UNEP

GREEN economy in a Blue World

SYNTHESIS REPORT

UNDESA UNDP IMO FAO IUCN GRID ARENDAL Regional Seas WorldFish CENTER

United Nations Environment Programme (UNEP)
UNEP coordinates United Nations environmental activities, assisting developing countries in implementing environmentally sound policies and practices. It was founded as a result of the United Nations Conference on the Human Environment in June 1972. Its mission is to provide leadership and encourage partnership in caring for the environment by inspiring, informing and enabling nations and peoples to improve their quality of life without compromising that of future generations.

Food and Agriculture Organisation (FAO)
Achieving food security for all - to make sure people have regular access to enough high-quality food to lead active, healthy lives – is at the core of all FAO activities, including for fisheries and aquaculture. FAO's mandate is to raise levels of nutrition, improve agricultural productivity, better the lives of rural populations and contribute to the growth of the world economy. Fisheries and aquaculture have the capacity – if supported and developed responsibly – to contribute significantly to improving the well-being of poor and disadvantaged communities. The vision of FAO for these sectors is a world in which responsible and sustainable use of fisheries and aquaculture resources makes an appreciable contribution to human well-being, food security and poverty alleviation. The FAO Fisheries and Aquaculture Department, in particular, aims to strengthen global governance and the managerial and technical capacities of members and to lead consensus-building towards improved conservation and utilisation of aquatic resources.

International Maritime Organisation (IMO)
IMO is the United Nations (UN) specialised agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships. International shipping is the carrier of world trade, transporting around ninety percent of global commerce. Being an international industry shipping needs a global regulatory framework in which to operate. IMO, with its 170 Member States, provides this framework and has adopted 52 treaties regulating virtually every technical aspect of ship design and operation, the most important of which – concerning the safety of life at sea and the protection of the environment – today apply on ninety-nine percent of the world's merchant fleet. IMO adopts international shipping regulations but it is the responsibility of Governments to implement those regulations. IMO has developed an Integrated Technical Co-operation Programme (ITCP) designed to assist Governments which lack the technical knowledge and resources needed to operate a shipping industry safely and efficiently.

United Nations Development Programme (UNDP)
UNDP is the United Nations' global development network, an organisation advocating for change and connecting countries to knowledge, experience and resources to help people build a better life. UNDP is on the ground in 177 countries, working with them on their own solutions to global and national development challenges. As they develop local capacity, they draw on the people of UNDP and its wide range of partners. Through its Ocean and Coastal Governance Programme, UNDP is working in cooperation with many other UN agencies, the Global Environment Facility, international financial institutions, regional fisheries organisations and others to improve oceans management and sustain livelihoods at the local, national, regional and global scales through effective oceans governance.

The United Nations Department of Economic and Social Affairs (DESA)
DESA and its predecessors have helped countries around the world meet their economic, social and environmental challenges for more than 50 years.
DESA's mission - to promote development for all - reflects a fundamental concern for equity and equality in countries large and small, developed and developing.

IUCN Global Marine Programme
Founded in 1948, The World Conservation Union brings together States, government agencies and a diverse range of non-governmental organizations in a unique world partnership: over 1000 members in all, spread across some 140 countries. As a Union, IUCN seeks to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

WorldFish Center
The WorldFish Center an organization dedicated to reducing poverty and hunger by improving fisheries and aquaculture. It is an international, non-profit research organization that focuses on the opportunities provided by fisheries and aquaculture to reduce poverty, hunger and vulnerability in developing countries. The WorldFish Center is one of the 15 members of the Consortium of International Agricultural Research Centers supported by the Consultative Group on International Agricultural Research (CGIAR), a global partnership that unites the organizations engaged in research for sustainable development with the funders of this work. The funders include developing and industrialized country governments, foundations, international and regional organizations.

GRID-Arendal
GRID-Arendal is a collaborating centre of the United Nations Environment Programme (UNEP). Established in 1989 by the Government of Norway as a Norwegian Foundation, its mission is to communicate environmental information to policy-makers and facilitate environmental decision-making for change. This is achieved by organizing and transforming available environmental data into credible, science-based information products, delivered through innovative communication tools and capacity-building services targeting relevant stakeholders.

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FOREWORD

A worldwide transition to a low-carbon, resource-efficient Green Economy will not be possible unless the seas and oceans are a key part of these urgently needed transformations.

The marine environment provides humanity with a myriad of services ranging from food security and climate regulation to nutrient cycling and storm protection. These in turn underpin lives and livelihoods in sectors from tourism to fisheries.

Yet despite this importance, the last three to four decades have seen increasing degradation of oceans as a result of, for example, pollution from land-based sources, overfishing and increasingly, climate change.

This in turn, is threatening the livelihoods of millions of people around the world who depend on these critical ecosystems for their primary source of protein and for job security both directly and indirectly.

With a growing population, set to rise from seven billion today to over nine billion by 2050, these pressures and impacts are likely to intensify unless the world becomes more intelligent about managing these essential resources.

The Green Economy in a Blue World report analyzes how key sectors that are interlinked with the marine and coastal environment – the blue world –can make the transition towards a Green Economy.

The report covers the impacts and opportunities linked with shipping and fisheries to tourism, marine-based renewable energies and agriculture.

The findings underline that a shift to sustainability in terms of improved human well-being and social equity can lead to healthier and more economically productive oceans that can simultaneously benefit coastal communities and ocean-linked industries.

Many countries are already acting to chart a fresh future for their seas and oceans and adopting the kinds of smart public policies needed to unlock the investments and creative strategies necessary.

The upcoming Rio+20 Summit is an opportunity to scale-up and accelerate these transitions under the twin themes of a Green Economy in the context of sustainable development and poverty eradication and an institutional framework for sustainable development.

Both the marine and the terrestrial environments are more than just an economy—they are part of humanity's cultural and spiritual dimensions. However, through a better understanding of the enormous economic losses being sustained and the enormous opportunities from investing and re-investing in marine ecosystems, perhaps the balance can be tipped away from degradation and destruction to sustainable management for this generation and the ones to come.

