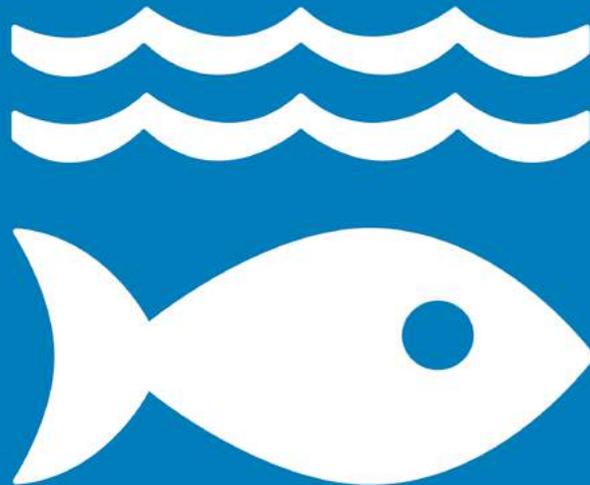


# NEREUS PROGRAM

PREDICTING FUTURE OCEANS

## Oceans and the Sustainable Development Goals: CO-BENEFITS, CLIMATE CHANGE & SOCIAL EQUITY

# 14 LIFE BELOW WATER





# FOREWORD

The challenges—both environmental and socioeconomic—that confront our oceans have reached a critical level. Yet, the international community has been slow to recognize these challenges and our collective response to these multifaceted threats, to date, has been underwhelming. In that sense, I am hopeful that the United Nations Ocean Conference and the momentum generated by the inclusion of ocean as one of the goals for the 2030 Agenda for Sustainable Development will bring these threats to the forefront of international policy discussion, forming an important first step in redefining our relationship with the oceans.

The Nippon Foundation-UBC Nereus Program was created in 2011 as a cross-disciplinary ocean research program bringing together the Nippon Foundation and 20 universities and institutes across the world. Based on three principles of *Capacity Building*, *Scientific Research* and *Public Outreach*, it is one of the central ocean capacity building projects for the Nippon Foundation. Tasked with the ambitious challenge of “predicting the future oceans”, I believe this network of outstanding marine researchers from diverse disciplines, collectively engaged in the search for solutions to the global ocean crises, will continue to make significant contributions to our understanding of ocean systems and help ensure that we can attain sustainable oceans for future generations to come.

It is, therefore, my pleasure to present to you *Oceans and Sustainable Development Goals: Co-Benefits, Climate Change and Social Equity*—a special report by the Nereus Program. This report demonstrates how ocean sustainability holds the key not only to our future prosperity but also for our survival from a comprehensive science-based perspective. The central theme of the report, the relationship between ocean sustainability (as highlighted by SDG14), climate change, and social equity, is crucial to achieving both sustainable global community and the common future of oceans and humanity.

It is my great hope that the continued activities of the Nereus Program will ensure development and promotion of science-based global ocean policies and achieve sustainable futures for our oceans and people that live with the oceans.

This report contains contributions by a number of Nereus Research Fellows with an array of expertise. I hope it will guide you in deliberating on solutions for the array of challenges that our oceans currently face.

Yohei Sasakawa  
Chairman of the Nippon Foundation

Yohei Sasakawa joined the Nippon Foundation as a trustee in 1981, served as president from 1989, and became chairman on July 1, 2005. The foundation’s overall objectives include assistance for humanitarian activities, both in Japan and overseas. Its philanthropic ideals embrace social development and self-sufficiency, and it pursues these principles by working to improve public health and education, alleviate poverty, eliminate hunger, and help the disabled. Sasakawa anticipated that the twenty-first century would become the “century of oceans” and established numerous fellowships and scholarships to nurture future leaders in maritime affairs globally.



# PREFACE

The Nereus Program aims to predict the state of future oceans by using the natural and social sciences to inform future pathways to sustainable oceans. The United Nations Sustainable Development Goals (SDGs) were developed as a global roadmap towards sustainable development, including SDG 14: Life Below Water.

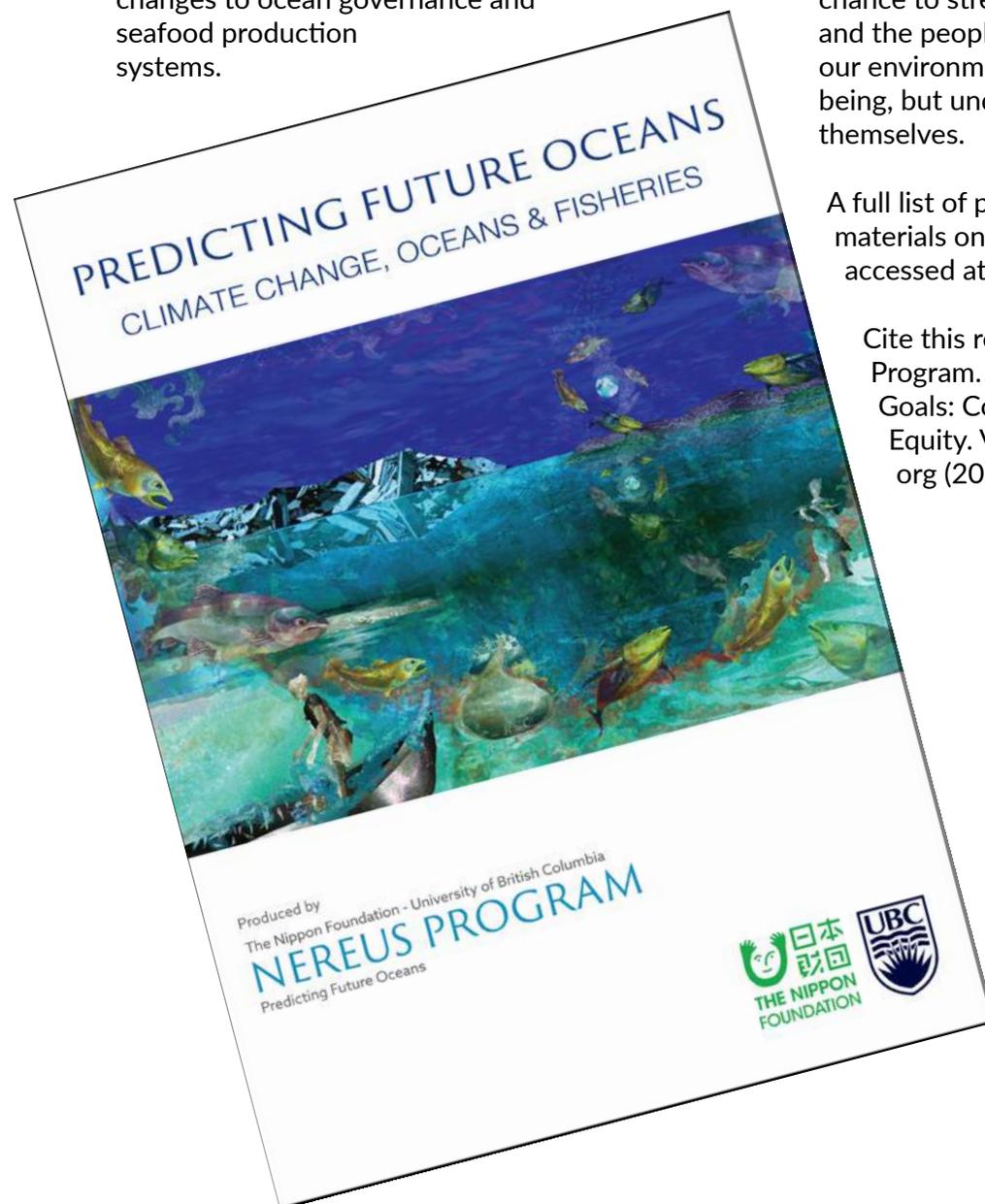
In our last report – Nippon Foundation-Nereus Program. Predicting Future Oceans: Climate Change, Oceans and Fisheries. Vancouver, p. 28, [www.nereusprogram.org](http://www.nereusprogram.org) (2015) – we outlined the multiple stressors that threaten the oceans and their benefits to humans, particularly climate change, overfishing, and habitat degradation. We also highlighted opportunities to address, mitigate, and manage these challenges, including changes to ocean governance and seafood production systems.

This new report synthesizes research findings from the Nereus Program and collaborators to highlight the importance of SDG 14 as a key component of the Earth's social-ecological system, by establishing the contributions of the oceans to all other SDG targets with the aim of strategizing ocean policy for sustainable development.

Here, we further show that addressing these human drivers through achieving SDG 14 contributes to the success of other SDGs. We also highlight the importance of climate change and social equity across the SDG targets. Furthermore, we outline potential pathways to use ocean policies to achieve wider SDGs, including the global impacts of reducing pollution and overfishing, and eliminating harmful subsidies. The SDGs also present us with a chance to strengthen our relationship to the ocean and the people who depend on it, recognizing that our environment not only provides for our well-being, but underlies relationships between people themselves.

