements and urban areas creates potential for benefits to local communities and coastal and marine ecosystems as well as trade-offs. For instance, protecting and conserving the coastal environment **(14.2, 14.5)** around urban areas will necessarily impose urbanisation constraints (Xu et al., 2008), potentially limiting options for ensuring housing and services for all **(11.1)**, access to transport **(11.2)** and inclusive urbanisation **(11.3)**. But tackling marine pollution under **target 14.1** reinforces and contributes synergistically to ensuring safe housing, basic services and upgrading slums **(11.1)**, enhancing sustainable urbanisation **(11.3)** and reducing the environmental impact of cities **(11.6)** (Nunes et al., 2016). The policy and management measures required to reduce coastal and marine pollution (especially that originating from urban centres) include upgrading sewage and wastewater management systems and improved urban planning. Furthermore, action on ocean acidification **(14.3)** will also benefit the safeguarding of natural heritage of coastal areas **(11.4)**; coastal ecosystems such as coral reefs provide a wide range of benefits from livelihoods to biodiversity but can be severely affected by ocean acidification.

Trade-offs are possible, depending on whether policies and management are approached in an integrative manner and across sectors as well as administrative or jurisdictional boundaries. Sustainable management of coastal areas **(14.2)** can enable better human settlement planning and management **(11.3)**, including the

provisioning of safe housing or upgrading of slums located in the coastal zone **(1.1)**, can safeguard natural heritage **(11.4)** by ensuring the inclusion of coastal, catchment, and wetland protected areas, can contribute to disaster management **(11.5)** such as the reduction of flooding or erosion, and can reduce the environmental impacts of cities **(11.6)**. Here also, trade-offs are possible depending on how the policies and measures adopted integrate these targets. Promoting the construction of new buildings utilising local materials **(11.c)** may have negative impacts on coastal ecosystems and hinder the restoration and protection of marine and coastal areas **(14.2, 14.5)**. Although some countries like the Maldives (Jaleel, 2013) have established strict regulations, mining of corals for construction material is an issue in many coastal countries and island states, such as the Solomon Islands (Albert et al., 2015) and Kiribati (Babinard et al., 2014). This is also the case for timber extraction from mangroves and sand mining from coastal systems (Masalu, 2002; Agardy et al., 2005; Babinard et al., 2014). In the other direction, **target 11.c** may encounter constraints due to protection and conservation measures taken under **targets 14.2** and **14.5**.

Overall, implementing SDG14 will provide opportunities for sustainable coastal development and urbanisation, and for the protection of cultural and natural heritage in coastal areas; and sustainable and integrative settlement planning and development as promoted under SDG 11 will support the achievement of SDG14 targets aiming at protection and conservation of coastal and marine areas. Planning and management across scales and sectors, cognisant of the land-sea nexus is therefore essential to reach targets from both SDGs and minimise possible trade-offs. In this context, it is important to note that coastal zones show on average higher population densities and experience stronger population growth and urbanisation rates than their hinterland, a trend that is regionally modified in terms of extent and drivers but which is generally expected to continue (Barragán and de Andrés, 2015; Neumann et al., 2015; Merkens et al., 2016). About 65% of all megacities are located in coastal areas, and population projections suggest the number of megacities will increase from 20 in 2010 to 25 by 2025 (Brown et al., 2013). Population growth, urbanisation trends and increasing demand and competition for resources, transport and energy are increasing pressure on coastal zones and their ecosystems, and in turn on the capacity to provide resources in a sustainable way (Sekovski et al., 2012; Barragán and de Andrés, 2015).

KEY UNCERTAINTIES

(1) The main uncertainties concern the lock-in effects that infrastructure brings to cities, and policy and governance decisions on urban development. (2) Further uncertainties concern the socio-economic impacts due to degradation of coastal habitats and ecosystems, and to the overall complexity of interactions within the coastal social-ecological system.

KEY DIMENSIONS

Time: Decisions are generally of a long-term nature because they tend to lock-in technologies and infrastructure with long lifecycles.

Geography: Interactions between SDG14 and SDG11 mainly concern urban settlements in coastal zones, with some effects especially pronounced in low-lying coastal areas, but may also apply to smaller coastal settlement structures and regions neighbouring coastal settlements, as well as to urban areas further upstream within the catchment (land-sea nexus).

Governance: Strong local governments and urban institutions as well as coherent policymaking and governance across administrative and jurisdictional boundaries are essential for formulating

integrated solutions and effective implementation (i.e. coordination).

Technology: Technology is central to some ocean/coast impacts from cities and human settlements. It is essential for pollution management and relevant for disaster reduction. Destructive technologies such as breakwater construction can negatively influence coastal and marine ecosystems, accelerate coastal erosion or cause coastal squeeze, and so require cautious and integrative planning.

Directionality: Most of the identified synergies and trade-offs have potential for bi-directional effects.

ILLUSTRATIVE EXAMPLE
EXPLORING LINKAGES BETWEEN URBANISATION AND THE OCEANS AND COASTS IN AUSTRALIA

Being a continent nation, Australia has an exceptionally long coastline (35,900 km without islands), an extensive maritime offshore area connected to large ocean basins and seas, and over 8200 islands (Short and Woodroffe, 2009; Australian Government - Geoscience Australia, 2016). Owing to their length and extent, Australia's coasts and marine waters contain a wide range of ecosystems.

Challenges in ensuring sustainable coastal management **(14.2)**, pollution management **(14.1)**, and a reduction in urban footprint **(11.6)**, together with the need for sustainable urban development **(11.3)**, safe and sustainable transport systems **(11.2)** and disaster risk reduction **(11.5)**, result from a combination of both human and environmental pressures (Stocker et al., 2012). Although the Australian coastline has many remote sections, about 85% of the population lives within 50 km of the coast; mostly along the east, south-east and south-west coast (Australian Bureau of Statistics, 2004, 2012, 2016). In contrast to regional inland areas which experience strong population decline, population growth is high in capital cities, most of which occur along the coast, and in non-metropolitan coastal areas (Australian Bureau of Statistics, 2016). This coastal migration trend, often referred to as the 'sea change' phenomenon and manifesting in increasing urbanisation of the Australian coastline with coast-specific developments such as 'canal estates' and waterfront housing (Harvey and Stocker, 2015), has been attributed to lifestyle decisions by residents as well as to financial interests of developers and to State government policies (Gurran and Blakely, 2007; Danaher, 2008). Leading to further coastal sprawl, these changes place many pressures on coastal systems (habitat degradation, pollution, changes in hydrology) as well as on social and community structures (Green, 2010; Harvey and Caton, 2010; Stocker, 2012). They also create demand for infrastructure developments **(11.2)** and challenges for coastal planning and management **(11.3, 14.2)** and climate change adaptation **(11.5)**, especially since most of these developments occur in low-lying coastal areas (Harvey and Stocker, 2015).

