BLUE ECONOMY FOR BUSINESS IN EAST ASIA

TOWARDS AN INTEGRATED UNDERSTANDING OF BLUE ECONOMY

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Blue Economy for Business in East Asia:
Towards an Integrated Understanding
of Blue Economy

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Acknowledgements

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Our thinking has been influenced by innumerable conversations with colleagues and members of our network, as well as through the thought leadership of several organizations already doing pioneering work on marine blue economy, including UNDP, APEC, FAO, The Economist and the World Ocean Council.

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This is not the first step, but we hope it will be an important one for PEMSEA in continuing to elevate the discussion on blue economy, and we welcome partnerships with other organizations seeking to develop a blue economy in East Asia.

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Executive Summary

Covering 7 million km^2 and 235,000 km of coastline, the seas of East Asia are some of the most ecologically and economically important sea areas in the world. They provide a rich array of services that directly and indirectly contribute to human survival and quality of life, supporting local coastal communities and their larger national economies.

With a growing global population, mounting pressure on the existing resource base and increasing access to coastal and marine environments through technological advances, accelerated development and exploitation of coasts and oceans is a certainty. The environmental and social impacts from these activities threaten a decline in ecosystem services that form the basis for economic growth in the region. The question is whether this growth will be sustainable, in a region so dependent on its coastal and marine resources.

Coastal management issues cut across sectors, making integrated approaches essential for addressing the governance of human activities affecting the sustainable use of goods and services generated by coastal and marine ecosystems. Proper governance is necessary to establish an enabling environment for investment in areas such as ecotourism, energy, sustainable fisheries, coastal habitat restoration, climate resilience, marine pollution reduction and access to fresh water.

"Blue economy" has emerged as a significant potential driver of sustainable economic growth in East Asia, and the concept has struck a chord with a number of countries and international organizations, increasingly appearing in policy discussions, conferences, publications and agreements. In 2012, PEMSEA's Country Partners expressed their interest in blue economy through the Changwon Declaration, recognizing that innovative partnerships with the business community and others are needed to achieve sustainable ecological and economic health. While the discussion has remained largely the domain of government, the private sector is showing more interest in the potential that blue economy holds. Indeed, business will play a critical role as its development unfolds. The goal of this report is to illuminate what blue economy means for business and why it will be an important consideration for companies in East Asia in the coming years.

Companies are exposed to a number of operational, regulatory, reputational, market and financial risks and opportunities related to proper management of coastal and marine ecosystem services. This report examines important blue economy trends, risks and opportunities across 9 key industries: Fisheries and

Aquaculture; Ports, Shipping and Marine Transport; Tourism, Resorts and Coastal Development; Oil and Gas; Coastal Manufacturing; Seabed Mining; Renewable Energy; Marine Biotechnology; and Marine Technology and Environmental Services. Across these industries, some of the most common business risks and opportunities include:

Risks:

- Increased operating costs or lost revenue from resource volatility or degradation;
- Disruption to business operations or legal action from social or environmental incidents;
- Limitation or loss of license to operate imposed by local communities and/or governments;
- Damage to company reputation from poor environmental performance;
- Lost market opportunity from failure to meet customer environmental requirements;
- Higher cost of capital due to poor environmental track record;
- Changes to cost structure from unanticipated regulatory requirements;
- Potential use conflicts with other industries; and
- Vulnerability of coastal infrastructure to sea level rise, storm surges, etc.

Opportunities:

- Cost savings from resource efficiency;
- Access to expanded and premium markets through enhanced reputation and brand;
- License to operate and policy influence from good relationships with governments and communities;
- Access to areas and resources for business activities based on good environmental track record;
- Continued availability of critical ecosystem resources required for industry;
- New markets based on strong regional needs for environmental solutions;
- Innovation emerging from environmental standards and sustainability trends; and
- Access to new forms of capital from socially and environmentally responsible investors.

Beyond simply being a collection of coastal and marine industries, blue economy is the **set of environmentally and socially sustainable commercial activities, products, services and investments dependent on and impacting coastal and marine resources.** Activities that erode natural capital through degradation of ecosystem services are inherently not sustainable, and not "blue". Four key elements are present in coastal and marine economic activities that can be considered blue economy:

1. **Protects, restores and sustains healthy coastal and marine ecosystem services;**
2. **Generates sustainable, equitable economic benefit and inclusive growth;**
3. **Integrates approaches between multiple industries and government; and**
4. **Innovates, informed by the best available science.**

As ocean health continues to rise on the agenda with policymakers, new developments, such as ASEAN economic integration, governance of activity in sea areas beyond national jurisdiction, innovative new financing mechanisms for coastal investment and the accelerating effects of climate change could have profound impacts on growth and investment in a blue economy.

There is a significant need for private sector capital and expertise to scale up blue economy investments for the benefit of both communities and companies. Blue economy investments are those that consider environmental and social impacts and build the long-term ecological, social and economic health of coastal and marine ecosystems and communities. This report identifies 10 categories of blue economy-related investment needs highlighted by governments across East Asia:

- Coastal Transport
- Ecotourism/Sustainable Tourism
- Energy
- Enterprise and Livelihood Development
- Fisheries and Food Security
- Habitat Protection, Restoration and Management
- ICM Development and Implementation
- Natural and Man-made Hazard Prevention and Management
- Pollution Reduction and Waste Management
- Water Use and Supply Management

As a global leader in several coastal and marine industries, East Asia relies on a healthy ocean economy. But as the natural capital that industry depends on continues to erode, so too will the health of these industries. The only way to ensure the long-term sustainability of both ecosystems and the economy is by transitioning from an ocean economy to a blue economy.

Blue economy is a process, and we don't know where it will lead next. Can a blue economy offer more than simply doing less harm? Can it be something truly transformational, and sustainable? We believe that the success of integrated coastal management (ICM) and other efforts in the region over the past two decades demonstrates that it can. This report is intended to provide an understanding of blue economy and the opportunity it represents, and we invite you to join PEMSEA and other organizations, governments and companies as we work together to build a blue economy in East Asia.

01

INTRODUCTION

Oceans cover more than 70 percent of the planet's surface, yet only 5 percent of the world's oceans have been explored. As our technology improves, along with our understanding of oceans and their complex interaction with the land at the coastal interface, so too does our ability to utilize and exploit coastal and marine resources. In the context of global megatrends such as population growth, migration to coastal cities, climate change and concerns about food security and energy demands, our relationship with the sea becomes all the more complex. It is clear that our current use of coastal and marine ecosystems is outstripping their ability to sustainably provide critical services.

Coasts and oceans are receiving increasing attention in the media and in national and international policy discussions. More countries are developing national ocean policies to protect their coastal and marine ecosystems, while, at the same time, viewing oceans as a relatively untapped source of economic growth. "Blue economy" has become a popular term for this emerging focus on coasts and oceans as a sustainable driver of economic growth. While the concept of blue economy has been around for 20 years, no shared definition yet exists, with several organizations and governments developing their own understanding of what it means.

In July 2012, at the Fourth Ministerial Forum on the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA), Ministers from 10 countries including Cambodia, China, Indonesia, Japan, Lao PDR, the Philippines, RO Korea, Singapore, Timor-Leste and Viet Nam signed the "Changwon Declaration Toward an Ocean-based blue economy: Moving Ahead with the Sustainable Development Strategy for the Seas of East Asia." As expressed in the Changwon Declaration, PEMSEA believes that blue economy offers a useful framing and organizing principle for the sustainable development of coastal and marine resources.

With a growing global population, mounting pressure on the existing resource base and increasing access to coastal and marine environments through technological advances, accelerated development and exploitation of coasts and oceans is a certainty. The question of blue economy is a question of how that development will occur, and whether it can be sustained. What lessons can we learn from previous experiences, and mistakes made, in the development of land-based resources?

In accordance with the Changwon Declaration, this report centers on one sector that plays a fundamental role in the economy, but which has received lesser attention thus far in the blue economy discussion: *business*. We focus specifically on businesses operating in coastal and marine areas in East Asia, a region where the seas are essential to the lives and economies of its people. From the perspective of industry, the report aims to define and establish an understanding of the importance of blue economy and how it might impact various industries and, ultimately, provide a roadmap to help companies make better decisions to position themselves competitively in the growing blue economy.

02

VALUING COASTAL AND MARINE ECOSYSTEM SERVICES

Coasts and oceans are some of the most productive ecosystems on the planet, providing a rich array of services that directly and indirectly contribute to human survival and quality of life, supporting local coastal communities and their larger national economies. For instance, coral reefs provide habitat for fish, a staple food source for 1 billion people in developing countries who depend on seafood for their primary source of protein.[1] Mangroves minimize coastal erosion and act as a natural barrier against storms and flooding, a growing concern due to the impacts of climate change. Seagrass beds help to regulate climate change by sequestering carbon dioxide from the atmosphere, up to twice as much as the world's temperate and tropical forests.[2] Examples of coastal and marine ecosystem services include:

- Food from wild-catch fisheries and aquaculture;
- Weather regulation and protection from natural hazards (e.g., storms and floods);
- Carbon sequestration by mangroves, seagrass beds and salt marshes;
- Energy from offshore oil, wind and waves;
- Shoreline stabilization and erosion control;
- Regulating and processing nutrients and waste in the environment;
- Formation of sand, soil and other sediments;
- Pharmaceutical and other biotechnology products;
- Trade through shipping and ports; and
- Tourism, recreation and spiritual value.

The services provided by marine ecosystems are the foundation for an enormous amount of economic activity. According to the World Wide Fund for Nature (WWF), coastal and oceanic environments are valued conservatively at US$2.5 trillion annually,[3] and the United Nations Environment Programme (UNEP) estimates that over 60 percent of the world's total gross national product comes from areas within 100 kilometers of the coastline.[4] Oceans play a key role in global supply chains, with 90 percent of trade moving by marine transportation.[5] Over 30 percent of global oil and gas production is from offshore sites.[6] Worldwide revenue from seafood amounts to more than US$190 billion, while marine and coastal tourism generate US$161 billion annually.[7] Fishing, aquaculture and tourism combined provide over 300 million jobs worldwide.[8] As much as any region in the world, East Asia relies on these and other coastal and marine industries to help drive its sustained economic growth.