A full list of publications and supplementary materials on topics discussed in this report can be accessed at: [www.nereusprogram.org](http://www.nereusprogram.org).

Cite this report as: Nippon Foundation-Nereus Program. Oceans and Sustainable Development Goals: Co-benefit, Climate Change and Social Equity. Vancouver, p.28, [www.nereusprogram.org](http://www.nereusprogram.org) (2017).



# THE NIPPON FOUNDATION NEREUS PROGRAM

The Nippon Foundation-UBC Nereus Program is an interdisciplinary ocean research initiative established in 2011 by the Nippon Foundation and the University of British Columbia. It is built on three core objectives: to conduct collaborative research across the natural and social sciences to better understand the future of global oceans; to develop a network of experts that can engage in discussion of complex and multifaceted questions surrounding ocean sustainability; and to transfer these concepts to practical solutions in global policy forums.

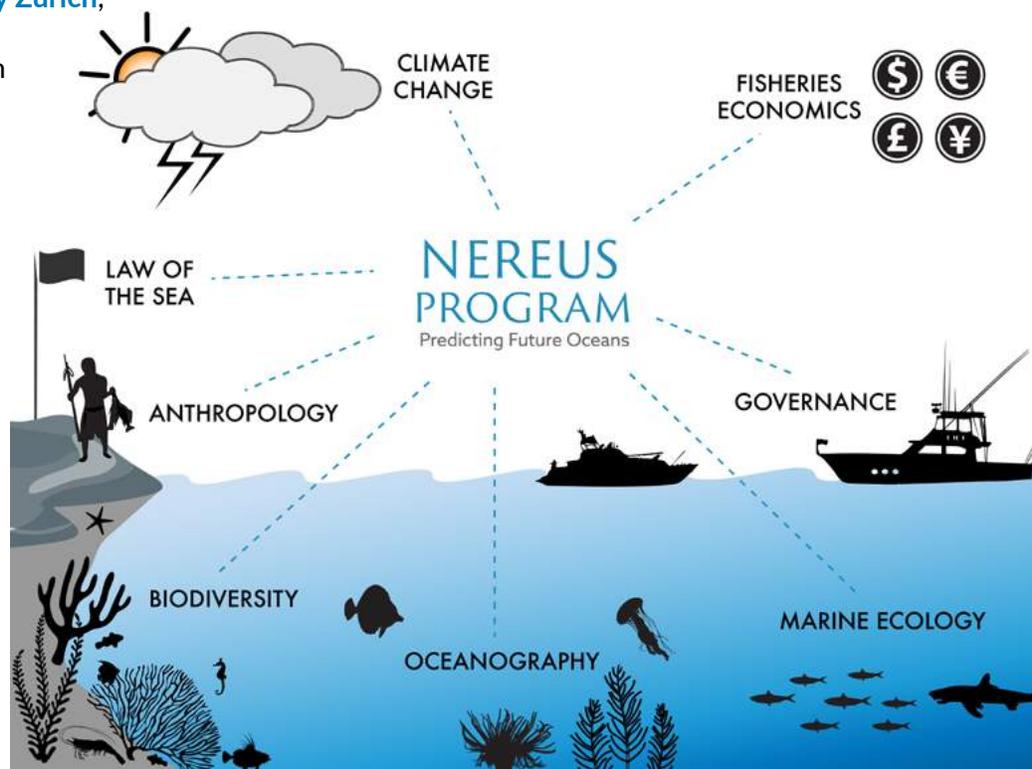


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# EXECUTIVE SUMMARY

Achieving ocean sustainability is paramount for coastal communities and marine industries, yet is also inextricably linked to much broader global sustainable development—including increased resilience to climate change and improved social equity—as envisioned by the UN 2030 Agenda for Sustainable Development. This report highlights the co-benefits from achieving each SDG 14 target: progress towards each of the other 161 SDG targets when ocean targets are met, given ten-year lag times between ocean targets and other SDG targets. The identification of co-benefits is based on input from more than 30 scientific experts in the Nereus Program. Below we highlight notable co-benefits of achieving each target within SDG 14.

**Preventing and reducing marine pollution** reduces impacts to marine ecosystems and their food production and contamination of seafood, contributing to improving the health of human populations. Achieving this target can contribute to improving food security and health, and may reduce poverty and inequalities within and among countries. **Pg. 10-11**

**Sustainably managing and restoring marine ecosystems** promotes ecologically resilient oceans that can produce more food and economic benefits in the longer term, as well as mitigate carbon emissions and withstand impacts of climate change such as sea level rise and coral bleaching. **Pg. 12-13**

**Mitigating ocean acidification** reduces the large-scale direct impacts of carbon dioxide on marine biodiversity and resource productivity. Achieving this target will thus reduce the risks of future scarcity and competition for living resources. **Pg. 14-15**

**Ending overfishing, illegal and destructive fisheries** promotes the recovery of fish stocks, improving food security and sustainable livelihoods of coastal communities. Restructuring fisheries can promote sustainable industrialization and innovation, and build ecological resilience to climate change impacts. **Pg. 16-17**

The **protection of marine areas** supports biodiversity, ecosystem function, and sustainable resource use, which potentially contributes to long-term food and job security. In order to realize these important contributions and avoid negative outcomes for coastal communities, marine protected areas must be designed inclusively and collaboratively. **Pg. 18-19**

**Reforming fisheries subsidies** actively remedies inequalities in fisheries. Redesigned public investments mitigate underlying causes of overfishing and promote sustainable production and consumption, contributing to increasing adaptive capacity of fisheries to climate change. **Pg. 20-21**

**Increasing sustainable benefits to Small Island Developing States and Least Developed Countries** through investment and development of local capacity, community engagement, infrastructure, and innovation increases marine industries contributions to local sustainable economic development, which could contribute to food security and poverty alleviation. Achieving this target may increase adaptive capacity of these countries to climate change. **Pg. 22-23**

Achieving the targets in SDG 14 will be complicated by growing climate change impacts and issues related to social inequity. Achieving the targets will become more difficult the later they are attempted, and in some cases the targets may not be achievable. Even with the great difficulties the future presents, progress towards the targets and their associated co-benefits - the subsequent contribution to the achievement of other targets- can still be made through policy strategies (highlighted at the end of the report) from local to global scales.

# SDG 14: LIFE BELOW WATER, CLIMATE CHANGE, AND SOCIAL EQUITY

The UN Sustainable Development Goals (SDGs) are a roadmap created as part of “Transforming our World: the 2030 Agenda for Sustainable Development”, adopted in 2015. The SDGs evolved from the Millennium Development Goals (MDGs) adopted in 2000 in the historic Millennium Declaration, with measurable goals for global development, including reducing extreme poverty, hunger, and child mortality. To extend and strengthen international and trans-sectoral cooperation, the SDGs include important new benchmarks such as increasing peace and justice, taking climate action, and, in SDG 14, ‘Protecting Life Below Water’.

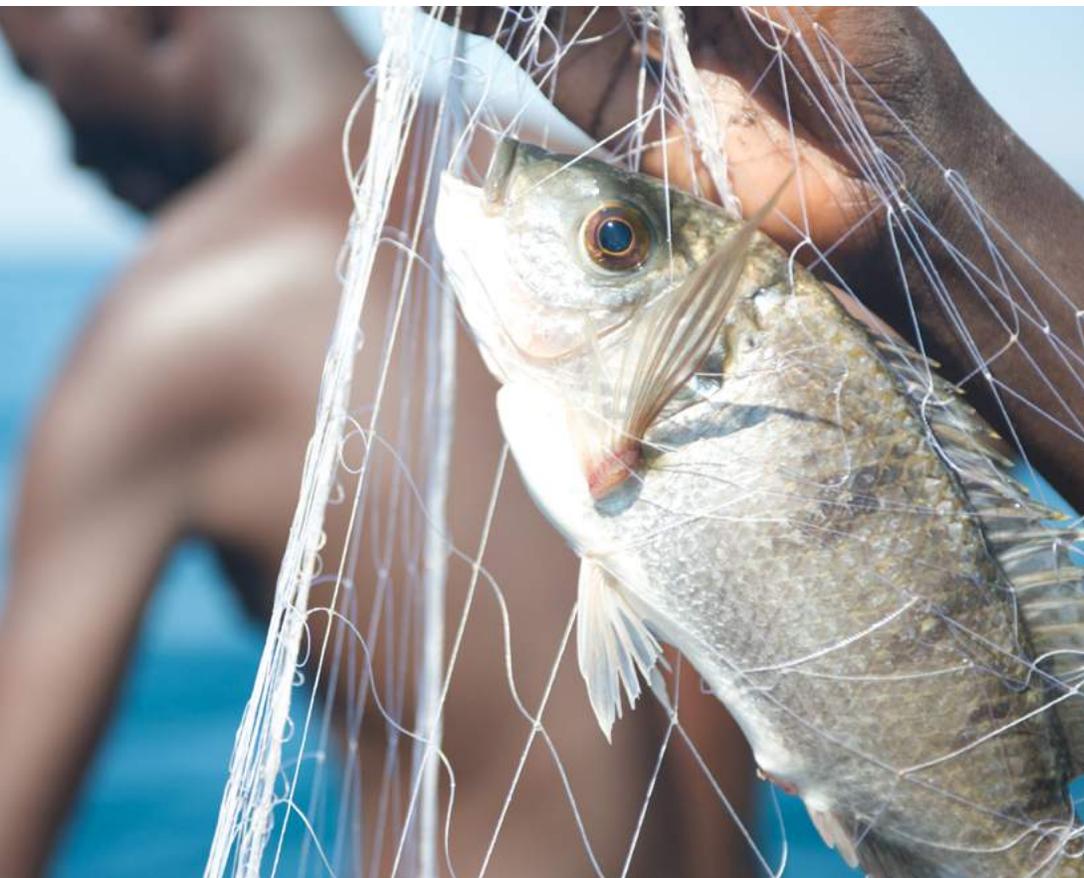
SDG 14 aims to “conserve and sustainably use the oceans, seas and marine resources for sustainable development”, an essential achievement for all who depend on marine ecosystem services, yet this goal currently shows the least progress—and limited available indicators— among all SDGs. Attaining sustainable benefits from the world’s oceans—as stated in SDG 14— requires achieving the following targets: 1) reducing pollution; 2) restoring ecosystems; 3) minimizing ocean acidification;