Achim Steiner
UN Under-Secretary General
and UNEP Executive Director

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Partner organizations

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- GRID-Arendal

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INTRODUCTION

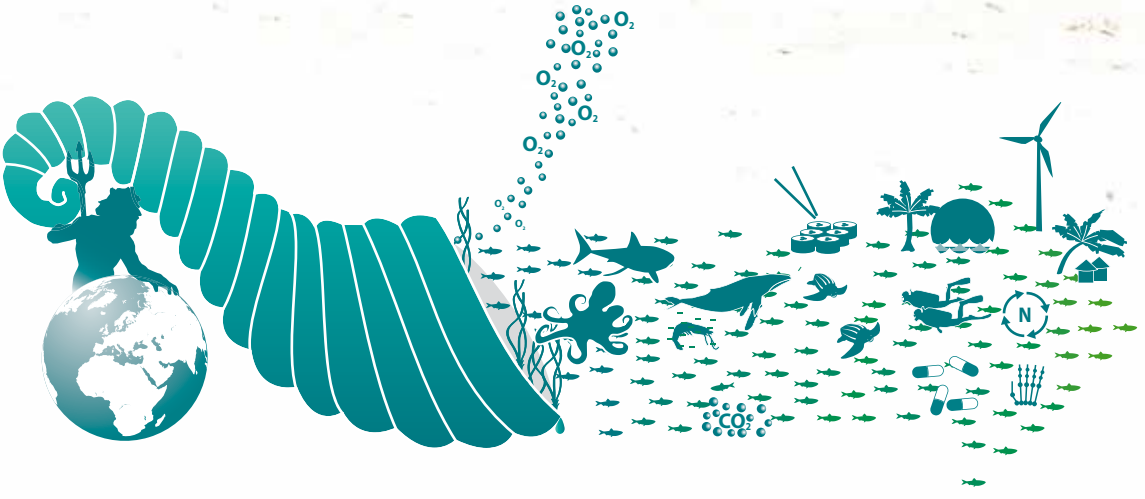
The world's oceans and coasts – the *Blue World* – are the cornucopia for humanity. They provide us with food, oxygen and livelihoods. Most of the world's international trade travels by sea. Sea floors yield important minerals, sand and gravel. Technology is beginning to tap new sources of energy from ocean tides, waves and wind. Coastal habitats provide firewood, fibres and other resources, are natural carbon sinks and protect from storms and surges. Ocean views have been shown to improve people's wellbeing and are an important reason homes near the sea have higher value. Tourism that relies on clean beaches, safe water and abundant marine wildlife provides many ocean communities with jobs, income and foreign exchange. Ocean recreation offers both market and non-market benefits to residents and visitors of the coasts.

Throughout the course of history, humans have been drawn to coastal areas to enjoy the bounty of the sea. Oceans and coasts are the foundation of much of the world's economy and the cultures of many peoples. As much as 40 per cent of the world's population now lives within 100 km of the shore line. Many of the world's great cities, markets and industries have risen along the coast because of access to trade and resources. Next to marine fisheries, traditional economic sectors like shipping, power generation and manufacturing are often concentrated in coastal areas. Only recently, however, have we started to understand the economic importance of the ecological health of our seas. Ocean and coastal habitats, species, and ecosystems support natural capital and economic flows, together referred to as ecosystem services, which may rival global market output in terms of sheer economic value.

Harmonising traditional economic activity and ecosystem-dependent economic values is a challenge we must address. Because of the fluid nature of the ocean, coastal and marine industries cannot be isolated from the watersheds and ocean ecosystems in which they operate. Economic activities near the sea and even far away have damaged the integrity of oceans and coasts. Human impacts on coasts and oceans have destroyed 20 per cent of mangroves and now put more than 60 per cent of tropical coral reefs under immediate, direct threat. Today, more than 30 per cent of the world's fish stocks are overexploited, depleted or recovering from depletion, and over 400 oxygen-poor "dead zones" exist in the world.

The decline in the ecological health and economic productivity of the world's oceans can be reversed by shifting to a greener, more sustainable economic paradigm in which human well-being and social equity are improved, while environmental risks and ecological scarcities are reduced. Technological advances now permit more profitable industrial output with fewer environmental impacts. Research shows that many ocean industries and businesses benefit directly from cleaner, more ecologically robust marine ecosystems. Market mechanisms and innovative agreements now exist to provide financial incentives for people to protect economically valuable marine ecosystem services that traditionally have fallen outside the market. Policies and collaborative solutions are

World oceans, a cornucopia of goods and services



emerging that internalise the external costs of environmentally damaging practices and reward those who create external benefits through sound uses. Sustainable practices can improve the current and future economic, nutritional, cultural and societal value of oceans to people and guarantee these values far into the future.

This report highlights ways to reduce the environmental impact and improve the environmental, economic and social sustainability of traditional and emerging ocean-oriented economies. The chapters that follow show where fisheries, tourism and maritime transportation can take steps to reduce their impact on the marine environment. In doing so, these industries themselves can become more efficient and profitable and sustainable and can contribute directly to the sustainability and productivity of other businesses and livelihoods that depend on healthy oceans and coasts. The authors also explore what it will mean to "green" emerging ocean economic activities including energy generation, aquaculture and the mining of deep-sea minerals. Lastly, the volume highlights how 'greening' the agriculture, wastewater and fertilizer industries could transform the nutrient economy with substantial benefits to ocean sustainability.

Throughout, the report demonstrates that creating a green economy in the blue world, one that "improves human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" means creating sustainable jobs, lasting economic value and increased social equity.

FISHERIES AND AQUACULTURE

Fishers and fish-farmers should, given the dependence of their businesses and livelihoods on ecosystem services, be stewards of the marine environment. Greening the fisheries and aquaculture sectors requires the overall recognition of their wider societal roles – in particular that of small-scale operations for local economic growth, poverty reduction and food security – through a comprehensive governance framework managing externalities from and on the sector, implementing an ecosystem approach to fisheries and aquaculture with fair and responsible tenure systems that foster stewardship and greater social inclusiveness, and integrating fisheries and aquaculture into watershed and coastal area management, including through spatial planning.

The potential economic gain from reducing fishing capacity to an optimal level and restoring fish stocks is on the order of USD 50 billion per annum. Approximately 32 per cent of the global stocks are estimated to be overexploited, depleted or recovering from depletion and a further 50 per cent to be fully exploited. Severe overfishing, the loss of yield due to over-exploitation, is worsening food security and poverty.

Aquaculture is the fastest growing food-production sector and future development prospects appear promising. While playing an important and not yet fully exploited role in supplementing capture production and creating new livelihood opportunities, aquaculture has – in some instances – caused socio-economic conflicts and added additional pressures on already suffering marine and coastal ecosystems.

Investment to reduce fossil energy use and thus the carbon footprint of fisheries and aquaculture has potential gains in terms of improved economic performance and in contributing to mitigating climate change. The needed reductions in fishing capacity and effort in capture fisheries along with the adoption of green technologies can drastically lower fuel consumption and GHG emissions while greatly enhancing the fisheries sector's contribution to economic growth, food and nutrition security and poverty reduction. Well-managed coastal aquaculture and mariculture offer significant scope for green growth and employment opportunities for coastal communities at low levels of CO_2 emissions when compared to other protein production systems.

Supporting development and investment in green technology and raising industry and consumer awareness on the sustainability of fisheries and aquaculture are key approaches to behavioral change and transition to green growth in fisheries and aquaculture. Green technologies include low impact, fuel-efficient fishing methods; innovative multi-trophic aquaculture production systems using environmentally friendly feeds; reduced energy use and greener refrigeration technologies; and improved waste management in fish handling, processing and transportation.

The reduction of fishing effort and the use of non-destructive fishing techniques will reduce the negative impacts on biodiversity, including on larger, longer-lived marine organisms that are more vulnerable to depletion and structurally complex habitats such as coral reefs, which are easily damaged by indiscriminate fishing methods.

Small- and large-scale fishery compared

Source: World Bank - FAO – WorldFish Centre, The Hidden Harvests, 2010.

Strengthening regional fisheries bodies, national fisheries management agencies, fishing community and fishworkers organisations and private sector associations is critical to sustainable and equitable use of marine resources. A strong international legislative and policy framework for fisheries is already in place with the FAO Code of Conduct for Responsible Fisheries and its related international agreements and plans of action. The social, economic and cultural dimensions of this framework will be further strengthened through the development of international guidelines on securing small-scale fisheries to complement the Code as called for by FAO's Committee on Fisheries. The challenge is to provide incentives and adequate resources to implement this framework at the local, national and regional level.