As in many other countries, the combination of pressures from urban development, flood mitigation measures, and the use of land and water in and around catchment areas and coastlines has changed enormously and even destroyed some Australian coastal ecosystems **(14.2)** (Australian Government, 2011; McDonald and Foerster, 2016). Low-lying coastal areas are frequently exposed to flood hazards and coastal erosion **(11.5)**, with climate change through sea-level rise increasing exposure and vulnerability to coastal hazards for metropolitan populations as well as for remote coastal areas (Harvey and Woodroffe, 2008; Australian Government, 2011). Australian coastal waters also contain important shipping routes (Harvey and Caton, 2010). Commercial and recreational fishing, and

aquaculture are other coastal activities that create environmental concern (Harvey and Caton, 2010; Australian Government, 2011), with recreational fishing rated as more significant than commercial fishing in some regions (McPhee et al., 2002; Cooke and Cowx, 2006).

Protecting coastal environments and critical aquatic habitats **(14.2)** has been designated one of Australia's six national priorities under its 'Caring for our Country' programme (Australian Government, 2013). Important steps were taken on the protection and rehabilitation of coastal and aquatic ecosystems through increased community participation, the improvement of water quality, and the protection of Ramsar wetlands and highly valued ecosystems such as the Great Barrier Reef. This included efforts to address key threats to wetlands, to clean up estuaries and coastal hotspot areas, and to protect habitats for biodiversity and ecosystem services. Australia has also designated 36 marine and coastal wetlands under the 1971 Ramsar Convention, six marine and coastal World Heritage sites under UNESCO, and several small and large-scale coastal and marine protected areas **(14.5)**. Despite these achievements and recent efforts towards more systematic conservation planning, Barr and Possingham (2013) found marine conservation in Australia is lacking representation of the full range of ecosystems and their diversity. Conservation of coastal ecosystems is further challenged by conflicting interests and jurisdictional issues arising from multiple land-sea interactions and transboundary effects, calling for integrated land-sea conservation planning and management to tackle these challenges (Álvarez-Romero et al., 2011; Kenchington, 2016).

SDG 14 + SDG 12

TARGETS	KEY INTERACTIONS	SCORE	POLICY OPTIONS
14.1 ⟷ 12.1, 12.2, 12.3, 12.4, 12.5	Sustainable production and consumption, sustainable management of natural resources, recycling, and sound management of chemicals and wastes will help prevent marine pollution	+3	Develop integrated policies and action plans on marine litter Promote circular economies and improve recycling along the entire value chain, including streamlining the prevention of marine litter into policies related to consumption and production
14.4 ⟷ 12.2, 12.3	Sustainable fisheries contribute to sustainable management of natural resources. Specific management measures, such as discard bans or selective fishing methods reduce food losses along the production chain	+3	Develop fisheries policies based on maximum sustainable yield, promote the adoption of sustainability and discard elimination targets for all fish stocks and support context-specific technical innovation for resource efficiency
14.4 ⟷ 12.6	Adoption of labelling schemes and voluntary codes of conduct by companies by the fishing industry will help support sustainable fisheries	+1	Promote and establish sound seafood eco-labelling
14.7 ⟶ 12.2, 12.3, 12.a	Increase in benefits for SIDS from sustainable use of marine resources can enable sustainable management and efficient use of natural resources, a reduction in food wastes, and strengthened scientific and technological capacity	+3	Strengthen capacities for impact assessment and sustainable management of fisheries and aquaculture Establish incentives for sustainable and resource-efficient use of marine resources and coastal areas

KEY POINTS

Many close synergies between SDG14 and SDG12 with some targets inextricably linked in both directions

Sustainable management and protection of marine and coastal ecosystems, and sustainable fishing practices can lead to more efficient use of natural resources and less food waste and loss

Sustainable consumption and production patterns (in agriculture, industry, private households) can help prevent and reduce marine pollution, minimise the effects of ocean acidification, and protect marine and coastal ecosystems

KEY INTERACTIONS

SDG14 has close synergistic positive links with SDG12 (ranging from 'enabling' over 'reinforcing' towards 'indivisible' interactions at the target-level). Achieving sustainable fisheries, restoring stocks and ending IUU fisheries **(14.4)** will contribute to sustainable management and efficient use of natural resources and is therefore indivisible for reaching **target 12.2** and reducing food waste **(12.3)**. Likewise, increasing economic benefits to SIDS from sustainable natural resources **(14.7)** reinforces the achievement of **targets 12.2** and **12.3**. The marine environment is at the receiving and accumulating end of consumption and production chains. Land-based pollution, such as nutrients from agriculture and input of wastes, is among the key impacts on the marine environment. Tackling marine pollution **(14.1)** (especially from land-based sources) to protect marine ecosystems, habitats and species from harmful effluents and discharges, involves better waste management and sustainable chemical policies, and will enable the achievement of environmentally sound management of chemicals and wastes **(12.4)** and a move towards a circular economy **(12.5)**.

A reduction in food waste at the retail and consumer level will support more sustainable, less output-orientated forms of agriculture (e.g. organic or small holder farming) and so reduce land-based pollution, such as from nutrients. Sustainable and efficient use of natural resources and recycling will decrease fossil fuel use (e.g. from smelting or maritime transportation), and so help reduce ocean acidification. Tackling marine pollution requires a transformation of production chains which will encourage companies to develop and improve their sustainability policies **(12.6)**. Increasing the role of ecolabels as a tool to drive sustainable fisheries **(14.4)** is an additional enabling factor.

KEY UNCERTAINTIES

(1) The effects of land-based pollution and the sources of pollutants have been well studied in many parts of the world. Nevertheless, monitoring data for specific types, amounts and sources are lacking for many regions. (2) There are also uncertainties concerning links with ecosystem dynamics as well as with management and governance across sectors to address land-ocean interactions.

KEY DIMENSIONS

Time: The necessary transformational changes will require substantial efforts and time. Achieving sustainable management and protection of marine and coastal ecosystems by 2020 seems unrealistic in light of the time frame for **target 12.3** (sustainable management of natural resources by 2030). Achieving sustainable fisheries by 2020 will contribute to achieving sustainable natural resource use by 2030. Also, pollutants such as

plastic debris, remain long-term in the environment if not removed, leading to considerable time lags for environmental responses to measures with regard to sustainable consumption and production patterns.

Geography: Over 70% of the planet's surface is covered by oceans, and 20 of 31 megacities with more than 8 million people are within the low-elevation coastal zones (Brown et al., 2013). Consumption and production patterns in coastal communities and megacities will greatly affect ocean sustainability. At the same time, development in SIDS will be crucial given their large proportion of ocean space.

Governance: Ocean governance is based on the legal and institutional framework established under UNCLOS. Many pressures and drivers of ocean decline are located on land, outside the mandates of marine management organisations. Greater integration between legal governance regimes for land, air/climate and the ocean will create synergies for SDG14 and SDG12. Voluntary or market-based policy approaches can foster better goal achievement.

Technology: Technology is central to sustainable aquaculture, resource efficiency and a circular economy.

Directionality: Bi-directional, but asymmetric for some targets. Sustainable fisheries will directly support sustainable management and efficient use of natural resources. For many pressures, the marine environment is the end point for pollutants from unsustainable production and consumption patterns on land.