4) ending overfishing; 5) conserving coastal and marine areas; 6) reforming fisheries subsidies; 7) increasing benefits to Small Island Developing States.

In this report, we highlight **Co-Benefits, Climate Change, and Social Equity** as key themes as we pursue efforts to achieve sustainability in a manner that does not undermine others, whose location, identity, context, and history, are diversity to be embraced rather than differences to be overcome. **Co-benefits** are defined as SDG goals and targets that are advanced through the achievement of Ocean SDG targets. Plans to achieve a specific target can easily overlook important contributions from achieving other targets. Understanding co-benefits of achieving targets can help design integrated policy platforms to consider these important contributions.

**Climate change** can affect the oceans through direct impacts on marine biodiversity and ecosystem services from ocean warming, deoxygenation, acidification, and sea level rise. Marine species responses to climate change

through, for example, shifting distribution, changing seasonal biological cycles and decreases in body size, and consequently affecting potential fisheries catches and their composition. Sea level rise also threatens coastal communities through loss of land and habitats, increases in flooding and storm surges. Some regions and ecosystems, such as the tropics and the Arctic, and coral reefs are particularly vulnerable to climate change. Climate change also exacerbates other human impacts on marine ecosystems,



such as increasing release and accumulation of contaminants. Solutions to climate change impacts include mitigating greenhouse emission and adapting to impacts.

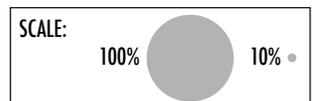
**Social equity**, in the context of this report, denotes fairness in social relationships, including equitable distribution of opportunities, full participation in decision-making, rights to self-determination, and rights, benefits, and access to resources for all members of society regardless of their social, cultural, ethnic, religious, class, and gender identity. Social equity is an essential condition for meaningful and enduring sustainable development. The 2030 Agenda for Sustainable Development notes the principle of ‘leaving no one behind’ to enshrine a global commitment to social equity, even while tackling the world’s social, economic, ecological and political challenges. Often, however, ‘sustainability’ follows a rationale of ‘optimization’, ignoring costs borne by the most vulnerable and at loss of values intangible and perhaps even unimaginable to others.

## LINKING THE OCEANS WITH THE SDGS

For each of the seven SDG Ocean targets, this report includes a summary of linkages—and supporting scientific evidence—between progress in each target and co-benefits with other SDGs. These linkages were established using network analyses drawing from extensive scientific expert consultation. Future climate change and potential intensifying social inequity can pose a challenge to achieving ocean sustainability, so benefits from progress in the ocean targets are discussed in the context of these two overarching themes.

The figure below summarizes co-benefits of achieving ocean targets. The size of bubbles represents the proportion of targets within each SDG that benefit from progress in each ocean target. This report does not address secondary targets (i.e. SDG 14.a, b, c) as these do not include achievement dates or specific benchmarks.

### Co-benefits of achieving targets for Sustainable Development Goal 14: Life Below Water

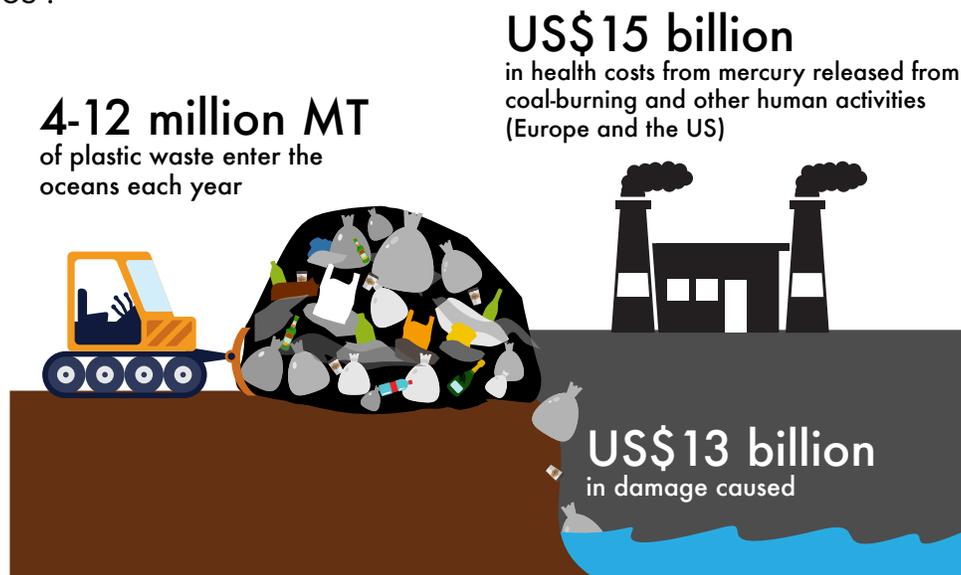


# TARGET 14.1: PREVENT AND REDUCE MARINE POLLUTION

By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.

## Importance of Target 14.1

Excessive nutrient loading in coastal environments is a primary cause of eutrophication and hypoxia<sup>1</sup> (a deficiency in oxygen that is lethal to many marine organisms) – currently affecting a total area of over 245,000 km<sup>2</sup> across more than 400 marine and coastal systems. Eutrophication can alter the structure and functioning of marine ecosystems, and lead to noxious algal blooms. Every year, an estimated 4-12 million metric tons of plastic waste enters the ocean<sup>2</sup>, impacting hundreds of marine species<sup>3</sup> and causing an estimated US\$13 billion in damage<sup>4</sup>. Mercury released from coal-burning and other human activities accumulates in marine foodwebs and seafood, with the associated health costs of about US\$15 billion in Europe and the US<sup>5</sup>.



## Co-Benefits of Achieving SDG Target 14.1 and other Targets

Reducing marine pollution helps support productive and biodiverse coastal and marine ecosystems, enhance habitat protection, and support sustainable fisheries, thus contributing to other Targets in conserving the ocean (SDG 14). These also increase an ecosystem's ecological resilience to extreme events (e.g. such as storms and heat waves), allowing marine systems to continue functioning and providing services<sup>6</sup>. Reducing energy dependency on coal mitigates mercury emissions and has co-benefits on both reducing climate change (SDG 13) and marine pollution<sup>7</sup>. Terrestrial species are also affected by consuming

contaminated seafood. Thus, reducing marine pollution has wide reaching benefits that transcend the marine realm (SDG 15 - conserving terrestrial biodiversity).

To the extent that pollution compromises the safety of seafood for human consumption, prohibits marine harvests, and contributes to declining fisheries yields, reducing marine pollution can increase access to nutritious, high protein, seafood<sup>8</sup> and contribute to local food security (SDG 2), health (SDG 3), and poverty reduction (SDG 1). Among coastal communities, including

those of Indigenous peoples<sup>9</sup> and Small Island Developing States (SIDS), who rely on seafood and lack resources to access alternate nutrient-rich food sources, the contamination and depletion of seafood can lead to food insecurity (SDG 2) and foster increased reliance on nutrient-poor alternative foods and increase the risk of chronic disease such as Type 2 diabetes<sup>10</sup>. Where disenfranchised groups disproportionately experience the burden of pollution (including contaminated food sources and polluted coastlines) achieving Target 14.1 and having local people take advantage of less polluted coastal waters can also contribute to reducing inequalities within and among countries (SDG 10).

Although healthy marine ecosystems are not a sufficient condition for reducing conflict, they can ease the likelihood of conflict<sup>11</sup> and contribute to peaceful societies (SDG 16).