MARITIME TRANSPORT

Shipping needs a global regulatory framework in which to operate: as an inherently international industry it requires the same rules to apply at both ends of a voyage. International shipping is the carrier of world trade, transporting around 90% of global commerce. Without it, the bulk transportation of raw materials and the import and export of affordable food and goods would simply not be possible. The global regulatory framework is provided by the International Maritime Organization (IMO), which has adopted 52 treaties regulating ship design and operation. The most important of them – concerning the safety of life at sea and the protection of the environment – today applies on 99% of the world's merchant fleet.

Shipping is the safest, most secure, most efficient and most environmentally sound means of bulk transportation – with declining rates of accidents, zero terrorist incidents, improving turnaround of ships and significant reductions in discharges to sea or emissions to air. Much of these advances have been made possible as a result of IMO's regulations, industry initiatives and technological developments; by helping to build technical maritime capacity in developing countries, where some 70%-75% of the world's merchant fleet is now registered.

Shipping is subject to the first ever global and legally binding CO2 regulations for an entire economic or industrial sector. Annex VI to the MARPOL Convention was adopted to regulate the emission of air pollutants from ships, and amended in July 2011 to include regulations on energy efficiency for ships. It is one of 13 treaty instruments IMO has adopted since the Earth Summit of 1992, dealing exclusively with the protection of the marine and atmospheric environment from adverse impacts deriving from shipping.

International shipping contributes to the three pillars of sustainable development. It facilitates global commerce and, the creation of wealth and prosperity among nations and peoples, creating a wide variety of jobs on board ships and ashore, with direct and indirect beneficial impacts on the livelihoods of others. It helps to moderate prices on exported goods (and therefore reduce inflation and its negative impact on real incomes) by providing a dependable, efficient and low cost means of transporting goods globally. In comparison to other transport modes, it provides the most environmentally sound and energy-efficient means of moving huge quantities of cargoes and people.

Further greening of the sector is nevertheless desirable and achievable. The challenges for IMO and the shipping industry include promoting entry into force of all of IMO's environmental treaties; reducing even further the pollution caused by ships through discharges to sea and air emissions, by helping countries to ensure global, uniform and effective implementation and enforcement of IMO standards; developing standards to ensure that the operation of ships using alternative sources of fuel is both safe and environmentally sound;

further improving the energy efficiency of ships; developing additional means – such as market-based measures – to further reduce emissions of greenhouse gases from ships; preventing and controlling the transfer of invasive aquatic species through ships' ballast water and ships' hull fouling, which are estimated to cost around USD 100 billion per year; and addressing the technical, operational and environmental aspects of the ever-increasing size of ships.

Projected annual CO2 emissions from the shipping sector

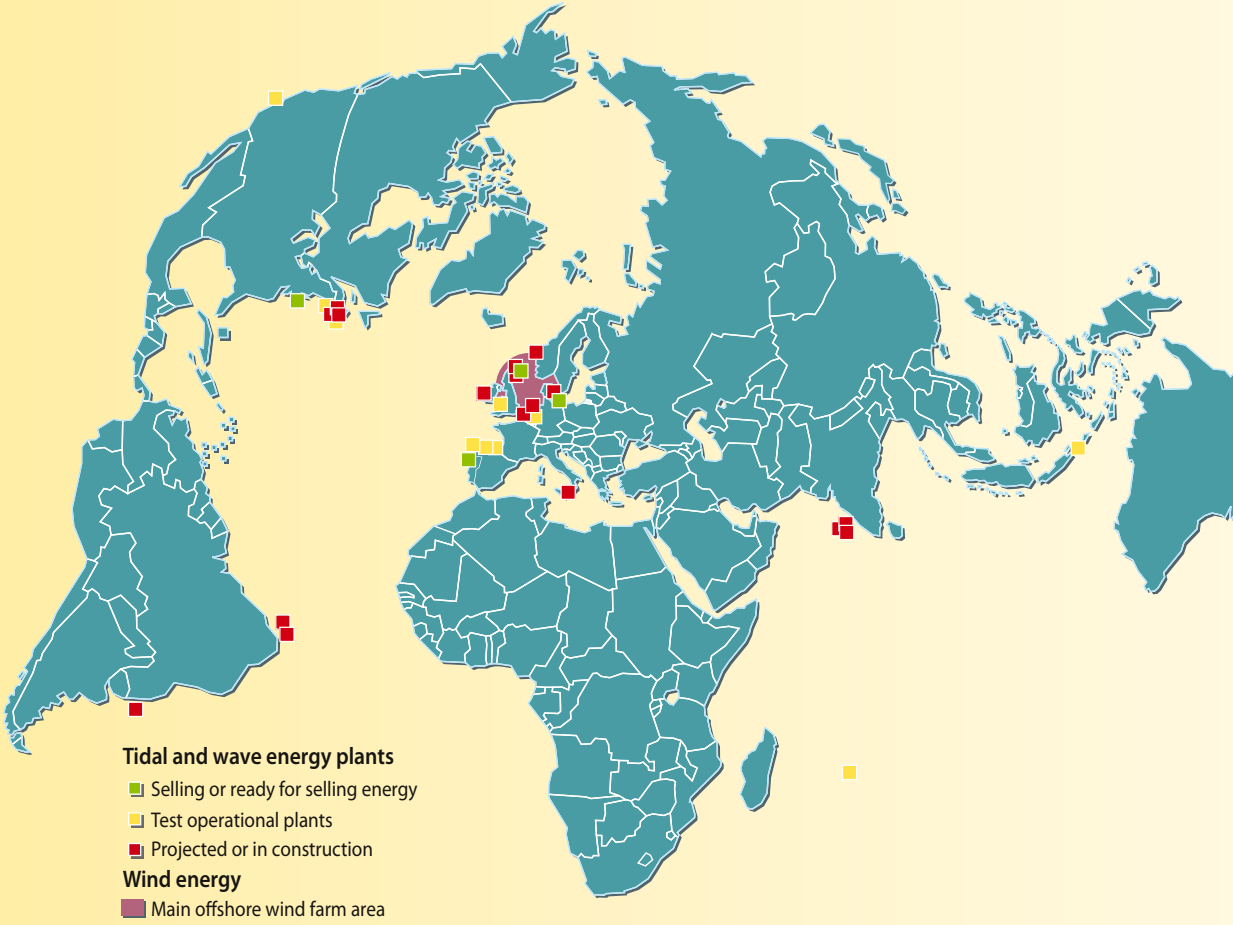
MARINE-BASED RENEWABLE ENERGY

Marine-based renewable energy potential is high, though little is currently utilised. Marine-based renewable energy such as wind, wave and tidal range and currents offers a significant potential to contribute to low-carbon energy supplies for regions with appropriate coastal features. The IPCC highlights that the technically exploitable potential for marine-based renewables excluding offshore wind ranges from 7 EJ per annum to 7,400 EJ per annum; the latter figure would exceed current global energy needs. However, marine-based renewable energy represented less than 1 per cent of all renewable energy production in 2008. Installed capacity is unlikely to become significant until after 2020 due to the early stage of development of most technologies aside from offshore wind energy.