ILLUSTRATIVE EXAMPLE
G7 ACTION PLAN TO COMBAT MARINE LITTER

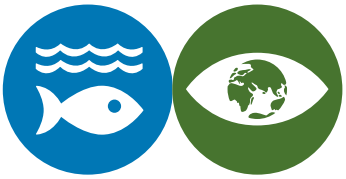
Marine litter is one of the main contributors to marine pollution. Plastics are of growing concern owing to their persistence in the marine environment and to their impacts on wildlife and potentially, humans consuming marine proteins. In 2010, 275 million tonnes of plastic waste were estimated to have been generated by 192 coastal countries, with 4.8–12.7 million tonnes of this entering the ocean (Jambeck et al., 2015). Key factors for the largest amounts of marine litter from countries were population size and the quality of waste management. Under a business-as-usual scenario, the cumulative amount of plastic waste entering the ocean from land-based sources could increase by an order of magnitude by 2025 (Jambeck et al., 2015). The input is not expected to peak before 2100, and without drastic transformative action in line with SDG12 the amount of waste generated will continue to grow with increased population and increased per capita consumption associated with economic growth (Hoornweg et al., 2013, 2015).

Growing public awareness has led to widespread action at different scales and by different actors, including 'fishing for litter' initiatives by civil society organisations, scientific research programmes, national strategies and measures by governments or action plans by international organisations such as the Regional Seas Conventions. The impacts of marine litter on ocean sustainability were recognised by the 2030 Agenda. Namely, pollution from land-based activities, including marine debris and nutrient pollution **(14.1)** and floating plastic debris **(14.1.1)**. Recent studies have also shown the toxicity of microplastics, for example leading to reduced fertility of marine organisms (Cressey, 2016).

In 2015, the Heads of State and Government of the seven strongest

economic countries addressed the effects of marine pollution from litter and adopted the G7 Action Plan to Combat Marine Litter. The Action Plan includes several actions that enable the achievement of **target 14.1** through addressing sustainable consumption and production patterns. It reflects the need to take action outside the traditional regulatory scope of regional seas conventions or other ocean governance bodies and supports an integrated, cross-sectoral approach to reducing marine pollution. Although primarily aimed at reducing marine litter there are strong interdependencies with SDG12 and reinforcing feedbacks can be expected if implemented coherently, particular for **targets 12.1, 12.4, 12.5, 12.6, 12.8** and **12.a**. Actions that support **target 14.1** and at the same time directly contribute to SDG12 include: improving countries' systems for waste management, reducing waste generation, and encouraging reuse and recycling **(12.1, 12.4. 12.5)**; incorporating waste management activities into international development assistance and investments and supporting the implementation of pilot projects where appropriate **(12.1, 12.a)**; investigating sustainable and cost-effective solutions to reduce and prevent sewage and stormwater-related waste, including microplastics entering the marine environment **(12.1, 12.4)**; promoting relevant regulations and incentives to reduce the use of disposable single-use and other items, which impact the marine environment **(12.1, 12.4, 12.5)**; encouraging industry to develop sustainable packaging and remove ingredients from products to gain environmental benefits, such as by voluntary phase-out of microbeads **(12.1, 12.5, 12.6)**; promoting best practice along the whole plastics manufacturing and value chain from production to transport, such as aiming for zero pellet loss **(12.1, 12.6)**; assessing and analysing removal data to support and target outreach efforts, potential policy options, and other means of preventing litter **(12.1, 12.8)**; promoting outreach and education activities leading to individual behaviour change that can reduce the amount of litter entering the environment, internal waters and the seas **(12.1, 12.8)**; supporting the initiation of a harmonised global marine litter monitoring effort and the standardisation of methods, data and evaluation **(12.b)**; supporting efforts by the United Nations Environment Programme and other organisations to help understand the sources, pathways and impacts of marine litter **(12.1, 12.8)**; and supporting and calling for additional research initiatives to address marine litter **(12.a)**.

SDG 14 + SDG 13



TARGETS	KEY INTERACTIONS	SCORE	POLICY OPTIONS
14.1, 14.2, 14.3, 14.4, 14.5, 14.6 ⟷ 13.1	Action taken to strengthen the health of coastal and marine ecosystems including fish stocks will reinforce the strengthening of environmental and societal resilience and adaptive capacities to climate change, and vice versa	+2	Enforce climate mitigation measures Take action to protect, restore and strengthen the mitigation and adaptation potential and resilience of coastal and marine ecosystems to climate change Ensure the adequate sharing of information, data and technologies Improve education and build awareness of the benefits arising from sustainable management and conservation of marine and coastal ecosystems for climate change mitigation and adaptation
14.2, 14.3, 14.5 ⟷ 13.2, 13.a, 13.b	Action taken for promoting healthy oceans and coastal systems will also enable or even reinforce the development and integration of climate change measures into policies, planning and management, such as by promoting coastal ecosystems serving as blue carbon systems, and vice versa	+1/ +2	Promote coastal ecosystems as blue carbon systems for climate change mitigation where appropriate Provide and sustain capacity building and support to LDCs and SIDS in developing and implementing sustainable projects for mitigation, adaptation and resilience building Ensure the adequate sharing of information, data and technologies
14.2, 14.3, 14.4, 14.5, 14.6 ⟵ 13.1, 13.2, 13.3	Policies and measure taken to adapt to climate change may counteract or even cancel SDG14 targets aiming at the protection and conservation of coastal ecosystems, such as if technical protection measures fail to provide enough space for saltmarshes to keep up with sea-level rise (coastal squeeze)	-2/ -3	Ensure coherent and integrated coastal zone management and coastal protection management Develop nature-based solutions that promote both coastal and marine conservation and sustainable urban development in an integrated way
14.a ⟷ 13.3, 13.b	Increasing marine scientific knowledge, research capacities and technologies will enable or even reinforce awareness raising and capacity building for climate change mitigation measures, planning and management, and vice versa	+1/ +2	Build human and institutional capacity and ensure participation of relevant stakeholders and societal actors in policymaking and management Build transdisciplinary partnerships for climate change action and programmes Develop, maintain and support early warning systems on coastal and marine hazards

KEY POINTS

Oceans and coasts are closely linked with mitigation and adaptation action on climate change and related hazards, resulting in strong synergistic and bi-directional links between SDG14 and SDG13 over various targets

Strong synergies exist between SDG14 and SDG13 in terms of capacity building, knowledge exchange and technological innovation. Investment in these areas under either goal will support the achievement of targets under both, as well as the achievement of targets relevant to building resilience and adaptive capacity

Failing to tackle SDG13 will have major consequences for oceans and coasts; however, sustainable use and conservation of oceans and coasts and their resources can contribute to climate change mitigation and adaptation

KEY INTERACTIONS

Oceans and coastal ecosystems are essential elements of the Earth system, and have an important role in climate regulation (Heckbert et al., 2011; Visbeck et al., 2014). Coastal ecosystems such as mangroves have great potential for climate mitigation through carbon sequestration (Luisetti et al., 2013; Warner et al., 2016) and for adaptation by providing protection from coastal hazards and climate change impacts such as sea-level rise and increased storminess (Agardy et al., 2005; Spalding et al., 2014). They also deliver important maintenance services for fisheries, such as by providing nursery grounds for fish (Brander et al., 2012). These processes and services contribute to building resilience to climate change both for the human and environmental components of this tightly coupled system.