In addition to negatively impacting ecological integrity, marine pollution can reduce the recreational and amenity value of coastal regions, and erode local tourist industries<sup>6</sup>. Therefore,



reducing pollution and transitioning to less polluted and healthier coasts and oceans has the potential to support new economic ventures (such as fisheries and tourism), which can open up pathways to sustainable economic growth (SDG 8) and lead to more sustainable and enjoyable coastal cities and communities (SDG 11)<sup>12</sup>. Reducing pollution is necessary to achieving sustainable toxicant and waste management, contributing to sustainable consumption and production patterns (SDG 12).

## Challenges of achieving Target 14.1 under climate change and social inequity

Climate change will exacerbate the impacts of marine pollution and the dual burden of climate change and environmental contaminants is likely to affect exposure among humans<sup>7</sup>. Projected increases in the intensity of rainfall extremes expected under climate change in some regions will also increase runoff from terrestrial systems to the ocean, causing a surge in nutrient loads and other pollutant levels<sup>13</sup>. Further, eutrophication and the subsequent microbial processing of the excessive organic matters release CO<sub>2</sub> and exacerbate ocean acidification and its local impacts<sup>7</sup>. These conditions may further constrain productive marine ecosystems, squeezing people to utilize marine resources from smaller areas. Marginalized groups, already facing inequitable access to resources, may be forced to live with even less access to marine areas. Achieving equitable access of marine resources can reduce pollution pressure in local areas as it can prevent a high concentration of people in specific areas, but achieving this

equitability will require spatial management that actively addresses current and avoids future inequity in access. Increased limitation to access to resources may render fair and effective marine spatial policy more difficult. Ineffective marine planning will exacerbate pollution pressures on local areas. Community-led pollution prevention plans may have limited progress in promoting sustainable development and co-benefits without larger scale action.

Though future climate change and social inequity may prevent the achievement of this target, progress towards the target may still be made. Regional and global efforts to mitigate climate change impacts, while promoting transboundary management and marine spatial planning at multiple scales to manage runoff and pollution, can help promote progress towards this target and associated co-benefits.

# TARGET 14.2:

## RESTORE & ACHIEVE SUSTAINABLE MARINE ECOSYSTEMS

By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans.

### Importance of Target 14.2

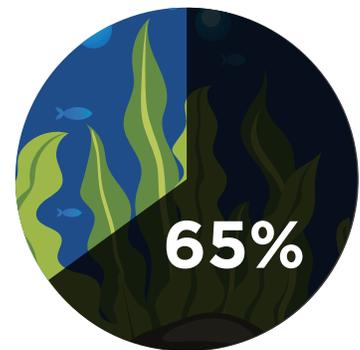
Multiple human activities impact 97.7% of the world's ocean habitats<sup>14</sup>. Human impacts have depleted more than 90% of many of the world's commercially and ecologically 'important' species (are harvested and support other species), and destroyed more than 65% of seagrass and wetland habitat<sup>15</sup>. However, encouragingly, of those populations and ecosystems that had been depleted, 10-50% show some sign of recovery following reduction of human impacts<sup>16</sup>.



of the world's ocean habitats  
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humans



of ecologically important  
species depleted by human  
impacts



of seagrass and wetland  
habitats destroyed

### Co-Benefits of Achieving SDG Target 14.2 and other Targets

Restoration involves not only actively remediating and renewing degraded ecosystems, but also reducing impacts to the environment through human extraction and development. To this end, the restoration of coastal and marine environments can positively contribute to resource productivity and the provision of ecosystem services. Restoration can help reduce the presence of pollutants such as heavy metals or excess nutrients<sup>17</sup>. Restoration would also involve the reintroduction and repopulation of keystone species such as sea otters, the restoration of seabird colonies, and invasive predator eradication<sup>18</sup>. By increasing the health, functioning and ecological resilience of marine ecosystems and reducing pollution-based impacts, restoration helps to conserve the ocean (SDG 14) and enhance human health (SDG 3)<sup>19</sup>. Furthermore, by restoring habitats and ecosystems,

terrestrial species that depend on marine resources also benefit, positively contributing to conserving terrestrial biodiversity (SDG 15). Such linkages are ubiquitous where marine resources directly provide food to terrestrial organisms (e.g. bears consuming anadromous fishes; birds and mammals eating intertidal organisms), or indirectly provide nutrients (e.g. salmon fertilizing trees and seabird guano enhancing primary production in terrestrial and aquatic ecosystems).<sup>20</sup>

In addition, for those who rely on marine resources for food and livelihoods, restoring marine ecosystems can contribute towards reducing poverty<sup>21</sup> (SDG 1), and enhancing food security<sup>22</sup> (SDG 2) and health<sup>23</sup> (SDG 3). Furthermore, the restoration of marine ecosystems and habitats can create new economic opportunities where marine

resource use was not viable due to environmental degradation (SDG 8) and where these are pursued sustainably (such as through ecotourism and sustainable local fisheries), it can contribute to sustainable production and consumption (SDG 12).<sup>24</sup>

Restored ocean systems and coastal habitats can help mitigate carbon emissions and increase ecological resistance and resilience to climate change impacts (SDG 13), contribute to mitigating coastal erosion and flooding<sup>25</sup>, and help prevent contamination of local wells with saltwater, ensuring clean water and sanitation (SDG 6).

Restoring marine ecosystems near urban areas can facilitate planning for sustainable cities and communities (SDG 11) by providing natural

areas that can be considered urban green/blue spaces and habitable areas. Active ecosystem restoration can also help reduce inequalities within and among countries (SDG 10) as some marine habitats that could provide benefits to people are facing disproportionate degradation. With a good governance structure, restoration of marine ecosystems can potentially contribute to peaceful societies (SDG 16) by alleviating resource scarcity that might otherwise promote conflict<sup>26</sup>. Environmental remediation could also promote education of SDGs<sup>27</sup> (SDG 4) in cases where efforts actively promote dissemination of knowledge regarding the benefits and limitation of remediation. Finally, restoration often requires new research and technical developments, enhancing innovation (SDG 9).

### Challenges of achieving Target 14.2 under climate change and social inequity

The active restoration of marine ecosystems can promote healthy, resilient coasts, but effective restoration will become more difficult under increasing climate change impacts. Increased stress from rising sea levels, acidification, deoxygenation, and warming (as well as secondary impacts such as increased runoff associated with rising temperatures) will all contribute to increasing degradation to many marine environments<sup>29</sup>. As climate change impacts are projected to increase over time, restoring marine ecosystems will likely

be more difficult and costlier the longer it is postponed. In cases where restoration relies on a reduction of marine resource use, alternative livelihood options are important for fostering cooperation and avoiding the marginalization of local communities. Restoration efforts should therefore be taken as soon as possible in combination with social ventures to promote alternative livelihoods and stewardship among the affected populations.



# TARGET 14.3: MINIMIZE EFFECTS OF OCEAN ACIDIFICATION

Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels.