Greater investments in research and development are needed to support technical advances and enable rapid progression in the sector. Current financial initiatives and investments are not sufficient to develop this potential. Investments in research and development are needed now to ensure that marine-based renewable energy delivers on its potential contribution to low-carbon energy security.

Designs of marine-based renewable energy technologies vary greatly, being adapted to

Producing energy from the oceans



Sources: Owen, A., D., *Renewable energy: Externality costs as market barriers,* Energy Policy, Elsevier, 2006; EEA online database, International Energy Agency-OES, *Annual report,* 2008; ISSC, Specialist Committee V.4 Ocean, Wind And Wave Energy Utilization, 2009; IPCC, *Wind Energy. In IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation*, in press.

Note: Energy production costs are averages estimates in the EuropeanUnion and refers to the cost of traditional and enewable energy technologies projected to 2020 assuming technology improvement for newer energy sources.

local conditions. Only offshore wind and to a lesser extent tidal range technologies have been developed to commercial scale, primarily in Europe where policy and investment frameworks are favourable. Many technologies that harness energy from waves, currents and temperature differentials have been developed at pilot stage, but without convergence on a single design type, and very few have been developed to a commercial scale.

Marine-based renewable energy can provide alternative employment opportunities particularly for maritime communities who were formerly reliant on fisheries or oil and gas production. Compared with thermal power generation, renewable energy has a higher labour intensity. The types and scale of opportunities will vary by national context and energy source. Lack of skilled labour is one of the potential barriers to deployment of renewable energy.

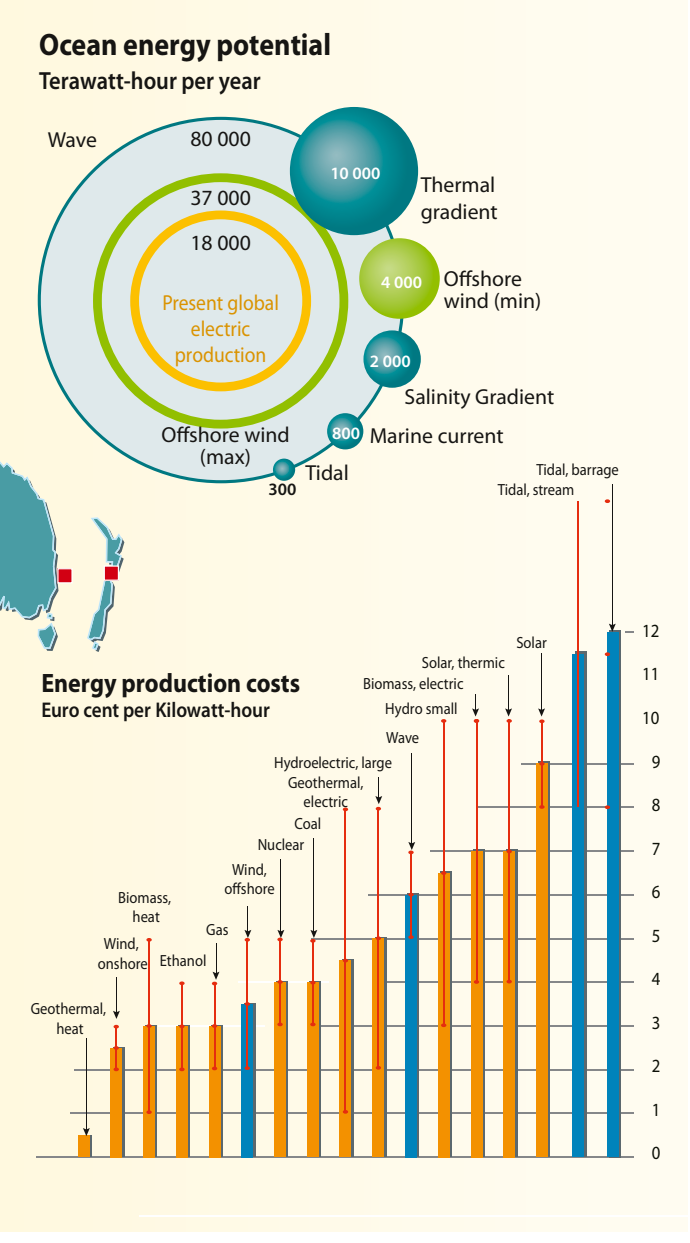
Marine-based renewable energy can provide an alternative electricity supply for oil-importing countries. Developing countries that spend large amounts of their export revenues on oil imports can benefit from an alternative electricity supply to improve national and regional energy security, as well as water and food security when used directly for desalination.

Without accounting for negative externalities, marine-based renewable energy is not yet cost competitive; only offshore wind is close to being cost competitive with fossil fuel and nuclear sources. There are many challenges to be overcome before marine-based renewable energy technologies can reach large-scale commercialisation; these include high capital costs and the logistics around storage and transmission.

Global environment benefits of reduced greenhouse gas emissions need to be balanced against local environmental risks and opportunities. For most marine-based renewable energy types, the greatest negative impacts on biodiversity occur most likely during construction and decommissioning due to noise and habitat disturbance. During operation, moving parts can affect birds, fish and sea mammals. However, if ecologically sensitive sites are avoided and best practice employed, there could be positive benefits for the marine environment, such as through the creation of appropriate artificial habitat and the reduction of other adverse activities in the area. As relatively little is known about more recent technologies, new developments need to be accompanied by appropriate monitoring and evaluation as part of environmental impact assessment procedures.

Consistent long-term policies and targeted financial support from governments are needed if technical barriers and cost reductions are to be overcome. Governments need to lead the way by establishing consistent renewable energy policies, including specific targets for marine-based renewable energy where possible. To implement this, incentives such as grants, subsidies and tax credits are required to encourage private investments in the large, expensive infrastructure that is required to move from small prototypes to pilot plants.

Governments need to proactively guide developments to reduce potential for social, environmental and legal conflicts and promote synergies with other sectors. Governments may play a key role in proactive strategic marine planning to offer concessions in areas with lower risk to ecosystems and biodiversity and to promote synergies with other marine users.