Central Role of Coasts and Oceans in East Asia

The seas of East Asia cover a total area of 7 million km^2 fed by 8.6 million km^2 of major river basins, such as the Mekong, Yangtze, Yellow and Red. The region spans 6 shared large marine ecosystems including the Yellow Sea, East China Sea, South China Sea, Gulf of Thailand, Sulu-Sulawesi Seas and Indonesian Sea. Its coastline spans 235,000 km, stretching from Japan, China, DPR Korea and RO Korea, down through Southeast Asia, from Thailand to the Philippines and Malaysia across Indonesia to Timor-Leste.[9] Of the

world's 28 megacities (with population more than 10 million), 9 are located on the coasts of East Asia, along with another dozen cities of more than 5 million residents.[10]

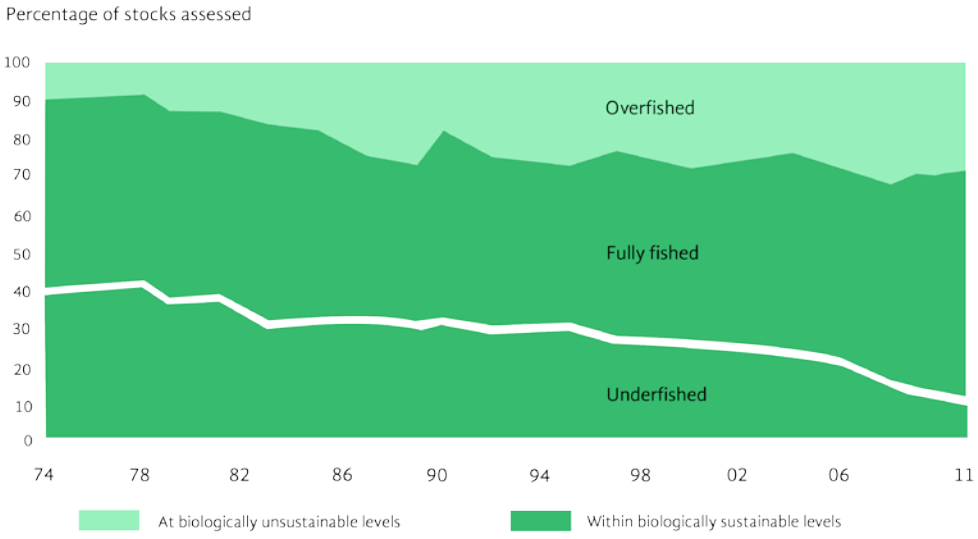
Ecologically speaking, the coastal and marine environment in East Asia is one of the richest areas in the world. The region is home to over one third of all coral reefs and mangroves and the highest levels of biodiversity for coral reef fish, mollusks, mangroves and seagrass species.[11, 12] This ecological abundance provides the foundation for economic development. For example, the annual economic benefit per square kilometer of healthy coral reef in Southeast Asia (e.g., from tourism and coral reef fisheries) ranges from US$23,100 – US$270,000.[13] East Asia is the top region globally for seafood exports, with China, Thailand and Vietnam as the 3 leading seafood exporting countries.[14] Overall, the region accounts for 83 percent of the world's aquaculture products and over 32 million tons of annual fish catch. The region continues to enjoy healthy overall economic growth, with 6.9 percent growth expected by the end of 2015.[15] Marine and coastal industries such as ports and shipping, fishing and coastal tourism comprise 15 to 20 percent of the GDP in some East Asian countries.[16]

Threats to Coasts and Oceans

This economic growth has come at a cost to the ecosystems on which it depends. Human activities and increasing demands for land, water, food and other resources are putting additional pressure on already strained coastal ecosystems, leading to an overall decline in ocean health at rates never before seen.

According to the United Nations, 88 percent of coral reefs in Southeast Asia are under threat, while globally, 20 percent have already been lost. Mangrove forests have been reduced to 30 – 50 percent of their historical coverage.[17] The Food and Agriculture Organization (FAO) of the United Nations reports that, as of 2011, 90 percent of global fish stocks were overfished or fully fished.[18] Destructive fishing practices, from industrial-scale bottom trawling to dynamite fishing by local fishers, continue to degrade marine habitats and reduce the productivity of fisheries.

Figure 1. Global trends in the state of world marine fish stocks, 1974-2011



Notes: Dark shading = within biologically sustainable levels; light shading = at biologically unsustainable levels. The light line divides the stocks within biologically sustainable levels into two subcategories: fullyfished (above the line) and underfished (below the line).

Source: FAO

Marine litter is a growing problem, with ocean plastics a particular concern. An estimated 8 million metric tons of plastic enters the ocean every year, forming great "plastic gyres" in seas around the globe.[19] Scientists have reported that the sea's acidity level has risen 26 percent since pre-industrial times, with widespread impacts on marine ecosystems and the goods and services they provide.[20] It is estimated that around 10 percent of the Arctic Ocean will be corrosive enough to dissolve the shells of sea creatures by 2018.[21] Add to this list the loss of seagrasses, changing weather patterns and more frequent extreme

weather events, rising sea levels, coastal erosion, saltwater intrusion into groundwater, nutrient and chemical pollution and the spread of marine invasive species, and it is clear that coasts and oceans face an onslaught of interrelated threats.

Coastal and marine environments represent a "tragedy of the commons", where otherwise rational actions by individuals, companies and governments end up depleting a common resource to the detriment of the greater group. Coastal and marine areas are interlinked, complex systems where solutions to one problem can cause other unintended or unforeseen consequences. For example, global demand for shrimp has spurred the growth of commercial shrimp farms throughout the region. This takes pressure off wild-caught shrimp, but can result in conversion of mangrove forests and other threatened aquatic ecosystems into shrimp farms, destroying nursery habitat for other species, making coastal areas more vulnerable to storms and exacerbating pollution and climate change. It has also introduced negative social impacts, where some companies in Southeast Asia have used "slave labor" to catch fish for the meal fed to farmed shrimp — a revelation that impacted some of the largest retailers in the US and Europe.[22]

According to the United Nations Development Programme (UNDP), overall, the impacts from overfishing, coastal hypoxia and eutrophication, invasive aquatic species, coastal habitat loss and ocean acidification cost the global economy at least US$350 billion – US$940 billion every year.[23]

The Importance of Ecosystems for Business

At a global scale, megatrends such as population growth, urbanization, resource scarcity and interrelated dependencies between water, energy and food security are changing the natural and economic landscape. Our collective global ecological footprint now exceeds the planet's carrying capacity by more than 50 percent.[24] The World Economic Forum lists extreme weather, failure to adapt to climate change and ecosystems collapse on its 2015 list of top risks over the next 18 months to 10 years.[25] Warnings from bodies such as the Intergovernmental Panel on Climate Change (IPCC) are becoming increasingly stern — including predictions as dire as 40 to 60 percent declines in fish catches in some areas of the tropics due to climate change.[26]

Traditionally considered "externalities" in economic terms, these environmental and social impacts can cause a decline in ecosystem services and degradation of the natural capital that is the basis for all economic activity. The concepts of sustainable development, ESG (Environmental, Social and Governance), sustainability and shared value have all emerged as approaches for internalizing these externalities and managing ecosystem service-related risks and opportunities.

Business Risks Related to Ecosystem Services

As shown in Table 1, companies are exposed to a number of operational, regulatory, reputational, market and financial risks related to proper management of ecosystem services.[27] According to research by McKinsey & Company, business value related to these risks could be as high as 25 to 70 percent of earnings before interest, taxes, depreciation and amortization (EBITDA).[28] Examples include the following:

- Over the past 13 years, the average annual volatility of resource prices has been almost three times what it was in the 1990s.[29]
- Companies exhibiting poor environmental performance or not disclosing their performance may be subject to higher cost of capital. A review by Deutsche Bank found that firms with higher ratings for ESG factors have a lower cost of capital in terms of both debt and equity.[30]
- Shareholders are calling for more transparency and accountability around companies' social and environmental performance. Publicly-listed companies on the Singapore Exchange (SGX), for instance, will be required to publish sustainability reports or explain why they are not publishing.
- Company reputation on environmental and social performance matters to increasing numbers of consumers and investors. Nearly 80 percent of corporate value reflected in the S&P 500 now resides in intangible assets, including reputation.[31]
- Paul Polman, the head of Unilever, has said that climate change is already costing his business hundreds of millions of dollars every year.[32]

Table 1. Types of risks and opportunities arising from trends in ecosystem services.

Type	Risk	Opportunity
Operational	• Increased scarcity or cost of inputs • Reduced output or productivity • Disruption to business operations	• Increased efficiency • Low-impact industrial processes
Regulatory and legal	• Extraction moratoria • Lower quotas • Fines • User fees • Permit or license suspension • Permit denial • Lawsuits	• Formal license to expand operations • New products to meet new regulations • Opportunity to shape government policy

Type	Risk	Opportunity
Reputational	• Damage to brand or image • Challenge to social "license to operate"	• Improved or differentiated brand
Market and Product	• Changes in customer preferences (public sector, private sector)	• New products or services • Markets for certified products • Markets for ecosystem services • New revenue streams from company-owned or managed ecosystems
Financing	• Higher cost of capital • More rigorous lending requirements	• Increased investment by progressive lenders and socially responsible investment funds

Source: WRI, WBCSD

Vulnerability of infrastructure and operations to extreme weather and other impacts of climate change has become a serious concern for business. In early 2015, top insurers from around the world called on governments to step up efforts to build resilience against natural disasters, highlighting that average economic losses from disasters in the last decade amounted to around US$190 billion annually.[33] Most of the large cities at extreme risk from climate change are located in Asia, and by midcentury could face annual disaster losses in excess of US$19 billion.[34] This is especially concerning for coastal areas. Based on predictions for sea level rise, the Organization for Economic Co-operation and Development (OECD) finds that the total assets vulnerable to flooding and storm surges in 10 megacities around the world could account for 9 percent of the world's GDP by 2070.[35]

Risks Identified by Companies

The greatest risks related to sustainable development of coasts and oceans that were identified by companies surveyed for this report include:

- Lack of financial resources to devote to sustainable development;
- Lack of public awareness about sustainable practices (by consumers and communities);
- Pressure from competitors following unsustainable practices; and
- Challenges in establishing effective partnerships with government and NGOs.

Opportunities in Healthy Ecosystems

Proper management of ecosystem services is not just about mitigating and avoiding risks, it is also about opportunities. At the most basic level, companies comply with laws governing proper management of environmental and social concerns. The payoff at this level is simply avoiding legal and financial repercussions. But research has shown that companies incorporating sustainability considerations more strategically into their operations can realize a number of benefits, including:

- Reduced costs through efficiency;
- A differentiated employment proposition and more engaged workforce;
- Stronger relationships with communities and government, and the social license to operate that comes with it;
- Greater levels of innovation;
- Enhanced reputation;
- Access to new markets; and
- Access to new sources and lower cost of capital.[36]

These potential opportunities arise from a business approach that considers stakeholders and forms of capital other than just financial — which, in the end, can improve financial performance. The NGO Natural Capitalism Solutions cites more than 50 studies demonstrating that companies that lead on environmental and social performance financially outperform their less sustainable peers.[37]

Up until recently, companies in Asia have generally lagged in their sustainability efforts relative to U.S. and European peers. But they are quickly catching up. The past few years have seen a dramatic increase in the number of Asian companies publishing sustainability reports.[38] One survey of companies found that 95 percent of respondents from Asia believed the delivery of sustainable products is a key factor for the successful performance of their business, 10 percent more than their European counterparts.[39]

Interface, a carpet manufacturer based in the United States, pioneered a model for closed-loop production of carpets working with coastal communities in the Philippines. Partnering with the Zoological Society of London, a yarn producer and a marine NGO, the company sources raw material from coastal communities that clean and bale discarded nylon fishing nets collected from reefs and beaches. The nets are recycled into new carpet fiber, a process that emits almost 3/4 less greenhouse gas emissions than making polyester from virgin petrochemicals, reduces the cost of inputs and provides livelihoods for local communities.