But marine and coastal ecosystems and coastal regions are also directly affected by climate change (Rhein et al., 2013; Pörtner et al., 2014; Wong et al., 2014; Stocker, 2015). Ocean warming and ocean acidification or changes in ocean circulation patterns will have potentially large impacts on marine and coastal ecosystems. These range from degradation of coral reefs to changes in species composition and distribution, with potentially critical effects for fish stocks and fisheries (Pörtner et al., 2014; Visbeck et al., 2014; Wong et al., 2014). Coastal ecosystems and human coastal communities are increasingly exposed to the effects of sea-level rise and extreme events, especially through coastal flooding and erosion or saltwater intrusion into coastal aquifers. Coastal ecosystems may be unable to cope with the rate at which sea-level is rising and changes in light availability, salinity or circulation patterns are occurring, risking degradation or even ecosystem loss and possibly reducing the protection and mitigation potential of coastal ecosystems (Wong et al., 2014).

Cumulative impacts from direct and indirect (via climate change) human pressures on marine and coastal ecosystems are potentially large and require concerted action in both directions of SDG14 and SDG13. Strengthening the resilience of ocean and coastal ecosystems by reducing pollution **(14.1)**, restoring their health **(14.2)**, tackling ocean acidification **(14.3)**, managing fish stocks sustainably **(14.4, 14.6)** and protecting coastal and marine areas and biodiversity **(14.5)** helps strengthen the overall resilience and adaptive capacity of coastal systems to climate change **(13.1)**. It will also co-facilitate the integration of climate change

measures into policies and planning **(13.2)**, the promotion of mechanisms for raising capacity to climate change-related planning and management **(13.b)**, and the implementation of commitments on climate mitigation taken under the United Nations Framework Convention on Climate Change (UNFCCC) **(13.a)**. Increasing research capacity, scientific knowledge and marine technology **(14.a)** can contribute to developing capacity on climate change adaptation and mitigation **(13.3)** and to effective climate change planning and management **(13.b)**, especially in coastal LDCs and SIDS. In turn, targets under SDG13 that aim at building resilience to climate-related hazards **(13.1)**, integrating climate change measures into policies **(13.2)**, improving education, awareness and institutional capacity **(13.3)** and addressing the needs of developing countries under the UNFCCC **(13.a)**, for example with regard to adaptation measures, may support sustainable ocean management and conservation **(14.2, 14.5)**. Targets under SDG13 may also help reduce ocean acidification **(14.3)**, and have positive impacts on fisheries **(14.4, 14.6)** and economic benefits for SIDS and LDCS **(14.7)**. Trade-off are possible depending on how measures are aligned between SDG14 and SDG13.

KEY UNCERTAINTIES

There are uncertainties linked to natural dynamics, the complexity of interlinkages within the natural system and between the natural and the human systems, and to management and good governance.

KEY DIMENSIONS

Time: (1) The timing of ocean and coastal restoration and conservation depends on natural dynamics and the level of degradation. Building capacity takes time but has a long-term effect. (2) Climate change-related planning and management, and adaptation and mitigation measures, have different time scales of implementation and effect and should thus always complement each other.

Geography: Interactions primarily concern island and coastal zones, but are also of global importance owing to the relevance of marine and coastal systems for global climate regulation.

Governance: Ocean sustainability needs integrated governance such as coordination of regulatory measures and incentives among different sectors and across different scales. Besides climate change adaptation and mitigation and the overall strengthening of the health and resilience of coastal and marine systems in the context of climate change, this also includes energy and technology or consumption and production patterns.

Technology: Outcomes depend on technology transfer for capacity building, but also on the development of technologies and measures in consideration of the complexity of the system.

Directionality: While positive synergistic and bi-directional interactions occur between SDG14 and SDG13, there is also potential for negative interactions. The strength of impacts, synergies and trade-offs often depends on the degree of policy and management integration between both goals.

ILLUSTRATIVE EXAMPLE
THE PARIS AGREEMENT

The fundamental global agenda for combating climate change is the United Nations Framework Convention on Climate Change (UNFCCC, 1992). The most recent agreement under the UNFCCC, the Paris Agreement, entered into force on 4 November 2016. This agreement "aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty" (UNFCCC, 2015). Key elements of the Paris Agreement of relevance to oceans and coasts, their contributions to SDG13 and the achievement of SDG14 include the following.

Holding the increase in global temperature to below 2°C and aiming for a maximum of 1.5°C above pre-industrial levels (Art. 2). This long-term temperature goal will support the achievement of targets that aim at healthy and resilient marine and coastal ecosystems **(14.2, 14.5)** and those that promote sustainable fisheries management **(14.4, 14.6)** and economic benefits for SIDS and LDCs **(14.7)**. Although science has issued warnings that the agreed temperature limits could have critical effects on the Earth system (Knutti et al., 2016), slowing global warming will support the overall strengthening of resilience and adaptive capacity of the natural system and the human system towards climate change **(13.1)**.

Targeted reduction of emissions and achieving of a balance between greenhouse gas emissions and sinks in the latter half of the 21st century, including successful preparation, communication and maintenance of Intended Nationally Determined Contributions (INDCs) as established under Art. 4. Reducing greenhouse gas emissions and concentrations in the atmosphere is fundamental for minimising ocean acidification **(14.3)**, and the required INDCs relate directly to **targets 13.2** and **13.3**.

Conserving and enhancing sinks and reservoirs of greenhouse gases (Art. 5) and establishing mechanisms to contribute to the mitigation of greenhouse gas emissions and to support sustainable development (Art. 6). These elements have synergistic links to **targets 14.2** and **14.5** when considering the carbon sink potential of coastal ecosystems and the need to protect, conserve or restore this potential. Such mechanisms could also be established under **target 13.b**.

Strengthening adaptation options and "enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development" (Art. 7). This is a direct link to **target 13.1**, but also contains an indirect and synergistic link to SDG14 targets working towards healthy and resilient marine and coastal ecosystems **(14.1, 14.2, 14.5, 14.4, 14.6)**.

Addressing loss and damage "associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of loss and damage" (Art. 8). This directly links to both SDGs by addressing the protective potential and mitigation potential of coastal ecosystems **(13.1, 14.2, 14.5)**.

Reaffirming the obligations of developed countries for supporting developing Parties in their efforts on mitigation and adaptation to climate change through finance and voluntary support, technology transfer and capacity building (Arts. 9, 10, 11). These goals directly link to all targets under SDG13 but measures taken here will also benefit the achievement of SDG14 due to the central role that oceans and coasts play in the climate system.