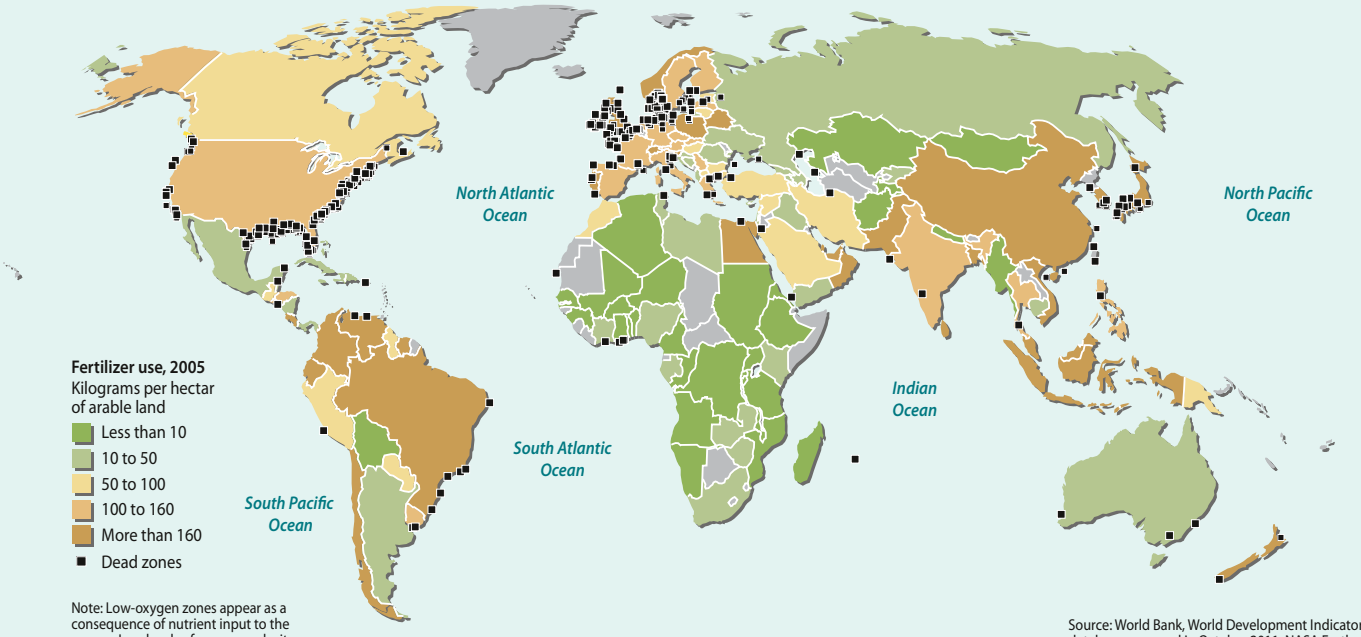


OCEAN NUTRIENT POLLUTION

Industrially produced nutrient fertilizers (nitrogen, phosphorus) are essential to global food security and have been the main driver of dramatically improved agricultural yields over the last sixty years to feed a growing population. At the same time, excess nutrients from inefficient use in farming and insufficient treatment of nutrients in wastewater, have made their way into rivers, aquifers, coastal areas and oceans, leading to degradation of marine ecosystems and groundwater at a global scale.

Nutrient loads from continents to oceans and the coastal zone have increased roughly three fold from pre-industrial levels, primarily from agricultural run-off and poorly or untreated sewage. Mainly due to the addition of manufactured nitrogen (from atmospheric nitrogen and natural gas), the amount of reactive nitrogen entering the earth's biogeochemical system has increased by about 150% compared to pre-industrial times. A 2009 Nature Report1, "A Safe Operating Space for Humanity", determined that excess nitrogen in the environment was one of 3 of the 9 'planetary boundaries' that had already been exceeded. In effect, mankind is 'mining' the atmosphere for nitrogen; with a practically limitless supply, this process could proceed for hundreds if not thousands of years leading to continually worsening conditions for coastal areas and groundwater.

Dead zones and fertilizers



Note: Low-oxygen zones appear as a consequence of nutrient input to the oceans. Low levels of oxygen make it difficult for marine creatures to survive.

Source: World Bank, World Development Indicators database, accessed in October 2011; NASA Earth Observatory, data acquired in 2008.

The environmental and socioeconomic impacts of nutrient pollution are massive and occurring over wide areas globally. The occurrence of coastal hypoxic zones caused by eutrophication has increased exponentially in recent years, and nitrate pollution is one of the main groundwater contaminants in the developed and also increasingly in the developing world. Coastal hypoxia impacts fisheries, tourism and various ecosystem services provided by healthy coastal ecosystems. For the EU alone, the economic costs of damage to the aquatic environment from excess reactive nitrogen are estimated at up to € 320 billion per year. Initial evidence from the EU and US suggests that the overall benefits from improved nutrient management exceed costs and that this cost/benefit calculus occurs in other parts of the world.

A paradigm shift is needed in the way we produce, use and treat nutrients, from a dominantly 'linear' approach to a much more cyclic approach with substantial recovery of 'waste' nutrients. Without this change our oceans will continue to degrade through increased hypoxic zones with disastrous consequences to coastal communities dependent on marine resources for food and livelihoods. The 'business as usual' approach where we use sizeable fossil fuel energy resources to convert atmospheric nitrogen to fertiliser for production of food, and then use significant energy and infrastructure through conventional wastewater treatment to convert a portion of this reactive nitrogen back to atmospheric nitrogen, is highly wasteful. A move to a far more efficient and closed recycling approach to nutrients will not only protect the freshwater and ocean environment from pollution but will improve livelihoods through creation of new business and job opportunities and reduce fossil fuel energy consumption and associated greenhouse gas emissions.

As part of the transition to a green economy, the massive global environmental externality from nutrient pollution needs to be internalized through use of a range of policy and regulatory tools and economic instruments at all geographic scales. Policy and regulatory instruments could include more strict regulation of nutrient removal from wastewater, mandatory nutrient management plans in agriculture, and enhanced regulation of manure. Economic instruments could include taxes on fertilizer and/or agriculture and wastewater emissions, cap and trade frameworks on nutrient emissions and/or fertilizer production, and subsidies that encourage nutrient recycling and efficient use of fertilizer.

Technology innovation, public-private partnerships, job creation and other benefits of a paradigm shift to a much more 'cyclic' nutrient economy would be catalysed by such actions. Furthermore, in the long run it will help to safeguard global food security by diversifying sources of nutrient raw materials to meet continued demand for fertilizer to feed a still growing world population. Many developing countries, for which wastewater collection and treatment and the 'green revolution' are still works in progress, present special opportunities to pilot and scale up new nutrient recovery and efficiency paradigms. Enhanced nutrient recovery and reuse would also help to ensure that phosphorus, with finite reserves, is increasingly recycled to maintain sufficient supplies to meet the long-term needs of human society.

COASTAL TOURISM

Globally, coastal tourism is the largest market segment and is growing rapidly.
The tourism economy represents 5 per cent of world GDP and contributes to 6-7 per cent of total employment. In 150 countries, it is one of five top export earners and in 60 it is the first. It is the main source of foreign exchange for one-half of Least Developed Countries (LDCs). No comprehensive assessment of the share of coastal and marine tourism exists, yet the sectors are considered the largest segment and trends suggest continued growth over the next 20 years.

Global tourism is increasingly becoming less sustainable.
Rapid growth in travel (over 4% annually through 2020) and preferences for further distances, shorter time-periods and energy-intensive activities are resulting in the sector's contribution of 12.5 per cent of radiative forcing and 5 per cent of anthropogenic emissions of CO2. Emissions cause coral bleaching, ocean acidification, and sea level rise. Other coastal tourism pressures include water pollution and consumption, waste, land conversion, pressure on biodiversity, survival of local and indigenous cultures and built heritage.

Marine and coastal environments are threatened assets of global tourism.
Coastal and marine environments are threatened by unsustainable development including urbanisation, waste, habitat destruction, coastal modification, and the loss of socio-cultural identity. Threats from climate change include coastal erosion, ecosystem loss, altered habitat productivity, and changes in the availability and quality of fresh water resources.

Climate change is demanding a greening of marine and coastal tourism.
Climate change is a key risk factor for tourism. Challenges from sea level rise, rising ocean temperatures, ocean acidification, and the loss of biodiversity need to be addressed. The information base for effective adaptation remains inadequate for developing nations, particularly SIDS.