03

INTEGRATED MANAGEMENT OF COASTS AND OCEANS

Coastal and marine industries, by and large, are concerned with activities within the exclusive economic zone (EEZ), an area up to 200-miles from shore where regulation is dictated by the UN Convention on the Law of the Sea (UNCLOS). Traditionally, commercial activity in the EEZ has been managed with little coordination between governing agencies and industries, potentially putting sectors at odds — for example, shipping lanes conflicting with aquaculture operations or pollution impacting ecotourism sites. As The Economist Intelligence Unit emphasizes in their recent report on blue economy, sustainable growth is more likely to take place in the context of well-developed regulatory frameworks for integrated coastal and ocean management.[40]

Integrated coastal management (ICM) was pioneered in East Asia by Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) over 20 years ago. ICM addresses the governance of human activities affecting the sustainable use of goods and services generated by coastal and marine ecosystems. Built on a foundation of science-based decision making and multisector stakeholder participation, ICM operationalizes ecosystems-based approaches through a systematic cycle and supporting tools, including marine spatial planning (MSP). ICM provides:

- A mechanism for stakeholder engagement in development of coastal governance;
- A guiding framework for policy design, strategy development and capacity building; and
- A means for companies to engage with government at the local and national levels.

ICM has been applied in dozens of sites across East Asia, covering more than 31,000 km of coastline and benefitting tens of millions of people living in coastal and watershed areas. ICM helps companies, local governments and other stakeholders to achieve environmental, social and economic development targets in a number of areas:

- Food security and livelihoods;
- Pollution reduction and waste management;
- Freshwater use and supply;
- Habitat protection and restoration; and
- Natural and man-made hazard prevention and management.

To support improved measurement and management in coastal areas, PEMSEA also developed a State of the Coasts (SOC) reporting system, including a set of indicators used to monitor governance and social, economic and environmental changes in coastal systems. In combination with an Integrated Information Management System (IIMS) developed for the coastal and marine environment, SOC reporting provides a comprehensive evaluation process for ICM implementation that serves as a basis for reviewing and improving the management of coastal resources.

By June 2015, ICM programs covered approximately 14 percent of the coastline of East Asia. In late 2015, countries are expected to commit to expanded ICM programs to cover at least another 11 percent of the coastline for total coverage of 25 percent of the region's coastline by 2021.[41]

In Xiamen, China, one of PEMSEA's first ICM sites, the waterfront was suffering from severe pollution and sea use conflicts in the 1980s. Over several cycles of ICM, the coastline of Xiamen has been transformed into a model for ecological and economic success, providing opportunities for leisure and tourism, residential real estate, a venue for industries and a home for rich biodiversity, including the return of the Chinese White Dolphin. According to one study, every dollar invested in ICM in Xiamen has returned seven dollars in economic benefit to the city.

04

THE EMERGENCE OF BLUE ECONOMY

Blue economy has gained prominance over the past few years, making appearances in an increasing number of policy discussions, conferences, publications and agreements. The concept has struck a chord with a number of groups, with the promise of moving the agenda forward on important coastal and marine aspects of the broader sustainable development conversation. But with this interest has come some confusion about what blue economy means and how it can be applied.

Developing a shared understanding of blue economy is essential as economic development of coastal and marine areas continues. To better appreciate the meaning and role of a blue economy, it is helpful to understand where it originated and how it is being used by various groups.

The First Blue Economy: A Model for Innovation

Some confusion around blue economy arises from two different, but somewhat overlapping, uses for the term — one focused on the marine environment, the other, business models and innovation.

The term "blue economy" was first introduced in 1994 by Professor Gunter Pauli, who was asked by the United Nations to consider how business models at the time might evolve. In response, Pauli established the Zero Emissions Research and Initiatives (ZERI), a "global network of creative minds seeking solutions to world challenges", and developed a set of Blue Economy Principles for sustainable business focused on local, science-based solutions, natural cycles and materials, innovation, diversity, and questioning basic assumptions about the traditional economy.

In Pauli's view, the blue economy introduced innovations inspired by nature, generating multiple benefits including jobs and social capital. The concept was not geared towards large companies with established business models. Instead, it was intended to offer a platform of ideas to inspire entrepreneurs to produce competitive business models offering value to the market at the lowest price by introducing innovations that generate multiple benefits, not just increased profits.

This focus on sustainable business and economic growth, and its link to natural systems, are shared by the proponents of the later definition for blue economy — one that focuses on the marine environment.

Blue Economy in the Marine Context

The term blue economy as applied to the coastal and marine environment first gained prominence much later, around the 2012 United Nations Conference on Sustainable Development held in Rio de Janeiro, also known as "Rio+20". In a paper published by the University of Guelph, researchers track the evolution and use of blue economy in the lead up to Rio+20.[42] The paper finds that blue economy was raised in

connection with the conference's theme of "green economy" that emphasized "eradicating poverty as well as sustained economic growth, enhancing social inclusion, improving human welfare and creating opportunities for employment and decent work for all, while maintaining the healthy functioning of the Earth's ecosystems." This green economy movement viewed natural systems in economic terms, with the potential for market-based solutions to protect these systems.

Rio+20 participants' use of blue economy followed four differing themes: (1) oceans as natural capital; (2) oceans as good business; (3) oceans as integral to Pacific Small Island Developing States; and (4) oceans as small-scale fisheries livelihoods. Despite efforts to bring more specific meaning to the term, a consensus never emerged from the conference.

Following Rio+20, a number of international organizations have taken up the call for blue economy including UNDP, Asia-Pacific Economic Cooperation (APEC) and FAO, along with governments in the East Asian seas region.

UNDP blue economy: Ocean development spaces

In a concept paper published by UNDP, the authors describe blue economy as constituting a sustainable development framework that addresses equity in access to, development of and the sharing of benefits from marine resources. They view blue economy as conceptualizing "oceans as 'Development Spaces' where spatial planning integrates conservation, sustainable use, oil and mineral wealth extraction, bio-prospecting, sustainable energy production and marine transport. The blue economy breaks the mould of the business as usual 'brown' development model where the oceans have been perceived as a means of free resource extraction and waste dumping; with costs externalized from economic calculations." In the view of UNDP, this blue economy approach should incorporate ocean values and services into economic modeling, policy- and decision-making processes — from infrastructure development and trade to resource extraction and energy production — decoupling socioeconomic development from environmental degradation.

The UNDP paper goes on to discuss how, similar to green economy, blue economy incorporates the same principles of "low carbon, resource efficiency and social inclusion, but grounded in a developing world context and fashioned to reflect the circumstances and needs of countries whose future resource base is marine." Critically important is the principle of equity, ensuring that developing countries receive benefits from the sustainable development of their marine resources and have their interests properly reflected in the development of seas beyond national jurisdiction.

APEC blue economy: Fostering economic growth

Blue economy aligns well with APEC's core agenda focused on investment and trade facilitation, and several APEC economies have made efforts to better understand and advance the topic since 2011. As recent as 2014, blue economy projects have been listed as "Rank 1 APEC-funded Projects". At the APEC Ocean-related Ministerial Meeting in 2014, Ocean Ministers issued the "Xiamen Declaration" calling for, among other things, cooperation on the blue economy in the Asia-Pacific region.[43] APEC sees a role for itself in supporting regional cooperation on blue economy, documenting and sharing concrete examples of good practice and promoting the facilitation of investments in the application of environment-friendly technologies in marine industries.

The APEC Ocean and Fisheries Working Group (OFWG), which leads its efforts on blue economy, has developed a view of blue economy as "an approach to advance sustainable management and conservation of ocean and coastal resources and ecosystems and sustainable development, in order to foster economic growth." The OFWG is exploring a Blue Economy Model Program that could include efforts related to "blue carbon" and the valuation of "blue capital."

FAO blue economy: Harnessing the potential of oceans, seas and coasts

According to FAO, the organization has "embraced the blue economy concept into its Global Initiative on Blue Growth in support of food security, poverty alleviation and sustainable management of aquatic resources." This initiative is designed to assist countries in developing and implementing the blue economy agenda, which in FAO's view, focuses on harnessing the potential of oceans, seas and coasts by:

- Eliminating harmful fishing practices and overfishing, promoting improved conservation and building sustainable fisheries;
- Ensuring tailor-made measures that foster cooperation between countries; and
- Acting as a catalyst for policy development, investment and innovation in support of food security, poverty reduction and the sustainable management of aquatic resources.

FAO emphasizes that blue economy is not in addition to the broader sustainable development agenda, but is a central part of it.

Blue economy initiatives by East Asian countries

A handful of countries in East Asia have proactively embraced the blue economy concept. In 2010, China created its first Blue Economic Zone in the Shandong Peninsula, one of 3 pilot zones for the development of China's marine economy, to spur growth in maritime industries, such as equipment manufacturing, oceanic chemicals, fishing, transport and tourism. The zone covers 160,000 km^2 of offshore waters and 64,000 km^2 of land in 6 cities and 2 coastal counties.[44] According to China's State Oceanic Administration (SOA), the country's share of GDP from its marine economy rose steadily from 2001 to 2012, up from 8.68 percent to 9.65 percent.[45] China has also established itself as the annual host for an APEC Blue Economy Forum, held in the coastal city of Xiamen.

As an archipelago of 17,508 islands, where two-thirds of the territory is ocean, Indonesia views blue economy as a means to advance conservation and sustainable management of oceans, fisheries and aquaculture in support of sustainable development and economic growth of the country. With the fisheries and aquaculture sector playing an important role in Indonesia's economy at 3 percent of GDP, the government is looking to promote blue economy models of investment and business, including district-level programs for shrimp and seaweed aquaculture and grouper and lobster mariculture. The government has committed to creating a Blue Economy Zone with integrated land- and ocean-based development, applying ICM with pilot projects on the islands of Bali and Lombok.

Several other countries in the region are taking collaborative action towards advancing development of blue economy. In the 2012 Changwon Declaration, Ministers from 10 countries including Cambodia, China, Indonesia, Japan, Lao PDR, the Philippines, RO Korea, Singapore, Timor-Leste and Viet Nam developed a working definition for blue economy as "a practical ocean-based economic model using green infrastructure and technologies, innovative financing mechanisms and proactive institutional arrangements for meeting the twin goals of protecting our oceans and coasts and enhancing its potential contribution to sustainable development, including improving human well-being, and reducing environmental risks and ecological scarcities."