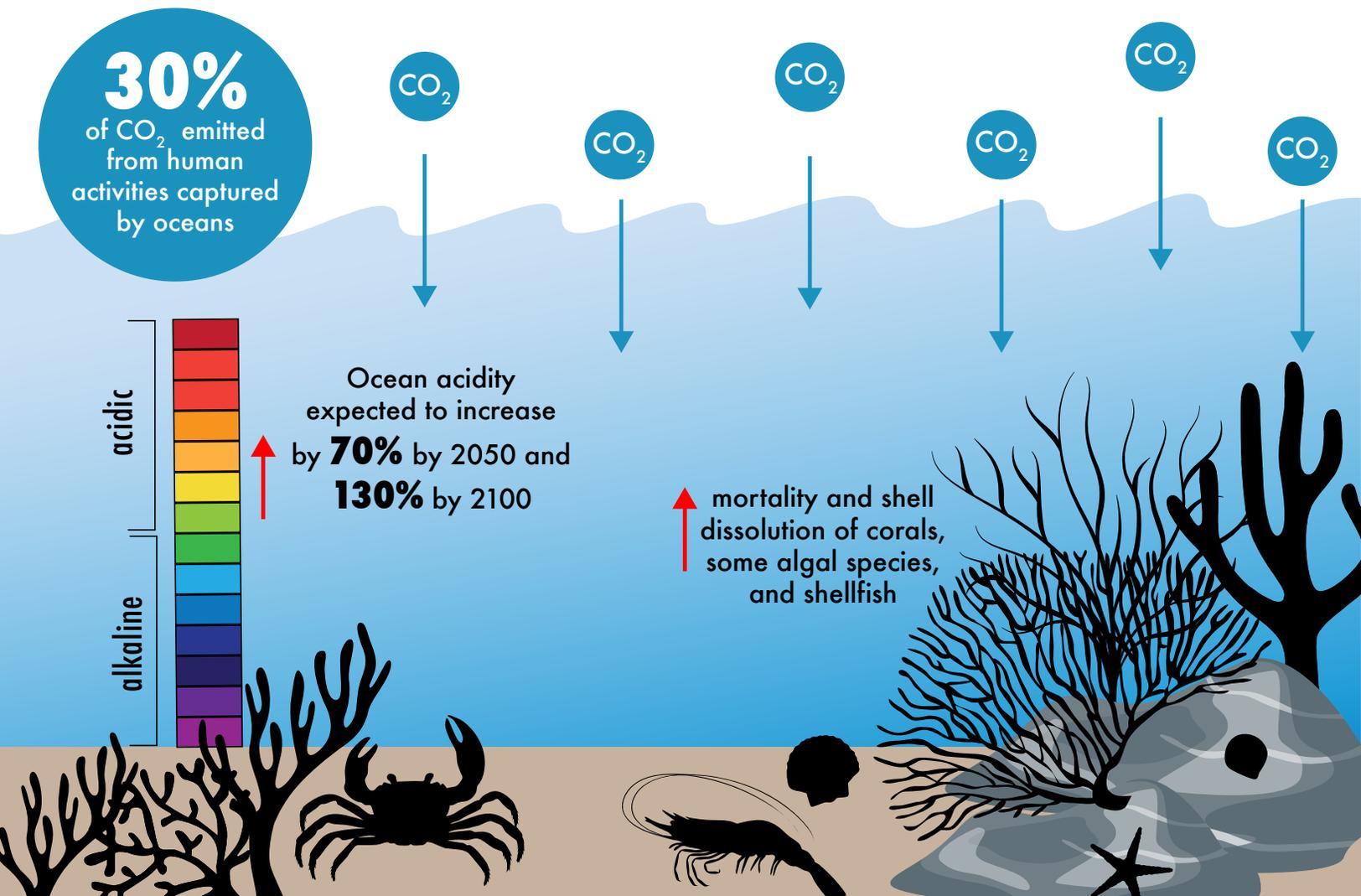
## Importance of Target 14.3

Relative to preindustrial levels, ocean acidity is projected to increase by 70% by 2050 and 130% by 2100<sup>30</sup>, under business as usual. Coastal processes, such as changes in river runoffs that are rich in organic matters and intensification of upwelling, will exacerbate acidification locally<sup>31</sup>. Many marine species that form the basis of food chains, including corals, some algal species, and shellfish, will face increases in mortality and shell dissolution<sup>32</sup>.

## Co-Benefits of Achieving SDG Target 14.3 and other Targets

Ocean acidification is a global stressor that has serious potential consequences for marine ecosystems<sup>34</sup>. Reducing impacts from ocean acidification is of central importance to combating climate change impacts (SDG 13). Furthermore, reducing the impacts of ocean acidification should

lead to greater productivity, or at least reduce degradation in marine ecosystems under future scenarios of climate change, particularly among corals, echinoderms, crustaceans and molluscs<sup>32</sup>. If marine productivity can be increased (or if declines can be prevented), particularly for crustaceans





and molluscs, this can benefit local economies and subsistence fisheries, particularly involving women and children, thereby reducing poverty and hunger (SDGs 1 and 2)<sup>35,36</sup>. Mitigating ocean acidification is also conducive to improved human health (SDG 3), because ocean acidification is expected to increase the frequency and severity of harmful algal blooms that create toxic marine environments<sup>37</sup>.

Reducing impacts from ocean acidification may facilitate marine restoration, increase fisheries productivity, and otherwise contribute to conserving oceans (SDG 14). To the extent that ocean acidification threatens ocean resources that sustain biodiversity on land, mitigating ocean acidification can reduce the risk of impacts to species important for terrestrial biodiversity (SDG 15). Reducing ocean acidification also increases the feasibility of sustainable aquaculture, which

can foster alternative livelihoods, and therefore economic diversification within communities (SDG 8)<sup>35,36</sup>. Increasing economic options for people, as well as reducing impacts on species that are culturally important (for subsistence, rituals, and traditional practices) can contribute to achieving sustainable cities and communities (SDG 11). Moreover, increasing resource availability, economic opportunities, and reducing hunger can all reduce the risk of conflict stemming from scarcity, contributing to peaceful societies (SDG 16)<sup>38</sup>. Mitigating and minimizing impacts of ocean acidification is contingent on increased scientific research, which can contribute to innovation (SDG 9). Ultimately, the most substantive way to reduce the effects of ocean acidification is to decrease CO<sub>2</sub> emissions to the atmosphere, which will also mitigate other climate change impacts (SDG 13).

### Challenges of achieving Target 14.3 under climate change and social inequity

Ocean acidification is projected to affect marine productivity and the distribution of species<sup>39</sup>. Coastal communities that depend on local marine resources may face future food and income scarcity. Potentially low-impact livelihoods, such as gleaning and shellfish mariculture, that are currently important for women and Indigenous fishers may face particular limitations in terms of ecological and economic viability. A lack of access to necessary food and resources can reduce people's ability to respond to changing environments, perpetuating a

loss of local adaptive capacity<sup>40</sup>.

Achieving this target requires strong carbon dioxide mitigations globally. Local adaptation can also help reduce the impacts, for example, as hotspots of acidity can be partly mitigated with relevant policies regulating storm-water surge, coastal erosion and land-use that contribute to acidic runoff, while regulating emission of nitrous oxides and sulfur oxides from agriculture fertilization and burning of fossil fuel can limit local acidification<sup>31</sup>.

# TARGET 14.4: END OVERFISHING

By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics.

## Importance of Target 14.4

Fisheries are the main source of protein for 20% of the global population<sup>41</sup>, an integral part of cultural practices worldwide—including for over 30 million coastal Indigenous peoples<sup>9</sup>—and contribute 260 million jobs and US\$235 billion to the world economy each year<sup>42</sup>. And yet, as much as 60% of global fish stocks are considered over-exploited.



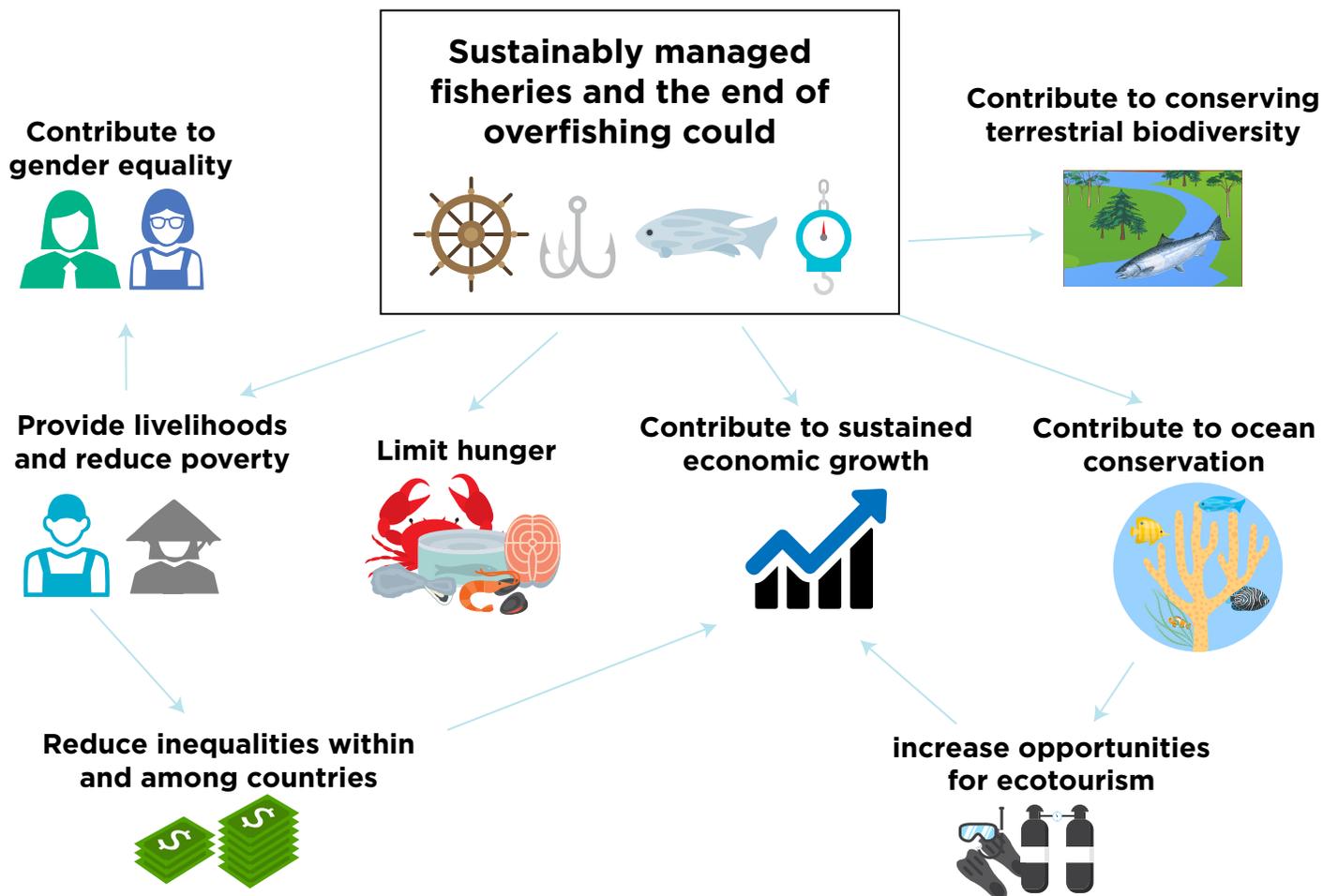
## Co-Benefits of Achieving SDG Target 14.4 and other Targets