Sustainable tourism can create new jobs and reduce poverty.
Tourism is human-resource intensive. One job in the core industry creates one and a half additional jobs in the tourism-related economy. Efficiency improvements, local hiring, sourcing local products and safeguarding local culture and environment can reinforce employment potential. The development of local food systems for tourism can generate jobs in sustainable farming and fishing. On the demand side, more than a third of travellers favour environmentally friendly experiences.

Tourism development can support local economy and reduce poverty.
The share of spending in the local economy determines local economic effects of tourism. Increasing involvement of local communities in the value chain can contribute to the development of local economies and poverty reduction. Positive impacts can stem from engaging local supply chains and increasing "green services" in energy, water and waste management efficiency. Tourism's impacts on local communities are complex and demand careful planning.

Investing in greening tourism can reduce costs and enhance the value of ecosystems and cultural heritage.
Investment in energy efficiency generates significant returns within short payback periods. Improving waste management can save money for businesses, create jobs and enhance destination aesthetics. Investment requirements in conservation and restoration are small relative to the high value of ecosystem services (ES). Provision of ES is essential for continued economic activities and human survival. Cultural heritage investment is usually the most significant and profitable investments the tourism sector can make.

The private sector must be mobilised to support sustainable tourism and needs access to financing for investing in greening practices.
The majority of tourism businesses are small and medium sized enterprises (SMEs) and contribute most to local livelihoods. Tools are required to educate SMEs. The use of internationally recognised standards can assist businesses to understand aspects of sustainable tourism and mobilise investment. Innovative multi-sector partnerships and financing strategies

are required and can spread the costs and risks of green investments. Micro-enterprises are especially important in LDCs but lack access to capital. Reduction of fees and favourable interest rates, along with in-kind technical, marketing or administration assistance can help.

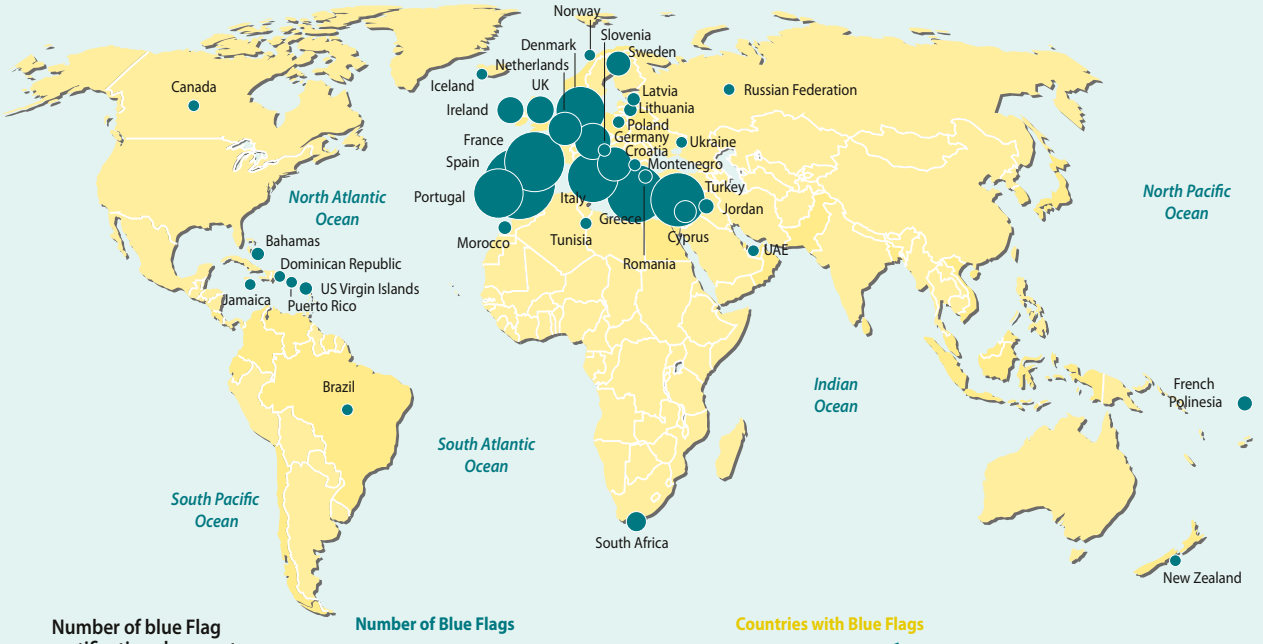
Cross-sectoral consultation and Integrated Coastal Zone Management (ICZM) are required for good sustainable tourism, destination planning and development strategies.

When developing tourism strategies, governments, communities and businesses need to establish mechanisms for coordinating with multiple ministries. Cross-sectoral consultation is required in areas such as zoning, protected areas and agricultural standards. Tourism planning has to include capacity building, government commitment, enforcement and climate change considerations. ICZM, a multi-sectoral approach for balanced development, use and protection, helps implement strategic planning.

Government investments and policies can leverage private sector actions on sustainable tourism.

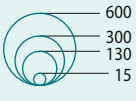
Government spending on public goods such as protected areas, cultural assets, transport, and renewable energies can reduce the cost of green investments. Governments can use tax concessions and subsidies to encourage investment. Energy use and waste generation need to be correctly priced to reflect the true cost. An efficient instrument to deal with greenhouse gas emissions is to introduce carbon taxes on production and consumption but can be challenging in developing nations.

Blue Flag up!



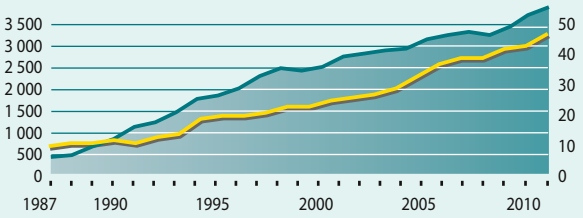
Number of blue Flag certifications by country

Total beaches and marinas



Source: Blue Flag International Coordination.

Number of Blue Flags — **Countries with Blue Flags**



The Blue Flag is a certification assigned towards sustainable development of beaches and marinas through strict criteria dealing with Water Quality, Environmental Education and Information, Environmental Management, and Safety and Other Services.

DEEP-SEA MINERALS

Deep-sea minerals are a possible new revenue stream that could support national development goals. There has not been any profit generated to date, but in the near future deep-sea minerals could provide income to states from multiple sources, including foreign investment, export earnings and government revenues. Managed correctly this natural capital could be converted into jobs, infrastructure, public service improvements and growth in the domestic private sector. But the imperative is on society to decide whether to focus on maximizing short term financial return or on longer term economic objectives, which balance social goals, including developing sustainable livelihoods, and the preservation of ecological parameters against inequitable, unfocused and unsustainable growth.

Deep-sea minerals constitute only one component of a society's natural capital. The determination of the economic value of resource development needs to include the cost to society from any associated social and environmental impacts, including the loss or damage to other components of natural capital, otherwise over the longer term the development may constitute "uneconomic growth" as opposed to "true economic" growth. Determining the "true" value of deep-sea minerals, when additional factors such as possible impacts on ecosystem services are taken into account, is at present challenging. The deep-sea environment is one of the least understood regions of the planet and we still have a fairly rudimentary understanding of the ecosystem services these environments support. To avoid any unintended consequences that may affect society through the loss of unaccounted for ecosystem services, we need to rapidly increase our knowledge of these services and management decisions need to be informed by sound scientific information and guided by the Precautionary Principle. The value of non-renewable resources can no longer be simply measured in terms of their ability to generate monetary returns.