Growing Interest in Blue Economy by Companies

While the concept of blue economy has remained largely the domain of government and international organizations, the private sector has increasingly shown interest in the topic. The Economist Group, for instance, has devoted more coverage to oceans and blue economy, with a bi-annual World Ocean Summit, themed "Blue economy; blue growth" in 2015. In a recent report entitled simply "The blue economy", The Economist offers its working definition for blue economy: "A sustainable ocean economy emerges when

economic activity is in balance with the long-term capacity of ocean ecosystems to support this activity and remain resilient and healthy."

The World Ocean Council (WOC), positioned as an international alliance for private sector leadership and collaboration in "Corporate Ocean Responsibility," was established in 2008 and now has more than 70 member companies worldwide. Its members come from a number of industries related to coasts and oceans, including oil and gas, shipping, seafood, fisheries, aquaculture, mining, renewable energy, ocean technology, maritime law and marine environmental services. WOC hosts an annual summit, with the theme for 2015, "Industry leadership in ocean governance and the blue economy."

05

TOWARDS AN INTEGRATED DEFINITION OF BLUE ECONOMY

Arriving at a shared definition for blue economy is a challenge given the varied contexts and priorities among those working to promote the concept. That said, organizations that have taken up the marine perspective on blue economy seem to be fairly well aligned. Previous work by governments and international organizations provides a good foundation, but we believe a succinct, practical understanding and definition for the private sector will be useful for companies interested in the potential of the blue economy.

The National Ocean Economics Program (NOEP) has been conducting research to better understand what it terms the "ocean economy." Examples of definitions from East Asia cited by NOEP include:

- **China:** the sum of all kinds of activities associated with the development, utilization and protection of the marine environment.
- **Japan:** industry exclusively responsible for the development, use, and conservation of the ocean.
- **South Korea:** economic activity that takes place in the ocean, puts goods and services into ocean activity, and the activity that uses the ocean resources as an input.

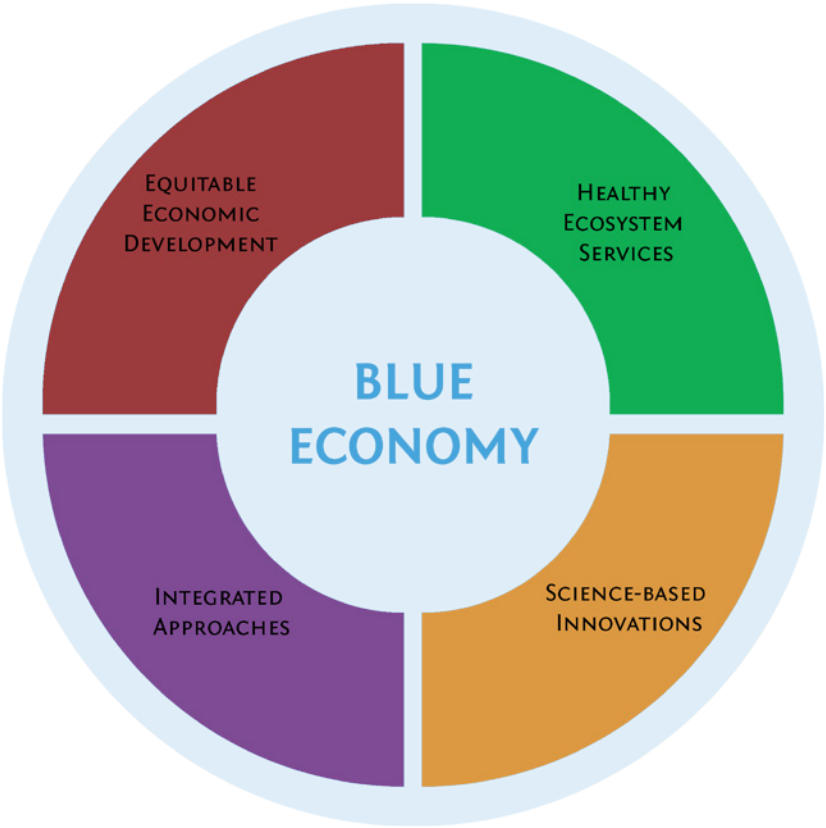
In accordance with the Changwon Declaration, PEMSEA's definition of blue economy implies something more than business (or ocean economy) as usual — it includes an emphasis on the protection and health of coastal and marine ecosystems and communities. Blue economy is not just about economic activity in coastal and marine areas, but activity that is sustainable — environmentally, socially and economically. More than simply representing a "greening" of the ocean economy, we find blue economy to be a useful and needed organizing principle for sustainable management of coastal and marine areas.

Based on our research and experience, we suggest that blue economy for business is the **set of environmentally and socially sustainable commercial activities, products, services and investments dependent on and impacting coastal and marine resources.**

Four key elements are present in coastal and marine economic activity that can be considered blue economy:

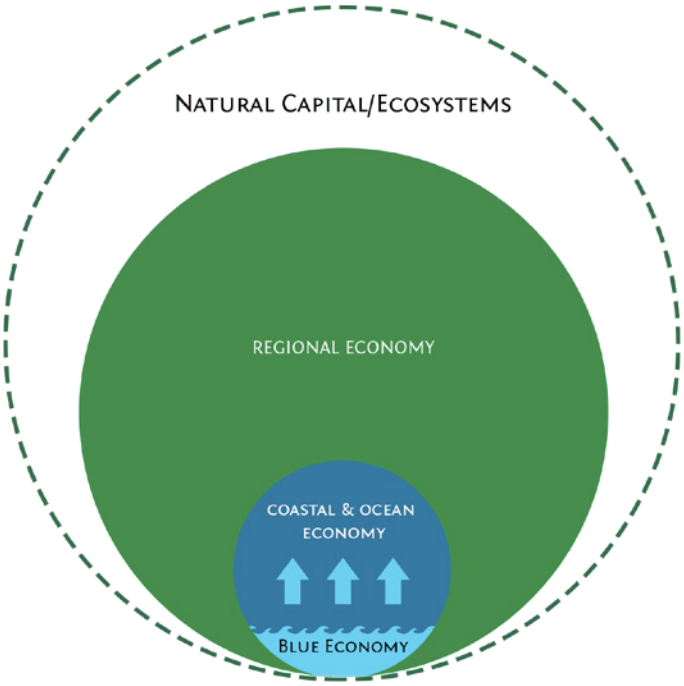
1. **Protects, restores and sustains healthy coastal and marine ecosystem services;**
2. **Generates sustainable, equitable economic benefit and inclusive growth;**
3. **Integrates approaches between multiple industries and government; and**
4. **Innovates, informed by the best available science.**

Figure 2. Elements for a blue economy



True blue economy activity considers the value of coastal and marine natural capital by internalizing otherwise unaccounted for externalities. Activities that erode natural capital through degradation of ecosystem services are inherently not sustainable, and not blue. As a complex system, blue economy cannot be generated or maintained by government alone, nor by any one industry. Fisheries and aquaculture, for example, cannot achieve truly sustainable economic activity without engaging with other industries in the region, such as oil and gas or shipping. Industry relies on the government to establish effective governance and the right institutional safeguards, and government looks to industry to provide its technical and investment expertise, and to "play by the rules" in protecting and sustaining ecosystem services in its activities.

Figure 3. From a coastal & ocean economy to a blue economy



Blue economy is not restricted to areas covered with water, but includes coastal economic activity that is linked to the ocean. At present, the region has a strong coastal and ocean economy, but blue economy represents only a small portion of this. Given all the threats to the sustainability of the coastal and ocean economy, and its significance to the regional economy, we must find ways to turn more of the coastal and ocean economy blue.

Company awareness and perception of blue economy

Companies in industries ranging from shipping, coastal tourism, seafood, coastal construction, oil and gas and environmental services report that they are unaware of the term blue economy or its use —underscoring the fact that blue economy has been almost exclusively a discussion within government and international organizations. Companies interviewed conjectured that blue economy consists of the following elements:

- "Related to the green economy, but focused on ocean ecosystems"
- "Tapping the marine sector, developing products and business services that make use of oceans"
- "Developing sustainable coastal projects and partnership between industries and communities"
- "Helping to enhance local industry in an environmentally sustainable way"
- "Economic benefits from protecting and sustainably managing the marine environment"

06

BLUE ECONOMY INDUSTRIES

To better understand blue economy, it is instructive to explore its constituent industries. Coastal and marine areas support a wide variety of established industries, such as shipping, fisheries and coastal tourism, and advancing technology is allowing us to access new resources through emerging industries, such as renewable energy, pharmaceuticals and seabed mining.

Nine primary industries are identified as key for growing a blue economy, based on their dependence or impact on coastal and marine areas. Industries are clustered by similar operating and ecosystem considerations. Consistent with our proposed definition for blue economy, this includes industries that operate in, supply products and services to, or source from, coastal and marine areas. While the broader blue economy includes significant contribution from government and non-profit sectors (e.g., security and defense, navigation and safety, coastal and marine environmental protection and construction of large-scale public works projects), for this report, we focus strictly on commercial/private industry.

Table 2. Blue economy industries

1	Fisheries and Aquaculture
2	Ports, Shipping and Marine Transport
3	Tourism, Resorts and Coastal Development
4	Oil and Gas
5	Coastal Manufacturing
6	Seabed Mining
7	Renewable Energy
8	Marine Biotechnology
9	Marine Technology and Environmental Services

The following profiles provide an overview of the economic significance of each industry, primary threats facing the sustainability of each and examples of the resulting business risks and opportunities. The examples reveal how blue economy as an approach supports better decision making and management of risks and opportunities through its 4 elements:

1. Sustaining the coastal and marine ecosystems that each industry relies on;
2. Maintaining the ongoing social and political capital necessary to conduct, and grow, business;
3. Addressing risks that cannot be solved by each industry alone and creating opportunities for collaborative relationships across industries and governments; and
4. Generating new, creative solutions, products and services.

Fisheries and Aquaculture

Driven by demand from a global population over 7 billion, of which 4.3 billion rely on fish for 15 percent of their animal protein intake,[46] the fisheries and aquaculture sector is critical for global food security and sustained economic development.