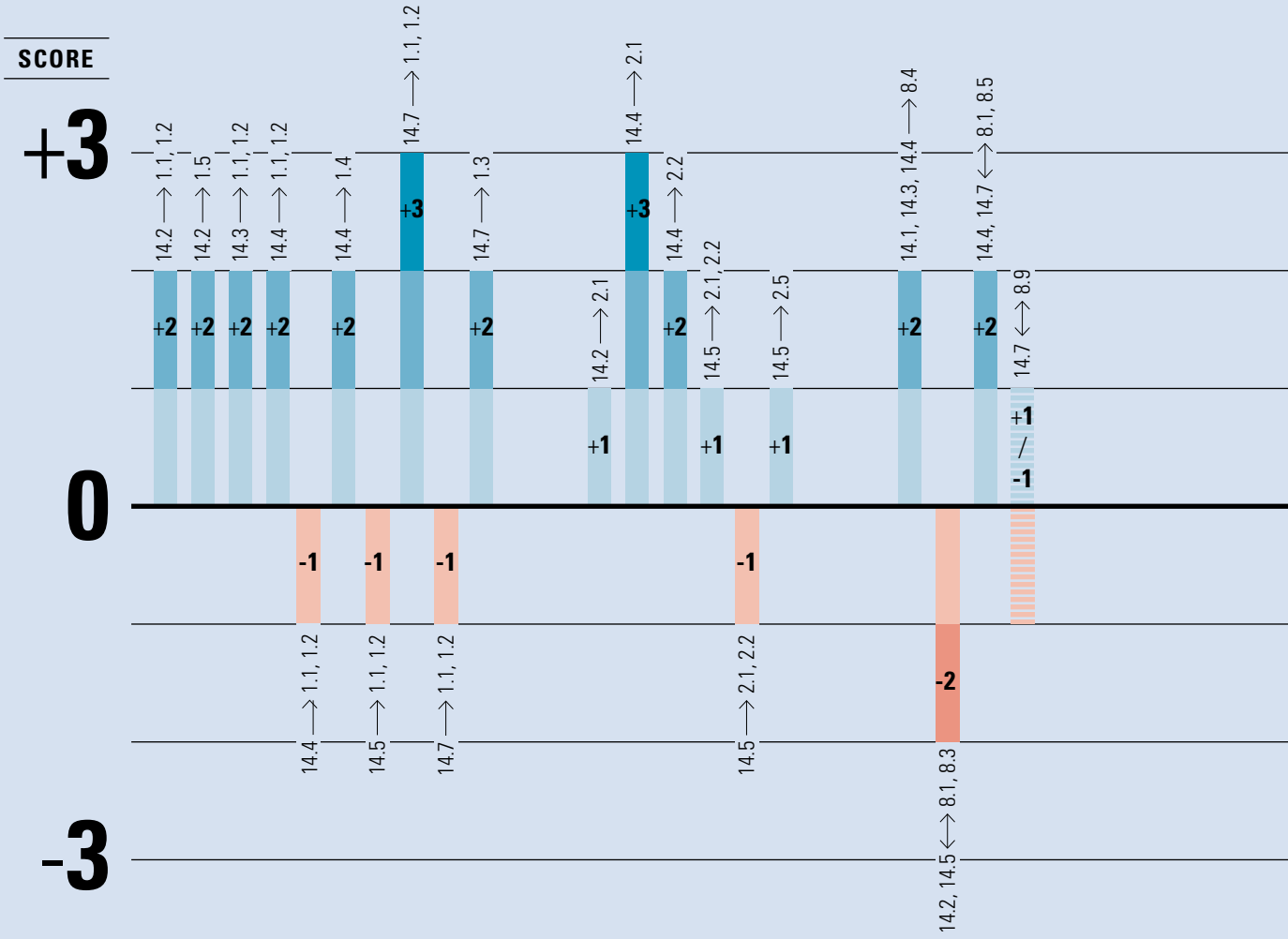
Implementing the Paris Agreement will thus support achieving SDG13 and SDG14 and the 2030 Agenda as such. However, aligning policies and developing integrated approaches will be essential for ensuring the best possible outcomes and for minimising potential trade-offs.

KEY INTERACTIONS
SDG 14 WITH OTHER GOALS

+ SDG 1

+ SDG 2

+ SDG 8




+ SDG 11
+ SDG 12
+ SDG 13
SCORE
+3
0
-3
14.1 ⟷ 11.1, 11.3, 11.6
+2
14.2 ⟷ 11.1, 11.3, 11.4, 11.5, 11.6
+2
14.3 ⟶ 11.4
+2
-1 / -2
14.2 ⟷ 11.1, 11.2, 11.3
-1 / -3
14.2, 14.5 ⟷ 11.c
-1 / -2
14.5 ⟷ 11.1, 11.2, 11.3
14.1 ⟷ 12.1, 12.2, 12.3, 12.4, 12.5
+3
14.4 ⟷ 12.2, 12.3
+3
14.4 ⟷ 12.6
+1
14.7 ⟶ 12.2, 12.3, 12.a
+3
14.1, 14.2, 14.3, 14.4, 14.5, 14.6 ⟷ 13.1
+2
14.2, 14.3, 14.5 ⟷ 13.2, 13.a, 13.b
+2 / +1
-2 / -3
14.2, 14.3, 14.4, 14.5, 14.6 ⟵ 13.1, 13.2, 13.3
14.a ⟷ 13.3, 13.b
+2 / +1

KNOWLEDGE GAPS

Knowledge gaps exist in relation to all SDG14 targets and their interactions with other targets in the 2030 Agenda. The reasons for these gaps and their dimensions vary. In some cases (such as food security and sustainable fisheries, or maritime industries and job creation), interactions have already been analysed and are regularly monitored in many marine regions and countries. In contrast, for example in the relation between marine conservation and poverty alleviation or between marine ecosystems and climate change, knowledge is limited, fragmented or exists only in generic terms often not updated on a regular basis. The knowledge gaps that exist are not always caused by lack of data or information but also access restrictions, lack of standardised data collection protocols, lack of coordination across political or sectoral boundaries, or by capacity limitations for the analysis and translation of data and other types of information into policy advice.

In general terms, integrated research, monitoring and data analyses will be needed in combination with targeted capacity development to fill existing knowledge gaps. Having regard to limited resources especially in SIDS and LDCs, consideration should also be given to the development and applicability of data-poor assessment approaches and models. Sea-basin based open-access platforms to marine data should be created. They could for example be developed based on existing platforms or as joint initiatives by member states and existing regional organisations. They should be interoperable and free of restrictions on use, with the specific target of developing an integrated information base on oceans, seabed resources, marine life, and risks to habitats and ecosystems. The table provides a non-exclusive list of knowledge gaps that have been identified in relation to the target-level interaction analysis provided in this chapter.

14 + 1

The social and economic value of oceans, ecosystem services, and risk analysis (in relation to extractive industries) in low-income countries within their coastal waters and EEZs

The impact of an expansion in blue jobs, value addition, and new technologies on jobs in traditional sectors

Options to maintain fish stocks at biologically sustainable levels by limiting fishing effort while ensuring profitability
Human and institutional capacity gaps in low-income countries

14 + 2

Under- or misreporting of landings of artisanal catches in low income countries
Stock assessments in artisanal fisheries in low-income countries

14 + 8

How marine ecosystem services link to economic and social development in concrete terms and how this changes over time. Especially in developing countries, this links to limited expertise on valuation techniques, their application and collection of the necessary data

How to minimise negative effects of economic and social development on marine ecosystems

The potential for sustainable blue growth in individual marine regions, sea basins and countries

The value of ecosystem services (especially non-marketed ones) and how to integrate monetised and non-monetisable values for policy analysis and reporting

14 + 11

How increased coastal development, urbanisation and coastal environments interact and influence each other
How urban and regional planning and fiscal policies influence the coastal environment and vice versa, and how to develop integrated cross-boundary governance (i.e. across the land-sea nexus) and across administrative boundaries and jurisdictions