By preventing overfishing, marine ecosystems can increase the restoration potential of marine ecosystems and potentially increase fisheries productivity. Preventing overfishing and restoring over-exploited fish stocks requires reducing catch which may in the short term negatively impact fishers and communities with limited immediate alternative options. However, if fish stocks recover and are effectively managed, fisheries are more likely to provide sustained livelihoods and food (SDG 12)<sup>45,46</sup>. Achieving sustainable fisheries can therefore help reduce poverty (SDG 1), limit hunger (SDG 2), and contribute to decent work and sustained economic growth (SDG 8)<sup>47</sup> by providing employment opportunities and productive fish stocks. Sustainable fishing practices reduce ecological impacts on marine ecosystems, contributing to the conservation of oceans (SDG 14). The increased diversity and productivity of marine ecosystems resulting from sustainable fisheries may lead to increased opportunities for ecotourism<sup>48</sup>, further promoting economic diversification and growth which, combined with the value of fishing to cultural heritage, can also contribute to sustainable cities and communities (SDG 11).

Overfishing is often facilitated by open access

conditions, unequal sharing of resources, and poor monitoring and implementation capacity<sup>49</sup>. Ensuring access rights for local coastal communities can promote ocean stewardship and help combat illegal fisheries, as well as contribute to reducing inequalities within and among countries (SDG 10). By developing and using fishing gears that reduce bycatch and damage to habitats, as well as reducing destructive fishing practices (including dynamite and cyanide fishing), achieving sustainable fisheries can contribute to sustainable industrialization and innovation (SDG 9). Promoting healthy coral reefs and other habitat forming species (by minimizing destructive fishing practices) can maintain the wave attenuation function under 'normal' conditions, aid recovery after storms, and allow systems to track rising sea levels through continued vertical accretion, thus synergistically combating climate change impacts (SDG 13). Some fish species (such as salmon) are important for terrestrial systems, so limiting their overexploitation can reduce pressure on terrestrial ecosystems<sup>50</sup>, contributing to conserving terrestrial biodiversity (SDG 15).

Preventing overfishing and illegal fishing must address human rights abuses including the complete elimination of slavery and child labor that currently occurs in some fisheries<sup>51</sup>. Reforming



current labor abuses promotes sustainable economies (SDG 8) and reduces inequalities (SDG 10), and releasing children in particular allows for greater access to education (SDG 4). Women are also important but often unrecognized agents in fisheries, so fisheries reform has the potential to

contribute to gender equality (SDG 5). Mitigating overfishing with adequate governance and functional management and equitable distributions of conservation burdens can help avoid conflict<sup>52</sup>, contributing to peaceful societies (SDG 16).

### Challenges of achieving Target 14.4 under climate change and social inequity

Climate change is projected to affect fish productivity and distribution, shifting species composition and abundance around the world. Fisheries management rules and targets currently used will have to adapt very fast, for example, to determine effective catch quotas and manage fisheries of emerging species within and across jurisdictions. The scope and ability to rebuild fisheries given climate change are extremely limited in the long term unless the global warming target specified under the Paris Agreement is achieved (SDG 13). In areas lacking alternative livelihoods, decreased regional fish availability may intensify pressure to overfish. Unequal access to

resources and capital (that must also be solved) is a major barrier to adaptation to changing marine ecosystems, and will further increase conflict.

By eliminating overfishing and destructive fisheries as soon as possible, and by favoring the development of adaptive management systems, including inclusive management involving local communities, we will enhance benefits from fisheries and enhance ecological resistance and resilience to climate change. Social equity concerns requires increasing food security and resource sovereignty of vulnerable populations, including coastal communities and Indigenous peoples.

# TARGET 14.5: CONSERVE 10% OF MARINE AREAS

By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information.

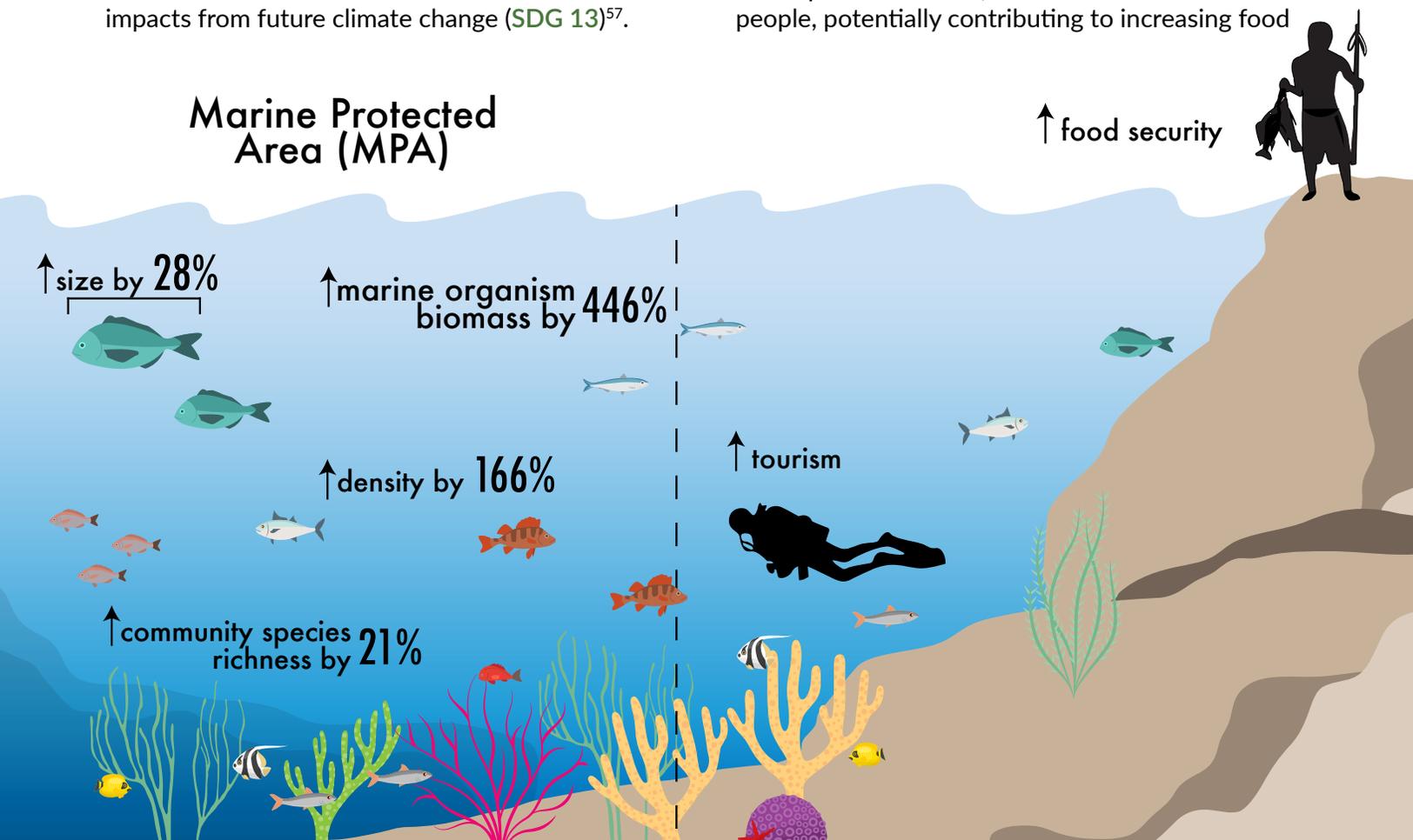
## Importance of Target 14.5

Protecting at least 10% of marine areas has been widely agreed upon as necessary to support wider sustainable management policies, and provide insurance against overexploitation so that ecosystems can at least partly continue to function<sup>53</sup>. Recent global reviews show that 70% of Marine Protected Areas (MPAs) have positive effects on biomass, with the highest benefits occurring within adequately funded and managed MPAs<sup>54</sup>. With proper management, MPAs can benefit adjacent fisheries through increased biomass production as well as provide areas and time to develop new cooperative governance frameworks.

## Co-Benefits of Achieving SDG Target 14.5 and other Targets

Marine protected areas can limit the deterioration of the marine environment from multiple human activities<sup>55,56</sup> and potentially lead to more productive ecosystems, which can contribute to conserving oceans (SDG 14). Implementing effective marine protected areas can increase ecological resistance and resilience to environmental shocks which can in turn reduce impacts from future climate change (SDG 13)<sup>57</sup>.