Deep-sea minerals, as any other mineral resources, are not endless. Planning across generations becomes a moral obligation for decision makers today, as access to adequate resources or wealth (note that wealth is not purely defined as financial capital) linked to resources is an inherent right of an entire society regardless of time. Mining is a finite economic activity, often with a short life span, but poor development without the consideration of environmental and social impacts may leave a legacy of problems and lost opportunity long after the gains from development have been consumed. Past practices related to resource development have obviously damaged the natural capital inherited by today's children, and unfortunately this is especially evident in some resource rich developing countries. Natural resources underpin economic development, but in order to maintain natural capital for future generations, management needs to ensure that mining ends up balancing the capital account by generating net value. Marine mining has the potential to significantly deteriorate benthic ecosystems. The effective conservation of these ecosystems requires the application of Best Environmental Practice as well as spatial planning exercises including the establishment of Protected Areas. Thereby we not only ensure sustainability but also add the bonus of stimulating a dramatic increase in understanding of these ecosystems including the functions and services they provide.

All stakeholders need to be considered when managing deep-sea mining activities in the context of the sustainable use of the oceans. These include actors with non-commercial, subsistence and traditional interests, other commercial interests (e.g. oil and gas exploitation and fisheries), and most importantly future generations and their right to live in healthy and productive ecosystems. There is growing acknowledgment that human well-being is linked to environmental condition. Management practices should therefore be holistic, based on an integrated overview of all present and future human uses and ecosystems services.

SMALL ISLAND DEVELOPING STATES (SIDS)

The biologically and culturally diverse nations that constitute our world's Small Island Developing States (SIDS) share several unique characteristics. Their small economies, geographic location and size, vulnerability to natural disasters, fragile and limited ecosystems, and limited human and financial resources, make them prone to sudden environmental, social or economic changes.

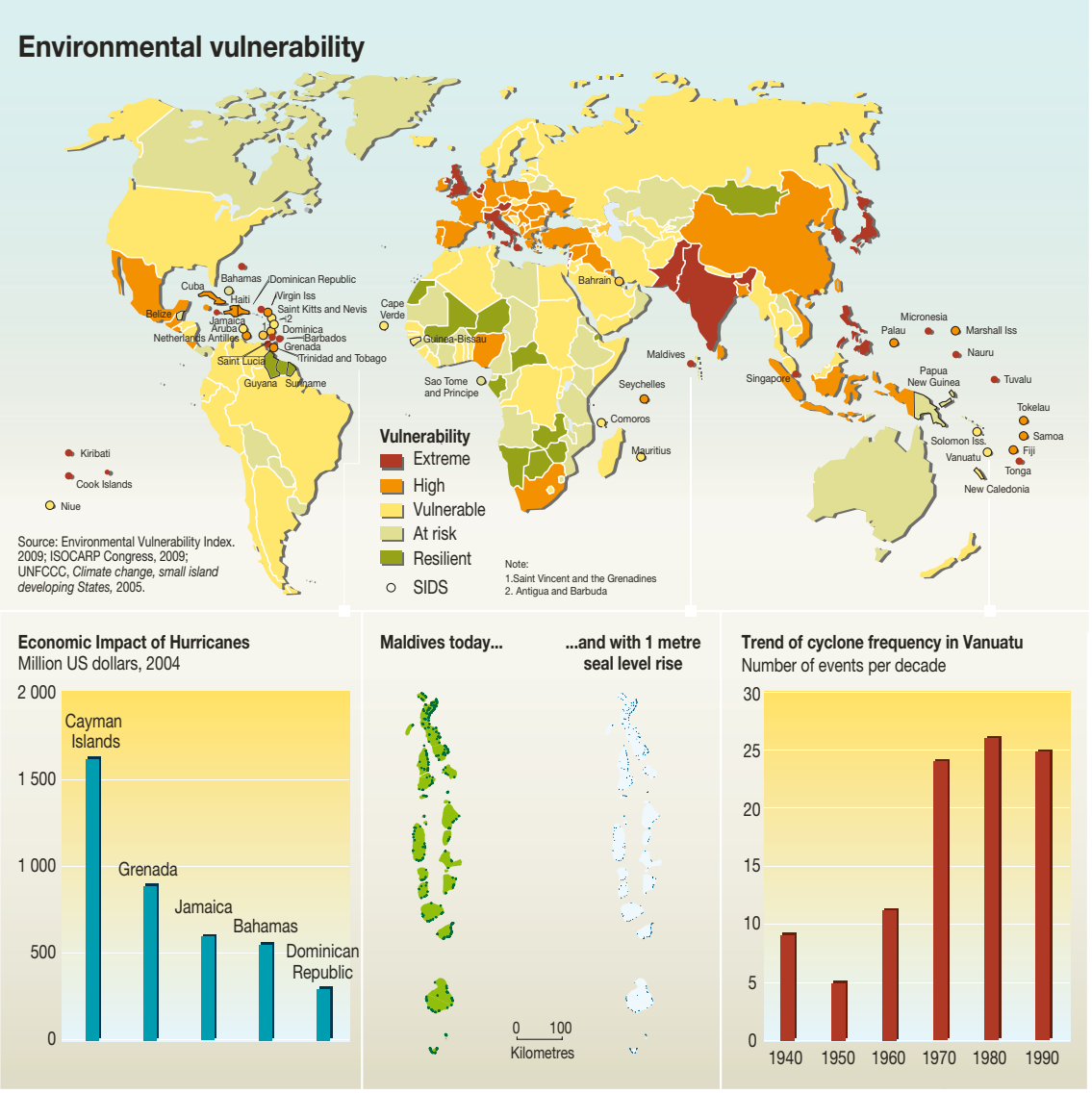
Given their reliance on their natural resources and the inextricable linkage of economic sectors, the continued use and reliance on these resources pose certain challenges as they often struggle to align competing national priorities with sustainable practises, environmental protection and social equity. The thrust towards a green economy provides a critical pathway to socio-economic development and inclusion, harmonising conflicting demands, maintaining macro-economic stability, facilitating job creation and protecting natural resources.

With most SIDS populations and economic activities located in the narrow coastal belt, one of the closest connections between humanity and the blue world is found among those who harvest the seas for a living. This connection to the oceans, primarily through fisheries, is strongest in SIDS.

Fisheries account for 10% of GDP and over 50% of exports in some islands. Main mechanisms for a transition to green growth in fisheries, as well as aquaculture, include fair and responsible tenure systems to turn resource users into resource stewards, an ecosystem approach accounting for cross-sectoral linkages and integrative with watershed and coastal zone management as well as wider (spatial management) frameworks, development of and investment in 'green' technology, and industry and consumer awareness-building to support products from sustainable fisheries and aquaculture that provide fair and equitable benefits to fishers, fish farmers, fish workers and their communities.

Tourism, another dominant economic activity in SIDS is the largest source of foreign exchange for more than half of all the countries.