Gaps in capacity, especially in developing countries, for ensuring sustainable human settlement planning and regional development

14 + 12

The status of stocks and fisheries including the level of discards and how they should be managed to provide for maximum sustainable yield

How aquaculture affects marine systems in specific contexts, particularly with regard to inputs of chemicals and nutrients to the marine environment and to effects on wild fish stocks and how these can be reduced

How to minimise post-harvest loss in seafood production and supply chains, especially through small-scale artisanal fisheries

How to achieve better waste management, recycling and reduce marine pollution of all kinds, including marine debris

How human health is affected by the release of microplastics to the marine ecosystems

14 + 13

What are the effects and impacts of the long-term temperature targets established under the Paris Agreement, on oceans, seas, coasts and their ecosystems

What are the impacts of climate change on the health of marine ecosystems, habitats and species in low-income countries, and how can these be mitigated or reduced

How resilient are marine and coastal ecosystems to climate change, and what are suitable and effective conservation and management measures to provide climate mitigation, nature-based adaptation and the reversion of negative effects such as coral bleaching

The influence of climate change on fish stocks

CONCLUDING COMMENTS

SDG14 plays a cross-cutting role in the 2030 Agenda, interacting with many other SDGs. Transformation towards more integrated and aligned policies and measures in response to these interactions, backed by tailor-made capacity building and strengthened institutions, is a prerequisite for achieving the 2030 Agenda.

Progress has been made towards more integrated governance of the ocean. However, silo-based decision-making often irrespective of ecosystem-dynamics and meaningful ecological boundaries still prevails in many cases. Decision-making needs to take due account of the environmental dimension as an indispensable enabler for sustainable development and ensure that this dimension is not lost when negotiating between conflicting goals and targets, especially in relation to potential trade-offs and conflicts. To date, degradation of the marine environment has outpaced development of the international ocean governance landscape. Achieving SDG14 and its associated targets, and other SDGs where the ocean plays a crucial role will thus depend on a robust implementation framework, including mechanisms for tracking commitments, regional cooperation and integrated thematic assessments (Unger et al., 2017).

Building on these general considerations, the six summary tables in the target-level interactions section provide options for how policy could address the specific target interactions in practice. Although addressed to specific target interactions, many of these policy options are also relevant for other interactions.

REFERENCES

Agardy, T., J. Alder, P. Dayton, S. Curran, A. Kitchingman, M. Wilson, A. Catenazzi, J. Restrepo, C. Birkeland, S. Blaber, S. Saifullah, G. Branch, D. Boersma, S. Nixon, P. Dugan, N. Davidson, and C. Vorosmarty, 2005. Coastal systems. In: Reid, W. (ed.), Ecosystems and Human Well-Being. Volume 1: Current State and Trends. Millennium Ecosystem Assessment Series. pp. 513-549. Island Press.

Ahtiainen, H. and M.C. Öhman, 2014. Ecosystem Services in the Baltic Sea: Valuation of Marine and Coastal Ecosystem Services in the Baltic Sea. Nordic Council of Ministers, TemaNord 2014:563.

Ahtiainen, H., J. Artell, M. Czajkowski, B. hasler, L. Hasselström, K. Hyytiäinen, J. Meyerhoff, J.C.R. Smart, T. Söderqvist, K. Zimmer, J. Khaleeva, O. Rastrigina and H. Tuhkanen, 2013. Public preferences regarding use and condition of the Baltic Sea: An international comparison informing marine policy. Marine Policy, 42:20-30.

Albert, J.A., A.D. Olds, S. Albetr, A. Cruz-Trinidad and A.-M. Schwarz, 2015. Reaping the reef: Provisioning services from coral reefs in Solomon Islands. Marine Policy, 62:244-251.

Álvarez -Romero, J.G., R.L. Pressey, N.C. Ban, K. Vance-Borland, C. Willer, C.J. Klein and S.D. Gaines, 2011. Integrated land-sea conservation planning: the missing links. Annual Review of Ecology, Evolution, and Systematics, 42:381-409.

Australian Bureau of Statistics, 2004. How many people live in coastal areas? 1301.0 - Year Book Australia, 2004. www.abs.gov.au/Ausstats/abs@.nsf/Previousproducts/1301.0Feature Article32004

Australian Bureau of Statistics, 2012. Geographic Distribution of the Population. 1301.0 - Year Book Australia, 2012. www.abs.gov.au/ausstats/abs@.nsf/Lookup/by Subject/1301.0~2012~Main Features~Geographic distribution of the population~49

Australian Bureau of Statistics, 2016. Australia - Population Change. 3218.0 - Regional Population Growth, Australia, 2014-15. www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/3218.0Main Features152014-15?opendocument&tabname=Summary&prodno=3218.0&issue=2014-15&num=&view

Australian Government, 2011. Australia State of the Environment 2011. State of the Environment 2011 Committee. Independent report to the Australian Government Minister for Sustainability, Environment, Water, Population and Communities. www.environment.gov.au/science/soe/2011-report/download

Australian Government, 2013. Caring for our Country 2008-2013 Achievements Report: Synthesis. Independent summary to Caring for our Country. www.nrm.gov.au/system/files/resources/96c5fc3f-87d7-4fd4-bce2-52314e5562a7/files/achieve-report-synthesis.pdf

Australian Government - Geoscience Australia, 2016. Oceans and Seas. www.ga.gov.au/scientific-topics/national-location-information/dimensions/oceans-and-seas

Babinard, J., C.R. Bennett, M.E. Hatziolos, A. Faiz and A. Somani, 2014. Sustainably managing natural resources and the need for construction materials in Pacific island countries: The example of South Tarawa, Kiribati. Natural Resources Forum, 38:58-66.

Barr, L.M. and H.P. Possingham, 2013. Are outcomes matching policy commitments in Australian marine conservation planning? Marine Policy, 42:39-48.

Barragán, J.M. and M. de Andrés, 2015. Analysis and trends of the world's coastal cities and agglomerations. Ocean and Coastal Management, 114:11-20.

BCG, 2013. Turning Adversity into Opportunity: A Business Plan for the Baltic Sea. Boston Consulting Group (BCG).

Béné, C., R. Arthur, H. Norbury, E.H. Allison, M. Beveridge, S. Bush, L. Campling, W. Leschen, D. Little, D. Squires, S.H. Thilsted, M. Troell and M. Williams, 2016. Contribution of fisheries and aquaculture to food security and poverty reduction: assessing the current evidence. World Development, 79:177-196.

Borja, A., S.B. Bricker, D.M. Dauer, N.T. Demetriades, J.G. Ferreira, A.T. Forbes, P. Hutchings, X. Jia, R. Kenchington, J.C. Marques and C. Zhu, 2008. Overview of integrative tools and methods in assessing ecological integrity in estuarine and coastal systems worldwide. Marine Pollution Bulletin, 56:1519-1537.

Brander, L.M., A.J. Wagtendonk, S.S. Hussain, A. McVittie, P.H. Verburg, R.S. de Groot and S. van der Ploeg, 2012. Ecosystem service values for mangroves in Southeast Asia: A meta-analysis and value transfer application. Ecosystem Services, 1:62-69.