Research on the biological impacts of marine protected areas has concluded that, on average, these spatial management measures can increase marine organism biomass by 446%, density by 166%, size by 28%, and marine community species richness by 21%<sup>58</sup>. These benefits for marine productivity can spill over the borders of the protected areas, if accessible to local people, potentially contributing to increasing food





security (SDG 2), encouraging the development of sustainable production and consumption (SDG 12) of seafood. Marine protected areas require monitoring and study, contributing to our ecological understanding of the oceans, promoting scientific innovation (SDG 9).

Increasing the participation of coastal communities in the development of coastal protected areas can enhance local governance<sup>59</sup> and could facilitate participation from diverse social groups including women and marginalized coastal communities, helping reduce inequalities (SDG 10) and promote gender equality (SDG 5). This consultation process can increase cooperation and trust within the community, contributing to peaceful societies (SDG 16), and become an opportunity to promote quality education (SDG 4) for ocean governance and SDGs.

Where people are empowered to take advantage of increased marine productivity from marine protected areas (such as through sustainable fishing and tourism), this marine protection can help generate good jobs (SDG 8) and help alleviate poverty (SDG 1). Further, marine protected areas can also protect coastal areas that are important for cultural heritage<sup>60</sup>, contributing towards sustainable cities and communities (SDG 11).

Coastal wetlands and coral reefs serve a role in protecting shores and coastal communities from the impacts of storms and shoreline erosion, which can protect both marine terrestrial habitats, contributing to conserving terrestrial biodiversity (SDG 15)<sup>61</sup> and conserving oceans (SDG 14).

### Challenges of achieving Target 14.5 under climate change and social inequity

The composition, productivity and distributions of marine biological communities are predicted to change under climate change<sup>29</sup>. Changing species distributions towards cooler waters, generally in higher latitude or deeper water, could render protected areas ineffective for species conservation if they no longer protect key species. In practice, protected areas have undermined social equity by displacing coastal communities from accessing marine resources, which is a concern for future implementation. Displaced people may refuse to comply with protected area regulations, choosing instead to resist the protected area and question

the legitimacy of the conservation effort.

Networks of marine protected areas can be used as a tool to anticipate and help combat the impacts of climate change on biodiversity, ecosystem function and services. However, to do so effectively, they need to be designed to anticipate future changes in distribution beyond political boundaries and proactively engage local communities in the approval, planning, implementation and management process of the marine protected areas.

# TARGET 14.6: REFORM FISHERIES SUBSIDIES

By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation.

## Importance of Target 14.6

Subsidies are nominally intended to aid and support vulnerable sectors of economy during periods of economic shocks, particularly in regions where other economic opportunities are scarce. However, certain types of fisheries subsidies can promote buildup of excess fishing capacity and lead to overfishing. It is estimated that these types of subsidies currently make up 60-70% of the estimated US\$34 billion of public finance conferred annually to fisheries worldwide<sup>44</sup>. Global overcapacity is estimated to result in a net loss of potential profit of over US\$80 billion<sup>62</sup>. Rebuilding fisheries by reducing (redirecting) capacity-enhancing subsidies has been estimated to increase global catch by 8 million tonnes per year<sup>46</sup>.

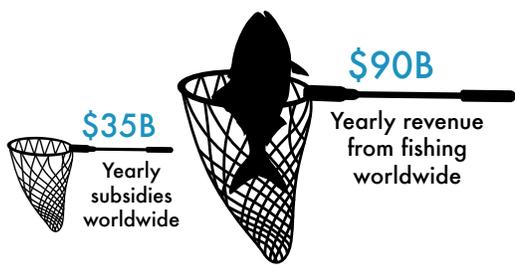
## Co-Benefits of Achieving SDG Target 14.6 and other Targets

Eliminating fisheries subsidies that contribute to excess capacity reduces overfishing, positively affecting marine productivity and supporting ocean conservation (SDG 14). Industrialized fishing fleets receive more subsidies than small-scale fisheries<sup>44</sup>, granting them artificial advantages while limiting access of small-scale, artisanal and subsistence fisheries to fish stocks. Subsidized industrialized fleets often employ fewer people to catch more fish compared to small scale fisheries. A select number of countries account for a disproportionately large portion of global fisheries subsidies. Appropriate international fisheries subsidies regulations under WTO can therefore contribute to reducing inequalities within and among countries (SDG 10) and combating poverty and hunger (SDG 1, 2). Similarly, women engage proportionately

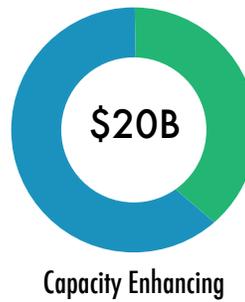
more in small-scale fisheries which receive a proportionately smaller share of subsidies. Subsidy reform has the potential therefore to indirectly contribute to gender equality (SDG 5). Reforming fisheries subsidies will lead to productive, sustainable fisheries, contributing towards sustainable economies (SDG 8) and to societies based on sustainable production and consumption (SDG 12). Reformed subsidies programs can help protect important cultural and natural heritage associated with fisheries and marine ecosystems, thus, contributing to sustainable cities and communities (SDG 11).

Evidence suggests that some fisheries engaging in unsustainable and often illegal fishing practices (such as bycatch discarding, catch of threatened

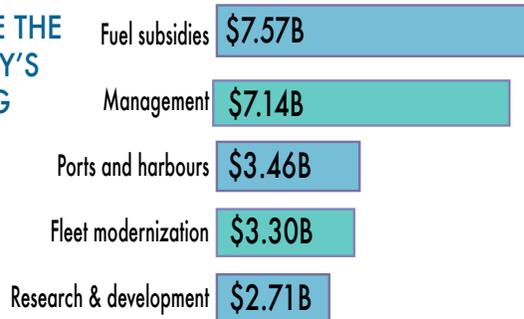




### TYPES OF SUBSIDIES GIVEN EACH YEAR



### WHERE THE MONEY'S GOING



### TOP 3 COUNTRIES



species, and habitat destruction)<sup>63</sup> also receive subsidies. Eliminating subsidies to these vessels will contribute to sustainable production and consumption (SDG 12). Subsidies allow fleets to operate in areas that would otherwise be economically unviable, allowing them to outcompete local fishers, creating conflict over resources and threatening maritime security. If such subsidies are removed, this could promote balanced transboundary ocean governance and lead to peaceful societies (SDG 16).

Regulating subsidies that contribute to overfishing can help ensure higher marine biodiversity and ecological resistance and resilience to environmental shocks, which can contribute to combating climate change impacts (SDG 13)<sup>64</sup>. If subsidy reform leads to decreased exploitation of marine species that terrestrial species utilize, subsidy reform can increase productivity and resilience of terrestrial ecosystems and help conserve terrestrial biodiversity (SDG 15).

## Challenges of achieving Target 14.6 under climate change and social inequity

Subsidies can be used to promote food and job security of national fishers in efforts to increase economic resilience and adaptive capacity. However, subsidies are disproportionately deployed in developed countries, and this can lead to more instances where developed country fisheries encroach on developing country fish stocks, whose food security would be under greater threat by climate change. Additionally, most subsidies support large industrial fishing fleets that are well connected politically. The great benefit to few powerful groups may make change difficult. Changes to fish distribution because of climate change mean that some fishing fleets have to travel farther to access target stocks or develop ways to utilize emerging species from distribution shifts. The increased cost of fishing may pressure governments to provide more subsidies to support their fishing fleets. Even

if changing fish distributions makes fish more readily available for fishing fleets, the powerful subsidy holders may pressure governments to maintain or increase subsidies. On the other hand, increased government financial support to facilitate adaptation of the fishing sectors to reduce climate risks may be needed.

Although the majority of subsidies currently granted are capacity enhancing and thus have negative effects on marine ecosystems, there are strategies for transforming subsidies that promote long-term sustainability. Well-designed subsidies that target sustainable fishing practices such as promoting technology and knowledge transfer, supporting adaptation strategies for fisheries affected by climate change, and improving social safety nets will lead to greater resilience to environmental and socioeconomic shocks.