According to FAO, 8 of the top 15 marine capture fish-producing countries in the world are in East Asia.[47] China has been responsible for the majority of growth in fish availability worldwide based on its expansion in fish production, particularly from aquaculture. By 2030, the World Bank anticipates that aquaculture will support around two-thirds of global fish consumption.[48] Asia has been producing more farmed fish than wild catch since 2008, with aquaculture accounting for 54 percent of its total fish production in 2012.[49] Fisheries are a significant employer in the region, with Asia accounting for 68 percent of the global fishing fleet and 84 percent of all people employed in the fisheries and aquaculture sector worldwide.[50]

On the demand side, fish consumption has doubled in Asia over the past 30 years as rising incomes have enabled people to purchase their preference of more nutritious, higher value foods such as fish.[51] The World Bank estimates that by 2030, Asia will consume 70 percent of fish globally.[52] In addition to fish used for human consumption, 7 of the world's top 10 fisheries (by volume) target "low trophic level" fish, 90 percent of which are processed into fishmeal and fish oil.[53] Fish is a significant global trade item with around 37 percent of fish production being traded internationally in 2013, valued at US$136 billion.[54]

Globally, fisheries are under siege. Unsustainable levels of fishing activity and the effects of marine pollution and climate change on fish habitats have all led to a decline in fish stocks. Worldwide, 85 percent of fisheries have been pushed to or beyond their biological limits.[55] An often cited World Bank report from 2009 found that, worldwide, the lost economic value of overfished stocks is around US$50 billion annually.[56]

Illegal, unregulated and unreported (IUU) fishing presents a major threat to fisheries health. In addition to using unsustainable methods for catching fish, IUU fishing makes it difficult to effectively measure and manage healthy fisheries. Unsustainable fishing practices increasingly represent a business risk. The European Union, a US$200 million annual seafood market for the Philippines, gave the country a yellow card fisheries rating in 2014, presenting a significant potential loss of market access.[57] The yellow card was lifted in 2015 based on new reforms by the Philippines to curb IUU. An estimated 20-32 percent of wild-caught seafood imported into the U.S. is illegal.[58] In late 2014, the U.S. issued a plan to fight illegal fishing including improved detection of black market fishing and seafood fraud, strengthened enforcement and traceability.[59]

Sustainable fisheries present a substantial unrealized economic benefit. It is estimated that wild fish production could rise by as much as 15 percent and profits by a factor of 2.5 if fisheries were managed sustainably.[60] In addition to good environmental management supporting the long-term productivity of fisheries, it also generates new market opportunities for seafood products. A growing segment of consumers are insisting on good environmental and social practices in seafood supply chains. In response, major retailers in the U.S. such as Whole Foods Market and Wegmans are imposing requirements for their seafood suppliers and offering "sustainable seafood" options to consumers. In addition to wild catch fisheries, practices such as integrated multi-trophic aquaculture (IMTA) offer new prospects for sustainable aquaculture production for ocean-based protein.[61]

Risks:

- Increased operating costs from decline in fish stock productivity or unrecoverable decline in stocks
- Disruption to business operations or legal action from social or environmental incidents
- Lower quotas or loss of license to operate imposed by local communities and governments
- Damage to company reputation and loss of market share

Opportunities:

- Continued access to fish stocks in governed waters
- Partnerships with governments and other companies to ensure long-term sustainability of fisheries
- Access to expanded and premium markets through enhanced brand
- Access to capital from socially and environmentally responsible investors for fisheries improvement

Unilever, one of the largest buyers of fish in the world, has committed to buying fish from sources certified by the Marine Stewardship Council (MSC) as following environmentally responsible practices.[62] MSC has already certified 10 percent of the global seafood market,[63] including 8 tuna canners responsible for 70 percent of global tuna consumption that have committed to upholding the standards of sustainable fishing.[64] Similar to MSC, the Global Aquaculture Alliance has developed a set of Good Aquaculture Practices (GAP). Red Lobster, the largest seafood restaurant chain in the U.S., requires its suppliers in Asia and elsewhere to comply with Global Aquaculture Alliance standards.[65]

Ports, Shipping and Marine Transport

90 percent of all goods in the world are transported via shipping.[66] As port traffic growth has slowed in other parts of the world, the shipping industry in Asia continues to grow. In 2012, 4 out of the top 6 shipping economies in the world were in East Asia.[67] 9 of the top 10 busiest container ports (by volume) are in East Asia, 6 of them in China.[68] In 2013, China was the top exporter globally with more than 11 percent of the world's exports, predominantly through ocean-bound vessels.[69]

Table 3. Top 10 global container ports

1	Shanghai, China
2	Singapore
3	Shenzhen, China
4	Hong Kong, China
5	Busan, Republic of Korea
6	Ningbo-Zhoushan, China
7	Qingdao, China
8	Guangzhou Harbor, China
9	Jebel Ali, Dubai, United Arab Emirates
10	Tianjin, China

In addition to being vulnerable to international economic and political conditions, the industry faces a number of environmental risks. Poor shipping practices can lead to degradation of coastal and marine areas from oil spills; dumping of wastes such as onboard sewage and bilge water; release of toxic chemicals; transfer of invasive species through ballast water; and physical damage through anchorage, noise, wave disturbances and striking of whales and other marine mammals.[70] Despite these potential risks, according to a 2013 report by PricewaterhouseCoopers, only 27 percent of shipping companies reported on their sustainability performance the prior year.[71]

Air pollution is a concern for ships that are not properly maintained: one ship can emit the equivalent of 50 million cars' worth of SO_2.[72] While considered a lesser emitting form of transport by amount of cargo shipped, in 2013 shipping alone contributed 3 percent to global CO_2 emissions.[73] Beyond regulation by the International Maritime Organization (IMO), initiatives such as the Environmental Ship Index, the World

Ports Climate and the Clean Cargo Working Group have emerged to promote environmental stewardship within the industry and hold companies accountable. Global companies with large bulk shipping needs are putting more pressure on the industry to improve its environmental performance. Cargill, the largest bulk shipper in the world, has demanded that its goods only be shipped on vessels with adequate energy ratings.[74] In addition to fuel considerations, anticipated ballast water regulations will increase the pressure for clean water treatment, requiring companies to upgrade their fleets with proper ballast water treatment systems.[75]

Risks:

- Vulnerability to volatile fuel prices
- Disruption to business operations, legal action, fines and loss of license to operate as a consequence of spills or other environmental incidents
- Damage to company reputation from poor environmental performance, e.g., on climate change
- Loss of business from failure to meet customer environmental requirements

Opportunities:

- Cost savings from fuel efficiency
- Access to more customers from reputation for meeting environmental requirements
- License to operate in port facilities and governed waters
- Coordination with government in shaping policy
- Coordination with other companies and industries for improved safety and environmental management

The Maersk Group, a conglomerate operating in 130 countries, identifies major oil spills, SO_x and CO_2 emissions and energy consumption among its most material issues in its 2014 corporate sustainability report. The company is taking steps in its container shipping business to decouple growth from CO_2 emissions and enable trade at lower CO_2 intensity, including a "smart sailing" program aimed at optimizing fuel efficiency.

Tourism, Resorts and Coastal Development

In 2014, travel and tourism generated US$7.6 trillion — 9.8 percent of total world GDP — and supported 1 in every 11 jobs.[76] Bolstered by arrivals to Southeast Asia, international tourism in the Asia-Pacific has shown stronger growth than other parts of the world at around 6 percent.[77] The region did experience some slowdown in 2014 with instability in Thailand, but foreign visitors to East Asia still spent US$334 billion last year. Domestic travel and tourism accounts for an even larger portion of overall spending in the region, predicted to grow to US$1,017 billion in 2015.[78,79] The World Travel and Tourism Council predicts that the fastest growing major countries for travel and tourism GDP by 2025 will include China, Thailand and Indonesia. China climbed from 5th to 3rd place in global tourism earnings in 2014.[80]

Most relevant to blue economy, 80 percent of all tourism takes place in coastal areas, with beaches and coral reefs among the most popular destinations.[81] Asian tourists are increasingly opting for cruise ships, an industry that has grown at a compound annual rate of 34 percent since 2012, reaching 1.4 million passengers in 2014.[82] China's cruise market is predicted to become the world's second largest by 2017, with international operators adding service through major ports in China, RO Korea, Japan, Malaysia, Singapore and Thailand.[83]

Tourism is highly dependent on environmental quality to attract visitors, but tourism development can introduce a host of environmental concerns, including loss of valuable habitats such as coral reefs, wetlands and mangrove forests for tourism infrastructure; significant consumption of resources including locally available sources of food and clean water; pollution through the discharge of untreated sewage and large quantities of solid waste; and contribution to climate change through substantial energy usage and the associated carbon emissions.[84] The cruise industry faces a similar set of challenges, along with those faced by the shipping industry, such as direct air emissions from burning fuels and transfer of invasive species through ballast water.[85]

The industry must grapple with an increasing vulnerability to the impacts of climate change. Rising ocean temperatures and acidity harm coral reefs and the marine life they support. Coastal infrastructure is becoming more susceptible to extreme weather events such as typhoons and storm surges, and even non-weather events such as tsunamis, due to sea level rise. In addition to tourism developers, commercial and residential real estate developers in coastal areas face similar challenges including efficient use of energy and water, managing solid and liquid waste, protecting marine habitats and coping with the effects of climate change.

A growing segment of tourists are aware of the potentially negative impacts of their activities and are demanding more sustainable ecotourism options that support local communities. For instance, a 2010

survey conducted by VISA and the Pacific Asia Travel Association found that Chinese tourists show an increasing preference for environment-friendly tourist and cultural immersion programs. A study the following year found that investing 0.2 percent of total GDP in "greening" the tourism sector could result in 7 percent additional growth by 2050, in terms of sector GDP, over a business-as-usual approach.[86] In response, a number of sustainable tourism certifications have sprung up in recent years, including Green Globe and the Global Sustainable Tourism Council, which promote sustainability standards for the industry. According to the Secretary General of the UN World Tourism Organization, the future of the sector depends on sustainable tourism as an overriding imperative.[87]

Risks:

- Loss of revenue from degradation of natural landscapes that attract tourists and residents
- Damage to reputation and loss of customers due to real or perceived environmental breaches
- Disruption to operations, fines or legal action from environmental concerns, e.g., dumping of sewage, land conversion
- Loss of license to operate in an area from inability to meet environmental standards

Opportunities:

- Cost savings from more efficient use of resources
- Growing markets for sustainable tourism
- Enhanced brand for marketing to customers and developing relationship with government
- Access to expanded areas of operation for development
- New revenue from diversified and/or premium offering for customers

El Nido Resorts on the island of Palawan in the Philippines utilizes its own state-of-the-art sewage treatment plant, ensuring that no raw sewage is discharged into the sea. This and other sustainable practices, such as desalinization and rain catchment to conserve fresh water, have won the resort numerous awards, elevated its status as a premium destination and provided another dimension to the visitor experience.