Brodzicki, T. and J. Zaucha, 2013. Study on blue growth, maritime policy and EU strategy for the Baltic Sea region. International Journal of Automation and Computing, 3:117-124.

Brown, S., R.J. Nicholls, C.D. Woodroffe, S. Hanson, J. Hinkel, A.S. Kebede, B. Neumann and A.T. Vafeidis, 2013. Sea-level rise impacts and responses: a global perspective. In: Finkl, C.W. (ed.), Coastal Hazards. pp. 117-149. Springer.

Burke, L., K. Reytar, M. Spalding and A. Perry, 2011. Reefs at Risk: Revisited. World Resources Institute.

Cooke, S.J. and I.G. Cowx, 2006. Contrasting recreational and commercial fishing: Searching for common issues to promote unified conservation of fisheries resources and aquatic environments. Biological Conservation, 128:93-108.

Cressey, D., 2016. Bottles, bags, ropes and toothbrushes: the struggle to track ocean plastics. Nature, 536:263-265.

Crossland, C.J., D. Baird, J.-P. Ducrotoy, H. Lindeboom, R.W. Buddemeir, W.C. Dennison, B.A. Maxwell, S.V. Smith and D.P. Swaney, 2005. The coastal zone – a domain of global interactions. In: Crossland, C.J., H.H. Kremer, H. Lindeboom, J.I. Marshall Crossland M.D.A. Le Tissier (eds.), Coastal Fluxes in the Anthropocene. pp. 1-37. Springer.

Danaher, M., 2008. Seeing the change in a sea change community: issues for environmental managers. Australasian Journal of Environmental Management, 15:51-60.

Duxbury, J. and S. Dickinson, 2007. Principles for sustainable governance of the coastal zone: In the context of coastal disasters. Ecological Economics, 63:319-330.

ECORYS, 2013. Study in Support of Policy Measures for Maritime and Coastal Tourism at EU level. ECORYS, Netherlands.

EUNETMAR, 2013. Study on Blue Growth, Maritime Policy and the EU Strategy for the Baltic Sea Region. Contract No. MARE/2012/07 - Ref. No 1. European Networking Group for Integrated Maritime Policy (EUNETMAR).

European Commission, 2014. A Sustainable Blue Growth Agenda for the Baltic Sea Region (SWD (2014) 167 final).

FAO, 2009. FAO Yearbook. Fishery and Aquaculture Statistics. 2007. UN Food and Agriculture Organization (FAO).

FAO, 2014. Global Blue Growth Initiative and Small Islands Developing States (SIDS). UN Food and Agriculture Organization (FAO).

Fisher, B. and T. Christopher, 2007. Poverty and biodiversity: Measuring the overlap of human poverty and the biodiversity hotspots. Ecological Economics, 62:93-101.

Gillet, R., 2016. Fisheries in the Economies of Pacific Island Countries and Territories. Pacific Community (SPC), Australian Government, Forum Fisheries Agency (FFA).

Golden, C., 2016. Fall in fish catch threatens human health. Nature, 534:317-320.

Gössling, S., 2006. Towards sustainable tourism in the western Indian Ocean. Western Indian Ocean Journal of Marine Science, 5:55-70.

Green, R.J., 2010. Coastal Towns in Transition: Local Perceptions of Landscape Change. Springer.

Gurran, N. and E. Blakely, 2007. Suffer a sea change? Contrasting perspectives towards urban policy and migration in coastal Australia. Australian Geographer, 38:113-131.

Harris, A. and D. Gove, 2005. Ten Years Promoting and Strengthening Regional Cooperation for Securing Sustainable Fisheries in South West Indian Ocean (SWIO) Region. South West Indian Ocean Fisheries Commission (SWIOFC).

Harvey, N. and B. Caton, 2010. Coastal Management in Australia. University of Adelaide Press.

Harvey, N. and L. Stocker, 2015. Coastal residential waterways, science and policy-making: The Australian experience. Estuarine, Coastal and Shelf Science, 155:A1-A13.

Harvey, N. and C.D. Woodroffe, 2008. Australian approaches to coastal vulnerability assessment. Sustainability Science, 3:67-87.

Heckbert, S., R. Costanza, E.S. Poloczanska and A.J. Richardson, 2011. 12.10 - Climate regulation as a service from estuarine and coastal ecosystems. Treatise on Estuarine and Coastal Science, 12:199-216.

HELCOM, 2010. Ecosystem Health of the Baltic Sea. HELCOM Initial Holistic Assessment 2003–2007. Baltic Sea Environmental Proceedings 122. Helsinki Commission (HELCOM).

Hoornweg, D., P. Bhada-Tata and C. Kennedy, 2013. Waste production must peak this century. Nature, 502:615-617.

Hoornweg, D., P. Bhada-Tata and C. Kennedy, 2015. Peak waste: when is it likely to occur? Journal of Industrial Ecology, 19:117-128.

ILO, 2016. World Employment and Social Outlook 2016: Transforming Jobs to End Poverty. International Labour Organization (ILO), Geneva.

Jaleel, A., 2013. The status of the coral reefs and the management approaches: The case of the Maldives. Ocean and Coastal Management, 82:104-118.

Jambeck, J.R., R. Geyer, C. Wilcox, T.R. Siegler, M. Perryman, A. Andrady, R. Narayan and K. Levender Law, 2015. Plastic waste inputs from land into the ocean. Science, 347:768-771.

Kanyange, N., P. Kimani, P. Onyango, S. Sweenarain and Y. Yvergniaux, 2014. Performance Assessment of Beach Management Units along the Coastlines of Kenya and Tanzania. Indian Ocean Commission.

Kelleher, K., 2015. Building the Blue Economy in the WIO Region. Conference presentation.

Kenchington, R., 2016. The evolution of marine conservation and marine protected areas in Australia. In: J. Fitzsimons, A. and G. C. Wescott (ed.), Big, Bold and Blue: Lessons from Australia's Marine Protected Areas. pp. 29-42. CSIRO Publishing.

Knutti, R., J. Rogelj, J. Sedlacek and E.M. Fischer, 2016. A scientific critique of the two-degree climate change target. Nature Geoscience, 9:13-18.

Liu, Q.Q., M. Yu and X.L. Wang, 2015. Poverty reduction within the framework of SDGs and Post-2015 Development Agenda. Advances in Climate Change Research, 6:67-73.

Luisetti, T., E.L. Jackson and R.K. Turner, 2013. Valuing the European "coastal blue carbon" storage benefit. Marine Pollution Bulletin, 71:101-106.

Maribus, 2015. World Ocean Review 4. Sustainable Use of Our Oceans - Making Ideas Work. Maribus gGmbH, Hamburg.

Masalu, D.C.P., 2002. Coastal erosion and its social and environmental aspects in Tanzania: A case study in illegal sand mining. Coastal Management, 30:347-359.

McDonald, J. and A. Foerster, 2016. Protecting coastal wetlands in a changing climate: reinvigorating integrated coastal zone governance. In: Gray, J., C. Holley and R. Rayfuse (eds.), Trans-jurisdictional Water Law and Governance. pp. 240-259. Routledge.