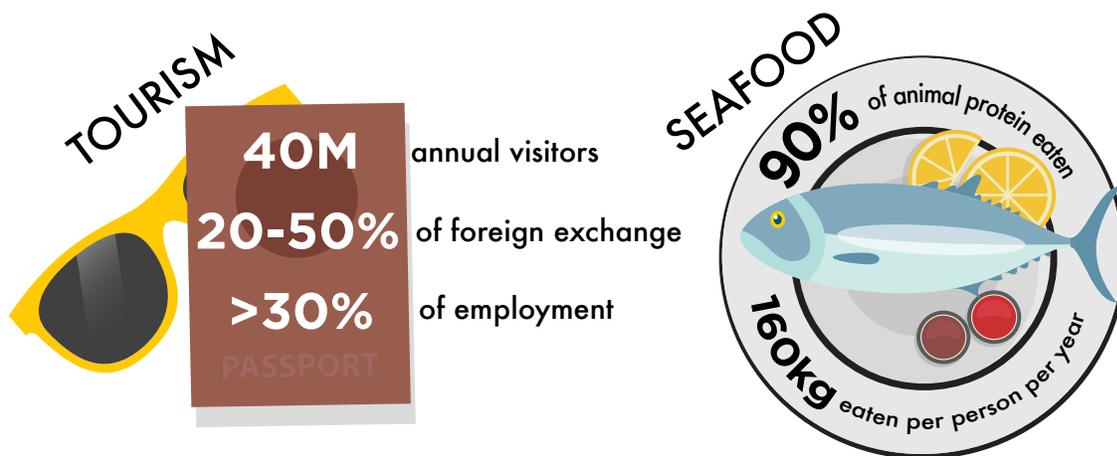
# TARGET 14.7:

## INCREASE BENEFITS TO SMALL ISLAND DEVELOPING STATES AND LEAST DEVELOPED COUNTRIES

By 2030, increase the economic benefits to Small Island Developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism.

### Importance of Target 14.7

In Small Island Developing States and Least Developed Countries (SIDS & LDC), fish trade represents ~3% of GDP<sup>66</sup>, with fish accounting for 7% of total exports. Tourism contributes to development of most SIDS, with >40 million visitors contributing 20-50% of foreign exchange and over 30% of employment<sup>67</sup>. Sustainable management of fisheries can strengthen local markets, as 90% of people's animal protein source is fish, with per capita annual consumption as high as ~160kg<sup>65</sup>.



### Co-Benefits of Achieving SDG Target 14.7 and other Targets

Encouraging the sustainable use of marine resources for economic opportunities, particularly where these have been overexploited previously and through the adaptive management of fisheries, can lead to increased productivity, economic opportunities and marine resource access, in turn helping to reduce poverty (SDG 1) and enhancing food security<sup>68</sup> (SDG 2). In SIDS & LDCs where people are highly dependent on coastal resources, increasing economic benefits will help promote health and well being (SDG 3). As many of the world's important marine ecosystems (such as coral reefs, mangroves, etc) are located in the waters of SIDS & LDCs, improving the sustainable use of ocean resources will help conserve ocean ecosystems (SDG 14). Furthermore, if encouraging sustainable marine use helps maintain and possibly support restoration efforts, such actions can

contribute to increasing ecological resistance and resilience to disturbances caused by climate change. Conservation and restoration of certain habitats, such as mangroves, increase carbon sequestration and contribute to mitigating climate change. Where marine protection, restoration and sustainable economic development helps counter marine degradation, maintain food security and provide economic opportunities, these activities can help combat inequalities within and among countries (SDG 10). In SIDS & LDCs that recognize the role of women in marine harvest and supply chains, promoting sustainable marine development can contribute to gender equality (SDG 5).

The sustainable use of marine resources can lead to economic diversification and the promotion of sustainable industries<sup>69,70</sup> (e.g., tourism,

aquaculture and fisheries), contributing to the creation of resilient and innovative industries (SDG 9) and societies built on sustainable production and consumption (SDG 12). Where the marine environment is important for natural and cultural heritage, promoting sustainable use can contribute to sustainable cities and communities (SDG 11). Where physical and social infrastructure (such as sanitation, energy, and education) is deeply linked to coastal resources (such as atoll SIDS and remote states), increasing economic benefits to SIDS & LDC can contribute to quality education (SDG 4), clean water and sanitation (SDG 6) and affordable energy (SDG 7).

The development and promotion of sustainable and equitable fisheries, aquaculture and tourism ventures in particular can be key enablers for the economic growth of SIDS & LDCs. Yet, economic leakages, lack of capacity and inadequate legal frameworks mean that benefits from local marine resources do not always accrue principally to SIDS & LDCs or members of local communities. Consequently, reforming management and governance conditions can help ensure the economic benefits derived from sustainable marine development in SIDS & LDC advantages all local communities: empower and include

local communities and stakeholders in the decision-making process for and management of proposed developments; have new industries process products locally and sustainably; promote partnerships with the private sector and an investment framework that stimulates the use and production of high quality local products and skills to ensure that revenue remains within SIDS & LDC. Such conditions would contribute significantly to reducing poverty (SDG 1) and supporting sustainable economies (SDG 8)<sup>71</sup>. Increasing resource abundance and access, as well as economic opportunities granted through economic benefit sharing, may also minimize resource-linked conflicts, contributing to peaceful societies (SDG 16). As a mechanism based in part on developed countries partnering with less developed countries in development, economic benefit sharing will assist with reducing inequalities within and among countries (SDG 10) and should increase the adaptive capacity of less developed nations, allowing them to combat climate change impacts (SDG 13). If sustainable development through benefit sharing increases productivity of marine resources available to terrestrial species, benefit sharing can contribute to conserving terrestrial biodiversity (SDG 15).

## Challenges of achieving Target 14.7 under climate change and social inequity

SIDS & LDC generate less than 1% of Greenhouse Gas Emissions, yet these nations and the marine ecosystems on which they depend face risks from climate change impacts through rising sea level and temperature rise, increased storm frequency and severity, and ocean acidification. These environmental threats will potentially perpetuate ongoing economic and political disparities between SIDS & LDCs and developed countries. Sea level rise in particular is a severe threat that can displace entire communities. As a result of the projected declines in marine resources and resulting loss of opportunities for local fisheries and tourism, unsustainable resource use may increase and threaten food security, cultural values, and communities. Other challenges including lack of local capacity and inadequate fisheries management frameworks need to be addressed

to mitigate impacts. Existing unequal access and sharing of benefits may worsen with fewer resources available.

In a situation where resources available to people are reduced, social equity should be prioritized in the development of economic strategies to ensure that all people have an opportunity to engage in sustainable development. Sustainable marine management in SIDS & LDCs can only be achieved through genuine and durable partnerships with developed countries to promote technical, institutional, and technological capacity, governance, local supply chains and empower local communities. Ultimately, many of the challenges that SIDS & LDCs face are part of ongoing economic conflict and disparity with developed countries and political struggles for autonomy.

# SDG 14 RECOMMENDATIONS FOR IMPLEMENTATION

## SDG 14 Target                      Recommendations for progress considering climate change and social equity concerns

Reduce Pollution	<ul style="list-style-type: none"><li>• Account for multi-scale sources of pollution, such as agricultural and urban run-off that can cause anoxic zones, in addition to visible pollution such as coastal trash and debris.</li><li>• Consider potential benefits beyond fisheries, such as tourism, nutritional quality, and health care costs.</li></ul>
Restore Ecosystems	<ul style="list-style-type: none"><li>• Include a broad set of ecosystems in restoration efforts, such as seagrass beds, sand flats, mangrove and kelp forests, marshes, and coral and rocky reefs.</li><li>• Accompany restoration with social ventures to promote alternative livelihoods and ongoing stewardship to prevent future degradation.</li></ul>
Minimize Ocean Acidification	<ul style="list-style-type: none"><li>• Reducing global ocean acidification will require global reduction in greenhouse gas emissions.</li><li>• Local hotspots of acidity can be mitigated by regulating storm-water surge, coastal erosion and land use that contribute to runoff, and the use and release of nitrous oxides and sulfur oxides in agriculture and fossil-fuel burning.</li></ul>
End Overfishing	<ul style="list-style-type: none"><li>• Operationalize ecosystem-based fisheries management, and make fisheries management adaptive to climate change.</li><li>• Promote human rights, equitable access rights and privileges (e.g. cooperative rights) that avoid social and economic power imbalances to prevent conflict.</li><li>• Support local and regional initiatives to decrease overfishing.</li></ul>
Conserve Marine Areas	<ul style="list-style-type: none"><li>• Create protected area networks that anticipate climate change impacts beyond political boundaries.</li><li>• Engage local communities in planning and managing protected areas, and improve cross-sectoral cooperation to ensure social acceptance for implementation.</li></ul>
Reform Fishery Subsidies	<ul style="list-style-type: none"><li>• Eliminate all subsidies to vessels engaged in illegal fishing practices, including labor abuses. Avoid vessel buy-back schemes.</li><li>• Shift capacity-enhancing subsidies toward investments to develop profitable sustainable fishing operations, climate adaptation and improve social safety nets.</li></ul>
Benefit SIDS (& LDCs)	<ul style="list-style-type: none"><li>• Foster strong and durable partnerships, including with the private sector, to promote sustainable business activities (e.g., certified fisheries, offshore aquaculture, renewable energy generation, eco-tourism).</li><li>• Economic activities should strengthen and develop local capacity and skills as well as increase opportunities for SIDs &amp; LDCs to access local and international markets.</li></ul>

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