Oil and Gas

Overall, Asia's primary energy demand could rise by 40 percent by the end of the decade, which could lead to investment of US$10 trillion in the Asian energy sector by 2022.[88] While the global energy mix will increasingly rely on renewable sources such as wind and solar, fossil fuels are expected to continue as the main source of energy in the medium-term. It is estimated that by 2035, Southeast Asia's total primary energy demand could increase by 83 percent, based primarily on fossil fuels,[89] while China will become the world's top consumer of oil.[90]

Globally, offshore fields could account for 34 percent of worldwide crude oil production by 2025.[91] The South China Sea is recognized as a significant source of sub-sea petroleum deposits. Several countries in East Asia — Indonesia, Malaysia, Thailand, Brunei Darussalam, Vietnam, Myanmar and Timor-Leste —are located on the Sunda Shelf, a massive continental shelf known to have rich subsea hydrocarbon deposits.[92]

Despite rich energy resources in the region, growing demand will drive a continuing need for imports. China's oil dependency is projected to rise from 50 percent to over 80 percent, while its net natural gas dependency is expected to double by 2035.[93] According to industry analysts, Asia will be the primary global buyer of liquefied natural gas (LNG) in the coming decade, which will require substantial coastal infrastructure.[94] In 2014, new LNG terminals were opened in Japan, RO Korea, Indonesia and China, with 13 terminals now in operation in China and 3 more under construction.[95]

While the oil and gas sector is poised for tremendous growth in the region, proper environmental management will be critical to maintain its ability to operate effectively. Offshore and deep-sea exploration and production, high shipping volume, port terminal and refining operations and transport of oil and gas through pipelines present a number of environmental risks for oil and gas companies. For instance, in early 2015, an oil tanker collided with a cargo ship in the busy shipping lanes northeast of Singapore, spilling an estimated 4,500 tons of crude oil into the ocean.[96]

Risks:

- Disruption to business operations from environmental incidents and extreme weather events due to climate change
- Damage to relationship with government, including loss of license to operate
- Legal action and fines
- Damage to company reputation
- Higher cost of capital in a capital-intensive industry
- Potential costs resulting from carbon emissions regulations (e.g., carbon tax)

Opportunities:

- Enhanced relationship with government and ability to help shape policy
- Access to new areas for exploration and production
- Access to expanded import markets

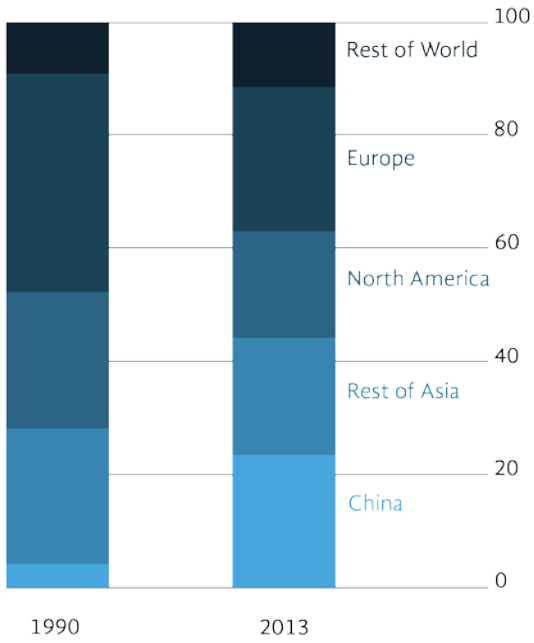
Thai company PTT is one of the world's largest producers of petroleum and petrochemical products. In 2013, an oil spill at a PTT facility resulted in over 50,000 liters spilling into the Gulf of Thailand. PTT committed to the long-term recovery of affected areas, supporting restoration efforts and creating programs to support the local economy, but the incident ended up costing the company over 500 million Baht (US$14 million).[97]

Coastal Manufacturing and Heavy Industry

Manufacturing is a powerful force in Asia. In 2013, the region accounted for 46.5 percent of all global manufacturing output, half of this from China.[98] The ASEAN region accounts for 7 percent of global exports, from auto-parts in Thailand to apparel and textiles in Vietnam, making it the fourth largest exporting region in the world.[99] Along with the established manufacturing base in RO Korea and Japan, these combine for a formidable East Asian manufacturing economy.

Certain industries have demonstrated strong performance in the region. RO Korea, China, Japan, the Philippines and Vietnam are among the largest shipbuilding countries in the world. In the chemical industry, most of the growth over the last two decades has been driven by Asia. It is expected that 5 to 8 of the top 10 chemical companies in the world will be from Asia by 2030, primarily from China.[100]

Figure 4. Manufacturing output (as percentage of global total)



Source: United Nations

Manufacturing is often located near coasts, close to ports with shipping access to imported materials and export markets. In addition to manufacturing directly related to marine activities, environmental impacts from manufacturing that degrade downstream ecosystem services are relevant to blue economy. Manufacturing can produce a number of negative impacts including air pollution and discharge of toxic substances into the environment. Spills and improper disposal of chemicals are having significant effects on communities and environmental health in the region, particularly as it relates to clean water. In 2014, China's Ministry of Environmental Protection reported that at least 280 million people don't have access to safe drinking water due to the contamination of rivers, lakes and other bodies of water.[101]

Consumers are becoming more conscientious in their purchasing decisions, putting pressure on the manufacturing supply chain for more transparency around companies' environmental and social practices. In 2011, some of the largest global apparel brands including Nike, adidas, H&M, Puma and Marks & Spencer launched Zero Discharge of Hazardous Chemicals (ZDHC), an initiative to eliminate the discharge of hazardous chemicals by apparel manufacturers in places such as China and Southeast Asia by 2020.

Risks:

- Disruption to operations, fines, cleanup costs or damage to reputation from environmental and social violations such as spills or improper disposal of chemicals
- Disruption to operations from extreme weather events, e.g., typhoons or flooding
- Loss of license to operate in a particular area from inability to meet environmental and safety requirements
- Changes to cost structure from unanticipated regulatory requirements
- Higher cost of capital for investing in expanded manufacturing infrastructure

Opportunities:

- Cost savings from more efficient use of electricity, water and other inputs
- Growing supply chain markets driven by environment-conscious consumer segment
- Enhanced relationship with government and ability to help shape policy
- Innovation in new product development based on efforts to meet environmental standards

In 2013, an investigation by Greenpeace International exposed a textile factory located in Bandung, Indonesia, for dumping industrial wastewater containing highly toxic substances directly into the Citarum River, eventually reaching Jakarta Bay. International fashion brands including Gap, Banana Republic and Old Navy were linked to the incident through their direct business with the company behind the polluting facility. In mid-2015, an explosion in the port of Tianjin, China, one of the country's busiest seaports, killed 150 people and injured more than 700. The explosion occurred at the warehouse of a company handling the export of dangerous chemicals, including sodium cyanide.[102]

Seabed Mining

As demand for metals continues to increase, fueled by consumption of material goods from electronics to automobiles, known reserves of certain minerals could run out in just a few decades. Copper reserves, for instance, are projected to remain productive for only 20-30 more years.[103] This pressure is spurring industry to explore alternatives to conventional mining.

Previously inaccessible due to technological constraints, seabed mining presents an appealing new source of mineral wealth. Along with conventional aggregates (e.g., sand, gravel), the ocean floor contains a host of economically valuable mineral deposits, including gold, copper, cobalt, nickel and rare earth minerals. Some deep sea "nodules" have been found to contain ores with up to 10 times the proportion of metal compared to deposits found on land.[104]

The potential economic value of these deposits is difficult to assess, but experts agree it is substantial. For instance, rare earth minerals are essential in many of today's modern electronics and command prices as high as US$1,900/kg.[105] Some geologists estimate that a single 2.3 km^2 patch of seafloor might contain enough rare earth materials to meet global demand for a year.[106]

Under the UN Convention on the Law of the Sea (UNCLOS), the International Seabed Authority (ISA) is responsible for granting exploration contracts for the ocean floor. Governments, state-owned corporations and private companies from China, Japan, RO Korea, Canada and the U.K. are all actively exploring seabed mining. As of 2013, there were 17 exploration contracts for the deep seas of the Pacific lying beyond national jurisdiction.[107] While the ISA has regulations in place to govern exploration of the oceans within its remit, clear legislation covering all aspects of the industrial extraction of undersea resources in international waters does not yet exist.

As a young industry, the extent of environmental damage from seabed mining activities is not fully understood. Mining is, by its nature, an intrusive activity requiring heavy machinery and some amount of damage to the seabed. Critics point out that the mining process can introduce toxic substances, sediment plumes, vibrations, light and invasive species that can harm local sea life.[108] The industry maintains that best available technology can minimize disturbance to surrounding ecosystems and cause less damage than terrestrial mining.[109] Some of the areas of interest for mining activities are located in waters belonging to developing countries, with a concern that these countries will shoulder all the environmental and social costs without fully benefiting from the economic gains.

Risks:

- Disruption of business operations, damage to company reputation, mitigation costs or loss of permits from environmental incidents
- Higher cost of capital in a capital-intensive industry

Opportunities:

- Enhanced relationship with government to help shape policy in a rapidly evolving industry
- Granting of contracts for exploration in new areas based on good environmental track record
- Opportunity to collaborate with government and peers to develop safer, more cost-efficient mining techniques to increase access to deposits

In the waters off Papua New Guinea, Canadian company Nautilus Minerals has plans for the world's first commercial deep seabed mining project, scheduled for 2018. The project, which will mine for copper, gold and other valuable metals from a depth of 1,500 m, is raising concerns from environmental groups, but the company maintains that the mine will have a minimal environmental footprint.[110]

Renewable Energy

Energy is available in many forms in the coastal and marine environment. Beyond hydrocarbon deposits under the seafloor, the ocean provides several renewable forms of energy including waves, tides, currents, thermal gradients, wind and biomass. As global energy demand continues to climb and industry searches for alternatives to traditional fossil fuels, exploitable marine-based renewable sources hold the potential to exceed all current global energy needs.[111]

Offshore wind is the most developed form of marine-based renewable energy, with capacity expected to reach at least 40 GW per year globally by 2020.[112] While Europe continues to dominate the market for offshore wind, countries such as China, Japan and RO Korea have set ambitious targets for developing additional capacity.[113] Other forms of marine-based energy are less mature, but governments in the region are pushing for further development. Indonesia has developed plants for wave energy in Yogyakarta, tidal current energy in East Lombok and ocean thermal energy conversion (OTEC) in Bali, and the Philippines plans to open its first ocean energy plant in 2018.[114]

The use of biofuels in the region continues to rise based on a push for higher percentage blends using biofuel. Even the aviation industry is beginning to invest in biofuels, with companies such as Cathay Pacific, Japan Airlines and Garuda Indonesia retrofitting some aircrafts for biofuel use. Traditional sources such as coconut and palm oils have been unable to keep pace with demand, and companies are turning to algae as a feedstock. Algae can produce 20,000 to 80,000 L of biofuel per ha annually, making it a much more productive option than terrestrial biofuel crops.[115]

Risks:

- Restrictions on deployment of technologies due to environmental risks such as noise pollution, sediment plumes and disruption of marine life
- Potential use conflicts with other industries such as fisheries, aquaculture, tourism and shipping
- Vulnerability of coastal energy infrastructure to sea level rise, storm surges, etc.