McPhee, D.P., D. Leadbitter and G.A. Skilleter, 2002. Swallowing the bait: is recreational fishing in Australia ecologically sustainable? Pacific Conservation Biology, 8:40-51.

Merkens, J.-L., L. Reimann, J. Hinkel and A.T. Vafeidis, 2016. Gridded population projections for the coastal zone under the Shared Socioeconomic Pathways. Global and Planetary Change, 145:57-66.

Munguía-Vega, A., A. Saenz-Arroyo, A.P. Greenley, J.A. Espionoza-Montes, S.R. Palumbi, M. Rossetto and F. Micheli, 2015. Marine reserves help preserve genetic diversity after impacts derived from climate variability: Lessons from the pink abalone in Baja California. Global Ecology and Conservation, 4:264-276.

NEF, 2012. Jobs Lost at Sea: Overfishing and the Jobs that Never Were. New Economics Foundation (NEF), London.

Neumann, B., A.T. Vafeidis, J. Zimmermann and R.J. Nicholls, 2015. Future coastal population growth and exposure to sea-level rise and coastal flooding - A global assessment. Plos One, 10(3): e0118571. doi:10.1371/journal.pone.0118571.

Nunes, A.R., K. Lee and T. O'Riordan, 2016. The importance of an integrating framework for achieving the Sustainable Development Goals: the example of health and well-being. BMJ Global Health, 1(3): e000068.

Obura, D. et al., 2017. Reviving the Western Indian Ocean Economy: Actions for a Sustainable Future. WWF International, Switzerland.

Olsson, L., M. Opondo, P. Tschakert, A. Agrawal, S.H. Eriksen, S. Ma, L.N. Perch and S.A. Zakieldeen, 2014. Livelihoods and poverty. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. pp. 793-832. Cambridge University Press.

Pörtner, H.-O., D. Karl, P.W. Boyd, W. Cheung, S.E. Lluch-Cota, Y. Nojiri, D.N. Schmidt, and P. Zavialov, 2014. Ocean systems. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. pp. 411-484. Cambridge University Press.

Ramsar and UNWTO, 2012. Destination Wetlands: Supporting Sustainable Tourism. Secretariat of the Ramsar Convention on Wetlands, Switzerland; World Tourism Organization (UNWTO).

Rhein, M., S.R. Rintoul, S. Aoki, E. Campos, D. Chambers, R.A. Feely, S. Gulev, G.C. Johnson, S.A. Josey, A. Kostianoy, C. Mauritzen, D. Roemmich, L.D. Talley and F. Wang, 2013. Observations: ocean. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. pp. 255-316. Cambridge University Press.

Russi, D., M. Pantzar, M. Kettunen, G. Gitti, K. Mutafoglu, M. Kotulak and P. ten Brink, 2016. Socio-Economic Benefits of the EU Marine Protected Areas. Report prepared by the Institute for European Environmental Policy (IEEP) for DG Environment.

Sekovski, I., A. Newton and W.C. Dennison, 2012. Megacities in the coastal zone: Using a driver-pressure-state-impact-response framework to address complex environmental problems. Estuarine, Coastal and Shelf Science, 96:48-59.

Short, A.D. and C.D. Woodroffe, 2009. The Coast of Australia, Melbourne. Cambridge University Press.

Spalding, M.D., S. Ruffo, C. Lacambra, I. Meliane, L.Z. Hale, C.C. Shepard and M.W. Beck, 2014. The role of ecosystems in coastal protection: Adapting to climate change and coastal hazards. Ocean and Coastal Management, 90:50-57.

Stocker, T.F., 2015. The silent services of the world ocean. Science, 350:764-765.

Stocker, L. and D. Kennedy, 2009. Cultural models of the coast in Australia: toward sustainability. Coastal Management, 37:387-404.

Stocker, L., D. Kennedy, R. Kenchington and K. Merrick, 2012. Introduction to Australian coasts and human influences. In: Kenchington, R., L. Stocker and D. Wood (eds.), Sustainable Coastal Management and Climate Adaptation: Global Lessons from Regional Approaches in Australia. CSIRO Publishing.

Stojanovic, T.A. and C.J.Q. Farmer, 2013. The development of world oceans & coasts and concepts of sustainability. Marine Policy, 42:157-165.

Thilsted, S.H., A. Thorne-Lyman, P. Webb, J.R. Bogard, R. Subasinghe, M.J. Phillips and E.H. Allison, 2016. Sustaining healthy diets: the role of capture fisheries and aquaculture for improving nutrition in the post-2015 era. Food Policy, 61:126-131.

UNDP, 2006. Human Development Report 2006. United Nations Development Programme (UNDP).

UNECA, 2016. Africa's Blue Economy: A policy handbook. United Nations Economic Commission for Africa (UNECA).

UNEP, 2012. Green Economy in a Blue World. Synthesis Report. United Nations Environment Programme (UNEP).

UNEP/Nairobi Convention Secretariat, 2009. Strategic Action Programme for the Protection of the Coastal and Marine Environment of the Western Indian Ocean from Land-based Sources and Activities.

UNEP/Nairobi Convention Secretariat and WIOMSA, 2015. Regional State of the Coast Report: Western Indian Ocean. United Nations Environment Programme (UNEP), Western Indian Ocean Marine Science Association (WIOMSA).

UNFCCC, 1992. United Nations Framework Convention on Climate Change. www.unfccc.de.

UNFCCC, 2015. Adoption of the Paris Agreement Framework Convention on Climate Change. United Nations Framework Convention on Climate Change (UNFCCC), http://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf

Unger, S., A. Müller, J. Rochette, S. Schmidt, J. Shackeroff and G. Wright, 2017. Achieving the Sustainable Development Goal for the Oceans. Institute for Advanced Sustainability Studies (IASS) Policy Brief 1/2017.

United Nations, 2016. The First Global Integrated Marine Assessment: World Ocean Assessment I.

Visbeck, M., U. Kronfeld-Goharani, B. Neumann, W. Rickels, J. Schmidt, E. van Doorn, N. Matz-Luck, K.O. Ott and M.F. Quaas, 2014. Securing blue wealth: The need for a special sustainable development goal for the ocean and coasts. Marine Policy, 48:184-191.

Warner, R., M. Kaidonis, O. Dun, K. Rogers, Y. Shi, T. Nguyen and C. Woodroffe, 2016. Opportunities and challenges for mangrove carbon sequestration in the Mekong River Delta in Vietnam. Sustainability Science, 11:661-677.

Wong, P.P., I.J. Losada, J.-P. Gattuso, J. Hinkel, A. Khattabi, K.L. McInnes, Y. Saito and A. Sallenger, 2014. Coastal systems and low-lying areas. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. pp. 361-409. Cambridge University Press.

World Bank 2009. The Sunken Billions: The economic justification for fisheries reform.

WWF, no date. Coastal development problems: Tourism. Accessed: 17 November 2016. wwf.panda.org/about_our_earth/blue_planet/problems/tourism/tourism_pressure

Xu, X., H. Peng, Q. Xu, H. Xiao and G. Benoit, 2008. Land changes and conflicts coordination in coastal urbanization: A case study of the Shandong Peninsula in China. Coastal Management, 37:54-69.