It represents more than 30% of their total exports and focuses primarily on fragile biotic systems like beaches and reefs and other coastal resources that are often over-exploited as tourism products. Continued reliance on tourism to drive economic growth will require a discrete integration of all components of the tourism sector into upstream and downstream related sectors and vice versa, to bolster the creation of sustainable jobs, while conserving natural resources, which in most cases are the main "natural capital" and attractiveness to tourism that countries have. Public investment should conserve critical natural assets of tourism such as iconic species and ecosystems. Support such as favorable loans, direct subsidies and tax exemption should be provided to enterprises willing to green, but lacking financial means. Partnerships with major tourism enterprises in greening practices within the industry and its suppliers can bring new expertise to SIDS and support the necessary capacity building for greener technologies and approaches. Regional alliances can provide level playing fields for States and private sector actors, and can further be used to share successful examples.



Nutrient pollution is a growing impact on marine ecosystems such as coral reefs, which are of vital importance for tourism and fisheries.

SIDS should to set policies that stimulate the sustainable management of fertilizers in order to obtain favourable agricultural yields while at the same time not over-enriching the natural environment with Nitrogen and Phosphorus that lead to eutrophication of the waterways and ultimately marine and coastal ecosystems. Innovative approaches to the management and use of fertilizers will create opportunities for private engagement while helping to secure SIDS' essential natural assets. Further positive effects include the quality of freshwater and cost-reductions in agriculture.

With only a few exceptions, SIDS depend on imported petroleum to supply their energy needs.

As of 2008, island states spent over $90 million daily for more than 900,000 barrels of oil at an average price of US$100 per barrel. More than 90% of that energy is obtained from oil imports, accounting for the largest claim on their foreign exchange earnings. The high cost of imported energy causes a severe drain on limited financial resources, while fluctuating oil prices have serious repercussions on their national economies. SIDS should pursue a collective approach under the UNFCCC and Rio+20 processes to secure financial resources to provide public support and infrastructure for the private sector to engage in the development of renewable energy production. Establishing technological expertise sharing mechanism would increase efficient utilization of unique expertise. Such a mechanism could be implemented through UN agencies focused on science or industrial development or through the relevant regional institutions. SIDS should take a collective approach to sustainable energy development particularly with regards to aggregate purchasing, approaches to technology developers, to seeking investment financing, and in research, development, and demonstration.

CONCLUSIONS

Healthy oceans are invaluable to human development. Human activities in the marine environment, and on the landmasses that drain to it, have damaged ocean ecosystems, the services they provide and the economic values they generate. Economic costs arise from having to substitute ecosystem services such as coastal protection, and lost revenues in sectors dependent on ecosystems, such as the fisheries "sunken" USD 50 billion per year reported by the World Bank and FAO. But beyond these measurable effects, there are decreased values such as beauty when walking a beach polluted by waste, let alone oil. Lost potential values such as pharmaceutically active substances are the consequence of the loss of biodiversity. Access to free market and non-market ecosystem services such as the provision of food and coastal protection, are of greatest importance to those who can not pay – here, greening the blue economy becomes a question of security and equity. For these and many other reasons, greening our ocean economies is a matter of enlightened self-interest.

Are we enlightened yet? **While major achievements have been made in both the private economic and public governance spheres, marine and coastal ecosystems and biodiversity remain under imminent pressure due to a general gap in integrated ocean governance.** The importance of ecosystem services is not fully recognised and incorporated in policy planning and investment decisions. Many parts of the ocean, particularly in the deep-sea, are virtually unknown. The myriad of links and dependencies in the marine environment are still far from being understood. Strengthening marine science and raising awareness are needed to increase our comprehension and maintenance of ecosystem services. The Precautionary Principle must guide our decision-making in areas where we do not know enough about the intricate complexity of our marine ecosystems.

Governance in the marine environment faces particular challenges. The fluid nature of the oceans makes the management of fisheries or pollution more difficult than on land. Further, few property or tenure rights exist in the ocean, leading to what has been termed the Tragedy of the Commons. In truly global sectors such as shipping, and also those two thirds of the oceans that are beyond the limits of national jurisdiction, single governments have limited power to protect the environment – regional and global frameworks are essential tools and need to become more effective to fill this role. Globally, subsidies that perpetuate 'brown' unsustainable economies must be shifted to greening, and environmental externalities must be reflected in the pricing of ocean-based goods and services. The transfer of new technologies that help us greening must not be hindered.

Shifting economy's purpose away from the pure GDP-measured production of market values leads to new questions on broader societal goals, such as equity, security and

the maintanance of natural capital. This holds particularly true for emerging sectors such as deep-sea mineral production, for which the direction of development is largely open. This can be a challenge to decision makers who have grown used to simplistic formulations which look at economic growth as the sine qua non. At the same time, such a shift grants modern governance tools a greater role. Ecosystem based management, a relatively recent approach receiving growing attention and application, recognises that human welfare and ecosystem health are linked. It calls for integrated management across sectors and aims for harmonising all human activities with one another and with ecosystems. The involvement of relevant public and private actors and the application of marine spatial planning can help to ensure optimal coexistence of uses, users and the marine environment.

Valuation of ecosystem services, a tool being increasingly applied by decision makers, helps us create new opportunities for reconciling use and protection of the coastal and marine environment. Payment for Ecosystem Services represents one of these opportunities, whereby the protection of valuable services such as clean water is financially supported by the beneficiaries of those services, often at much lower cost than more technology-driven approaches to service provision. Mobilising financial capital through sustainable innovative funding mechanisms can be a prerequisite to enable enterprises to make green investments. In coastal and marine tourism for example, the majority of businesses are small and medium sized enterprises. Governments, investors as well as global private and public donor organisations need to provide necessary funds to those actors who have a high potential for greening, but are hampered by lack of access to capital and capacity. Public private partnerships, tax exemptions and reduced interest rates are fiscal measures that can unleash that potential. On the other end of the spectrum, renewable energy production often needs support to take the effort of moving from prototypes to pilot plants. Public investment in green infrastructure, in education and capacity building, but also in protected areas can reduce private costs of greening. Cap and trade mechanisms are established tools to catalyse technological innovations towards greener productions; the application in new sectors such as fertilizer production should be explored.

Greening our ocean economies is a challenge that needs commitment from each of us – as the individual consumer, investor, entrepreneur or politician. This report shows how investment in a Green Economy in a Blue World pays off. A less energy-intensive, more labour-intensive, less destructive, more sustainable, less exclusive, more integrative approach will lead to more jobs, strengthen intra-and inter-generational equity and empower people to economic participation and greater self-determination. For countries, greening their marine economies means diversification, stronger resilience to economic or environmental shocks and sustainable prosperity.

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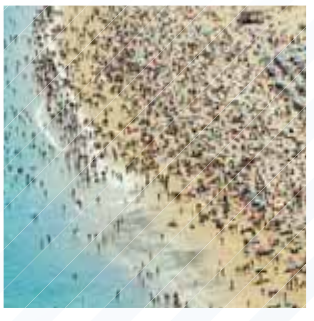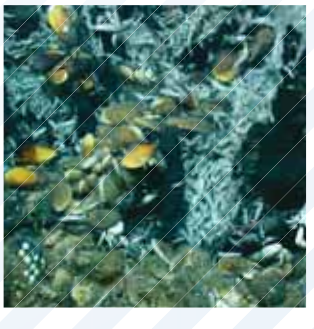
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