Opportunities:

- Enhanced relationship with government to help shape policy in a rapidly evolving industry
- New markets for low- to no-emission energy production, driven by increasing greenhouse gas emission regulations and consumer preference
- Leveraging investment from multipurpose infrastructure, e.g., wave turbines may also act as flood barriers; existing seawalls can enhance tidal energy production

RO Korea is home to the largest tidal energy installation in the world located at Shihwa Lake, about 60 km southwest of Seoul. With an installed capacity of 254 MW, it has allowed RO Korea to reduce its CO_2 emissions by more than 300,000 tonnes per year. The country is planning to complete two additional installations totaling 1,840 MW of capacity, maintaining its place as the world leader in tidal power generation.[116]

Marine Biotechnology

The marine environment offers a new frontier of biological resources for developing a range of products from pharmaceuticals and chemicals to personal care products, as well as applications such as environmental biotechnology, bioprocessing and bioremediation. Marine species provide key ingredients for biofuel, cosmetic products, dietary supplements, painkillers and even treatments for cancer, asthma and arthritis, and scientists have discovered useful properties in krill, sponges, soft corals, worms and deep sea bacteria that could provide a variety of new innovations. As a nascent industry in a complex environment, investment in biotechnology can be a risky venture with high barriers to entry. For instance, research and development (R&D) can cost US$30,000 per day to sample at sea and take 15 years to move from research to commercialization.[117] Despite the risks, the potential returns keep interest in the industry high. Filing of patents related to marine organisms has seen an annual growth rate of 12 percent over the past 15 years.[118]

In 2011, the demand for pharmaceuticals from marine species was valued at US$4.8 billion worldwide and is anticipated to grow to US$8.6 billion by 2016.[119] One example, a painkiller called Prialt Ziconotide derived from marine cone shell venom, generated sales revenues of US$12.1 million as early as 2006.[120] The U.S. National Cancer Institute states that anti-tumor properties were found in 1 percent of marine animals tested versus the 0.01 percent found in terrestrial samples.[121]

In a region with some of the highest marine biodiversity in the world, the prospects for East Asia are especially appealing. East Asian countries have played an active role in the industry with China, RO Korea and Japan all highlighting the value of marine biotechnology in their investment strategies and growth plans. China's National High-Tech R&D Program has elements dedicated to marine biotechnology. The Korea Institute of Ocean Science and Technology (KIOST) is viewed as a global leader in the field. Japan established its Marine Biotechnology Institute in 1990. Malaysia dedicated almost US$550 million to developing the industry from 2006-2010,[122] and the Philippines created a PharmaSeas Drug Discovery Program funded by its Department of Science and Technology.[123]

Risks:

- Potential use conflicts with other industries
- Degradation of marine ecosystems leading to loss of commercially valuable species
- Policy complications from harvesting specimens in national waters and waters beyond national jurisdiction

Opportunities:

- Enhanced relationship with government to help shape policy in a rapidly evolving industry
- Granting of rights for sampling in new areas based on good environmental track record

Marine Technology and Environmental Services

Companies providing marine technology and environmental services cover a wide variety of activities including oil spill response, wastewater treatment, marine scientific services, information technology and data solutions and more. The quality and availability of these services can vary greatly, with a significant need in the emerging economies of the region.

The application of environmental services and technology is needed to address persistent problems of pollution and deteriorating water quality in the region's coasts. Companies providing wastewater treatment play a crucial role in managing the quality of coastal waters. Across Asia, a concerning 65 percent of all sewage is still dumped into the ocean without any treatment.[124] Solid waste management technology and service providers are also needed. Likewise, access to freshwater remains a significant problem in the region, with a need for infrastructure and technology such as freshwater storage and delivery systems and desalinization plants for coastal communities.

Technology solutions hold promise for addressing a number of environmental issues facing coasts and oceans. One example is curbing of IUU fishing. Companies ranging from entrepreneurial startups to large, established corporations are developing solutions for everything from fishing vessel tracking to law enforcement. Smart Communications, the largest mobile technology company in the Philippines, partnered with the United States Agency for International Development (USAID) to develop platforms for online fishing vessel registration and community reporting of harmful fishing methods.[125]

Ocean-based industries stand to benefit from improved availability of data in the marine environment such as currents, wave characteristics and water quality. By using satellite and remote sensing technology and applying real-time connectivity and analytics to large datasets, a "smart oceans" platform could provide forecasting of sea conditions, improve marine safety and support ocean-based business activities such as shipping, aquaculture and fisheries. One such program, dubbed "Smart Oceans/Smart Industries," has been proposed by the World Ocean Council.[126]

Risks:

- Projects often involve public goods (e.g., water), increasing the complexity of policy and management approaches
- Complexity of environmental challenges in the coastal and marine environment can increase the cost of developing and implementing solutions

Opportunities:

- Urgent need for environmental solutions in the region, with opportunities for investment and partnership from international agencies, foundations and governments
- Expanded opportunities from stronger coastal and marine environmental policies
- Development of new-to-market products and services

With its Asia regional offices based in Indonesia and Singapore, Oil Spill Response Limited (OSR) is an industry-owned cooperative of 160 corporations from the oil, gas, energy and shipping industries that exists to respond to oil spills.[127] OSR has attended to more than 350 spill incidents over the past 25 years, and provides a variety of services to its members from training of personnel for initial oil spill response to post-spill management and wildlife rehabilitation. OSR has developed a preparedness and response Good Practice Guide that is available to the public.

Blue Economy-related Industries

There is no clear line to be drawn around one set of blue economy industries. In some classifications, for instance, ocean salt production is considered a distinct industry, where others consider it part of seabed mining. But we believe these 9 industries help define the majority of potential blue economy business activities in the region.

In addition to these industries, there are a number of related industries that play a role in the blue economy. For example, with Asia's explosive growth in telecommunications and energy use, the region now has 375,000 km of undersea cable systems in operation.[128] Providers must consider the impacts of installing undersea cables to ensure that their activities do not damage coral reefs and other marine life.

Depending on how far down the value chain one goes, other industries might be considered part of the blue economy — seafood processing, for example. With the interconnections between industries, if a line must be drawn somewhere, we consider that immediate post-harvest processing near the sea would be part of a blue economy, whereas processing or retailing in overseas markets is part of secondary industry supporting blue economy. One critical supporting sector is Marine Finance and Legal Services, including activities such as marine insurance, shipping finance and marine dispute resolution. This sector provides the necessary financial and legal support for all of the industries discussed in this report — from insuring ocean-bound vessels to financing offshore wind farms.

While not considered part of the blue economy, other industries can have a profound impact on blue economy growth due to their downstream impacts on coastal and marine ecosystems — agricultural production being the most important example. According to FAO, Asia-Pacific has more hungry people than all the other regions of the world combined — more than 550 million.[129] To help feed its people through agricultural output, Asia continues to lead the world in fertilizer consumption, the bulk of this in East and South Asia.[130] Excess fertilizer from poor agricultural practices, along with livestock wastes, can run into rivers and eventually the sea, contributing to a problem known as "nutrient loading." An excess of nutrients causes massive algal blooms that eventually die and decompose, consuming all the oxygen in the water and creating large "hypoxic dead zones" where virtually no marine animals can survive. These dead zones can significantly disrupt marine ecosystems and endanger marine food chains.

According to UNDP, as of 2013 there were more than 500 of these dead zones worldwide covering 250,000 km^2, including Manila Bay and areas of the Yellow Sea.[131] China's agriculture sector, for instance, is the source of more water contamination than even factory waste.[132] Such impacts can have serious consequences for the natural capital in marine environments, impeding potential for sustainable blue economy growth.

Connections Between Blue Economy Industries

Coastal management issues cut across sectors. The conventional management approach, which addresses challenges separately on a sector-by-sector basis, is typically not sufficient for solving complex problems in coastal areas. Looking across blue economy industries, a number of positive and negative linkages exist between industries, for example:

- Aquaculture, if not properly zoned, can affect ship navigation routes and tourism sites
- Fisheries and tourism can both benefit from proper management of marine protected areas
- Oil and gas and shipping companies have a shared interest in oil spill preparedness and response
- Pollution from coastal development and manufacturing can damage tourism sites
- Marine technology providers can help fisheries companies in combating IUU fishing
- Seabed mining and oil and gas companies face similar environmental concerns in the marine environment from deployment of large infrastructure
- Marine renewable energy can supply energy for numerous sectors, but infrastructure can compete for ocean space with other industries
- Marine biotechnology can generate new solutions for environmental services and other industries

It is these types of interconnections between industries that make integrated approaches a crucial element of blue economy.

07

BLUE ECONOMY INVESTMENT

While investors may not yet use the term blue economy, they are becoming increasingly interested in investment opportunities in coastal and marine areas. Blue economy investments are those that consider environmental and social impacts and build the long-term ecological, social and economic health of coastal and marine ecosystems and communities — which ultimately supports the long-term competitiveness and financial health of the business.

Investors expect returns from their investments. But expectations can range from the more traditional (cash flows at a market rate of return or better) to the more impact-oriented (considering environmental and social returns and willing to sacrifice some level of financial return). Growing evidence demonstrates that impact investment can perform at least as well as traditional investments in terms of financial return. According to a 2015 report by the Global Impact Investing Network and Cambridge Associates, impact investment can indeed generate market returns. The report highlights an average net internal rate of return of 6.9 percent across 51 impact investment funds launched between 1998 and 2010 with combined assets of US$6.4 billion.[133]

The track record for impact investment in coastal and marine conservation remains almost exclusively with program-related investment (PRI) through development organizations, foundations and public institutions. However, a handful of investment-related initiatives are looking to develop viable models that can generate financial return from improved coastal and marine ecosystem services. One example is the Vibrant Oceans Initiative, launched in 2014 and backed by US$53 million from Bloomberg Philanthropies. As a partnership between ocean NGOs and investors, Vibrant Oceans attempts to develop investment models to rebuild sustainable fisheries in 3 of the world's largest fishing nations, including the Philippines.

A significant need exists for private sector capital and expertise to scale up blue economy investments for the benefit of both communities and companies. Public-private partnership (PPP) has received a lot of attention in the region, but the success rate for PPP projects has been mixed. One challenge has been a lack of coordinated understanding between the investment needs of local governments and communities and the investment aspirations of companies. In consultation with local and national governments from 7 countries in East Asia, a list of blue economy-related investment needs across 10 categories was compiled. Following are examples of investments from each category (not in any particular order).

Table 4. Examples of ICM investment, by category

1. Coastal Transport	large-scale port development, small-scale fishing port rehabilitation, route-to-market roads
2. Ecotourism/Sustainable Tourism	lodging, recreational facilities, protected areas for tourist destinations
3. Energy	community energy development projects (e.g., solar, wind, biogas), access for remote coastal communities
4. Enterprise and Livelihood Development	business training, market studies and financial products for poor coastal residents, small enterprise development (e.g., handicrafts, salt farming)
5. Fisheries and Food Security	cold storage, seafood processing, integrated fisheries management, market research, aquasilviculture/mariculture
6. Habitat Protection, Restoration and Management	coral reef, mangrove and seagrass rehabilitation, protected area management, riverbank/coastline stabilization, wetlands management and restoration
7. ICM Development and Implementation	baseline profile/risk assessment, coastal strategy and implementation plan, ecosystem valuation, marine spatial planning, environmental monitoring, reporting and information management, integrated river basin and coastal area management, capacity building
8. Natural and Man-made Hazard Prevention and Management	vulnerability assessment, disaster risk reduction plan, early warning systems, infrastructure resilience improvements, disaster preparedness and response facilities and services
9. Pollution Reduction and Waste Management	facilities and services covering management of domestic and industrial wastewater, hazardous and non-hazardous wastes from domestic, industrial, commercial and institutional sources, and runoff from agricultural land/operations
10. Water Use and Supply Management	facilities and services covering freshwater assessment and forecasting, integrated surface and groundwater management, including protection and management of water resources/ground water recharge areas, water conservation and recycling, sea water desalinization

Companies surveyed for this report indicated a number of areas where they anticipate investing in sustainable development of coasts and oceans over the next 3 to 5 years — areas that are, overall, well-aligned with needs identified by government.

- Pollution control and water supply technology and infrastructure
- Coastal restoration, protection and climate change adaptation (e.g., mangroves)
- Port facilities for energy transport and production (e.g., liquefied natural gas)
- Fisheries improvement and efforts to curb overfishing and illegal fishing activities
- Disaster response programs (e.g., oil spills)
- Incorporation of best-available environmental technology into coastal property development
- Programs to better engage local communities in company sustainability programs
- Better integration of best available science into management practice

Despite the alignment, barriers still exist to mainstreaming and scaling up blue economy investments, including lack of property rights and both over- and under-regulation. Governments play a critical role in enabling blue economy investment. According to a report by J.P. Morgan and the Global Impact Investing Network, from an investor perspective, governments can help to improve the risk/return profiles of investments in part by establishing clearly defined regulation.[134] More work must be done to better package these into investment products and new business opportunities for companies and investors.

08

THE IMPORTANCE OF GOVERNANCE FOR ENABLING BLUE ECONOMY

Private sector activities are only half of the story of building a blue economy. Governments must provide effective policies and regulatory regimes to establish stable governance and proper ecological protections to enable sustainable private sector operations and investments, including policies ensuring that environmental and social costs are internalized.

The 2015 Coastal Governance Index from The Economist Intelligence Unit evaluates the state of coastal governance at the national level across 20 countries with ocean-based economies, assessing the business environment for coastal activities along measures, including ease of doing business, corruption perception, effectiveness of dispute resolution mechanisms and quality of coastal infrastructure. Within East Asia, the report places Japan as a leader at 7th place globally, followed in order by RO Korea, China, the Philippines, Vietnam and Indonesia. The report finds that leading countries demonstrate a fundamental need for an integrated approach to coastal governance.[135]

National coastal and ocean policies seek to achieve a wide range of objectives including establishment of institutional mechanisms, promotion of science and technology and advocacy for new development paradigms such as coastal use zoning. In a review of 12 countries implementing the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA), a total of 255 ICM-related policies have been developed and implemented governing habitats, oceans, food security and livelihood, pollution reduction, hazards, water resources, and disaster risk reduction and sustainable development.

Figure 5. ICM-related policies in East Asia (255 total policies across 12 countries)

Several countries in East Asia have developed and implemented national policies, strategies or action plans for coastal and ocean management. The Vietnam Law of the Sea, which took effect in 2013, regulates marine economic development and management and protection of seas and islands. In late 2014, Indonesia adopted a Law on the Sea delineating its marine resource use, conservation and protection and establishing marine spatial planning as a tool to manage its use of coasts and oceans. In Thailand, the Promotion of Marine and Coastal Resource Management Act took effect in June 2015. The Philippines has adopted ICM as its national strategy to ensure the sustainable development of the country's coastal and marine environment, and an ICM Law was submitted for review by the Philippines Senate in early 2015.

How can government help business in building a blue economy?

Companies surveyed for this report generally indicated that they prefer to engage with government in the design and implementation of their corporate sustainability programs to ensure that the local government endorses the activities. When asked how government can help facilitate growth in the blue economy, companies consistently cited a small handful of suggestions:

- Reformed policies
- Improved mechanisms for public-private partnership
- Clearer processes for investment
- Sustainability practices built into the policymaking processes

09

TRENDS IMPACTING THE GROWTH OF BLUE ECONOMY

Global and regional trends could have profound impacts on the character and extent of blue economy growth. For instance, the opening of arctic shipping lanes from the loss of summer ice due to climate change could reconfigure the shipping industry in Asia. With some question about a lack of environmental and social safeguards, the impact of the forthcoming ASEAN economic integration on blue economy industries remains to be seen. And governments around the world agreed in 2015 to develop a legally-binding treaty to protect marine life in areas beyond national jurisdiction, with implications for a number of industries.

For the past decade or more, climate change has been front and center on the sustainable development agenda, and rightfully so given the magnitude, complexity and urgency of the challenge. But policymakers are increasingly realizing the similar seriousness of ocean health, and it is finding its place as a top issue in the global sustainability discussion.

Early in 2015, the G7 meeting featured ocean protection as an important topic on the agenda. The Intergovernmental Oceanographic Commission (IOC-UNESCO) organized a full day dedicated to the ocean's role in the climate system in the lead up to the climate negotiations taking place during COP21 in November 2015. In September 2015, the United Nations finalized the new sustainable development goals (SDGs) that will guide the post-2015 development agenda. One of the goals focuses specifically on conservation and sustainable use of oceans, seas and marine resources for sustainable development, covering marine pollution, fisheries management, ocean acidification and ecosystems protection, among other issues. The updated Sustainable Development Strategy for the Seas of East Asia, to be launched in November 2015, includes consideration of the new coastal and marine SDGs.

Innovative financing mechanisms continue to emerge to further enable investment in scaling up the protection of ecosystem services including debt-for-nature swaps, payments for ecosystem services, biodiversity offsets, revolving loan funds, climate investment funds and development impact bonds, among others. The advent of "green bonds" by The World Bank in 2008, which reached over US$36 billion in new issuances in 2014, has led to similar efforts by development agencies, governments and companies.[136] In early 2015, the Asian Development Bank (ADB) raised US$500 million from its inaugural green bond issuance to channel more investor funds to projects that promote low-carbon and climate-resilient economic growth.[137] With 55 percent of all atmospheric carbon captured by living organisms being taken up at sea, primarily by vegetated habitats such as mangroves, salt marshes, seagrasses and seaweed, some experts point to the similar potential for "blue bonds".[138]

A companion report prepared in partnership with Imapact Investment Exchange (IIX) Asia/Shujog entitled *Investment Landscape Mapping in East Asia* examines the flows of capital into ICM and blue economy investments in the region from various sources including donors (both bilateral and multilateral), foundations, private companies, development finance institutions and commercial investors.

10

FINAL REMARKS

Coastal and marine ecosystems and the products and services they provide are one of the treasures of the East Asian region. These resources are under assault by a collection of local, regional and global pressures.

A healthy ocean is vital to the region's economy. East Asia is a global leader in several coastal and marine industries, but as the natural capital that industries depend on continues to erode, so too will the health of those industries. The only way to ensure long-term sustainability of both the ecosystems and the economy is by transitioning from an ocean economy to a blue economy.

Blue economy offers a mindset for managing business risks, improving decision making and generating new opportunities. It is an imperative for the long-term sustainability of coastal and marine industries. As we already begin to see value chain impacts from climate change, marine pollution, overfishing and other threats to coastal and marine ecosystems, it is important for companies to start thinking and acting now.

Blue economy is a process, and we don't know where it will go next. We are encouraged by the number of countries and international organizations, and increasingly companies and investors, that have taken up the call of blue economy and are working to move it forward. As we venture into uncharted waters, we have an opportunity to learn the lessons from development of land-based resources. Can the blue economy offer more than simply doing less harm? Can it be something truly transformational, and sustainable? We believe that the success of ICM in the region over the past two decades demonstrates that it can.

We hope this report has provided a better understanding of blue economy and the opportunity it represents. Blue economy is ultimately about our relationship with the sea, one that supports our own economic and human well-being. We view this report as the continuation of an ongoing discussion, and we invite you to join PEMSEA and other organizations, governments and companies as we work together to build a blue economy in East Asia.

What's next?

This report has focused on practical considerations of blue economy from the perspective of business, and therefore it has not explored other economic dimensions of blue economy in more depth, including government activities and valuation of natural capital. With the challenges in measuring the value of natural capital, coastal and marine ecosystems are severely undervalued and countries' understanding of the economic contribution from coasts and oceans to their economies is generally limited.

A complementary research report is being developed in partnership with governments of the region to shed light on these issues and explore blue economy from the perspective of national governments. The research will culminate in a set of National State of the Coasts Reports including:

- Definitions and methodologies for assessing blue economy;
- The contribution of economic activities and ecosystem services in coastal and marine areas to national economies in East Asia;
- Policies and incentives to promote and facilitate investments in blue economy; and
- Growth sectors and emerging market and investment opportunities.

These national reports will combine into a comprehensive East Asia Regional State of Oceans and Coasts Report, planned for release in 2018.

East Asian Seas Sustainable Business Network

Building a blue economy in East Asia will be essential for the long-term health of ecosystems, communities and businesses in the region. The path to achieving a sustainable blue economy will require innovative, integrated approaches between industries, working collaboratively with government.

PEMSEA has established the East Asian Seas Sustainable Business Network as a coalition of forward-thinking companies focused on building a blue economy in the region. The network offers companies access to resources and technical assistance to advance their sustainable development strategies and programs and manage related risks and opportunities emerging in coastal and marine areas. It provides a practical forum for business leaders to engage with peers across industries to build integrated approaches for managing coastal resources, based on the latest science, management best practice and ocean policy developments. The network also serves as a unified voice for coastal and marine business to engage with local and national governments in the region to develop partnerships and identify investment opportunities.

For more information about participating in the East Asian Seas Sustainable Business Network, please contact us at info@pemsea.org.

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Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) is an intergovernmental organization operating in East Asia to foster and sustain healthy and resilient oceans, coasts, communities and economies across the region. Through integrated coastal management solutions and partnerships, PEMSEA works with local and national governments, international development organizations, companies, investors and research institutions towards sustainable development of coasts and oceans in East Asia.