

# Navigating a Shifting Risk Landscape

Expert Perspectives on the Marine Industry



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## INTRODUCTION

The articles contained in this publication have been selected for the ways in which they examine crucial issues for the maritime industry. They provide critical insight into the traditional and emerging risks facing companies in the sector, as well as the opportunities available to those companies that best position themselves to take advantage of them.

All articles appeared on BRINK – a digital platform that informs global decision-makers on critical growth and innovation topics. BRINK is made possible by Marsh & McLennan Companies and managed by Atlantic Media Strategies, the digital consultancy of *The Atlantic*. It collates knowledge and expertise from the world's leading experts on risk and resilience to provide practical and timely insights to top executives and policy leaders worldwide.

## MARINE INSURERS FACE CYBER, "UNKNOWN ACCUMULATION" RISKS

Erin Ayers, Advisen Media



As the investigation into the October 2015 sinking of the commercial cargo ship *El Faro* moves forward, marine insurers say this “isolated” event should not have any effect on pricing or underwriting, but the industry does face other challenges for the future, notably an increasing reliance on technology and risk aggregation.

The *El Faro* sunk during Hurricane Joaquin, killing 33 crew members in a still-mysterious event that spurred lawsuits against the ship’s owner by the crew’s families. While tragic, insurers say the event shouldn’t affect the marine insurance market, nor should the circumstances surrounding it affect settling claims pertaining to lost cargo.

“It’s not going to have any effect on pricing. The *Costa Concordia* didn’t really do anything to move the needle,” said Anne Marie Elder, chief underwriting officer for marine insurance at XL Catlin, referring to the Italian cruise ship that struck a rock and sank in 2012.

Alex Berisha, vice president of marine for Liberty International Underwriters, told Advisen, “The event is widely considered to be an isolated incident. While high-profile in terms of media and industry attention, it’s unlikely to have much impact on underwriting or on pricing going forward.”

The industry representatives explained that the marine industry must follow many safety guidelines for seaworthiness and safety of the vessel, making events such as the *El Faro* and the *Costa Concordia* outliers.

Claims handling is also unlikely to be a problem. “To expedite the claims process, we use a global network of investigators as well as conduct our own investigation to gather the pertinent facts as quickly as possible,” Berisha said. “While the exact details of a marine loss are often not readily available, the risk engineering analysis we develop at the beginning of a project to mitigate loss during transport is invaluable in helping us fill in the missing information and allowing us to more quickly process claims after a loss”.

The marine industry must follow many safety guidelines for seaworthiness and safety of the vessel, making events such as the *El Faro* and the *Costa Concordia* outliers.

## OTHER CHALLENGES

The lack of a major impact from the sinking does not mean that the marine insurance industry does not face emerging trends that could affect underwriting, pricing and the health of the market. Experts cited a downturn in the oil industry, aggregation risk and cyber risk, the new trend in seemingly every line of coverage. Industry representatives expressed confidence that they can face this “sea of troubles” with aplomb. For now, these risks haven’t propelled any insurers away from the market, with cargo insurance showing profits even during a buyer’s market.

Elder said that the marine insurance industry sees continued downward pressure on rates as well as new entrants to the market, which she deemed “surprising.”

According to Berisha, the excess of availability in the market can itself be a challenge. Cargo insurance requires a highly specialized process to mitigate risks in the journey from manufacturer to user, he said.

“The challenge facing the marine industry is that it is currently in a soft market cycle with overabundant capacity and extremely competitive pricing. This can undermine the underwriting process and limits opportunities for risk engineering involvement, leaving cargo companies at risk for increased loss as well as not having the proper coverage in place to respond,” Berisha said.

Insurer expertise can also play a part, according to Paul Keane, marine claims manager at XL Catlin. “You could be on a risk with someone who ... might not understand the complexities of what they’ve underwritten,” he said.

The shipping industry’s trend toward significantly larger container ships presents an unwieldy aggregation risk for marine and cargo insurers. In any given shipment, one insurer could have underwritten policies for several of the cargo clients on the ship.

“There’s no way for us to know whether we have an aggregation on a single vessel,” Elder said. John Miklus, president of the American Institute of Marine Underwriters (AIMU), told Advisen that in just 20 years, vessels have increased to encompass 20,000 TEUs, a unit of measurement to describe a 20-foot equivalent unit.

“If it sank, we’d be looking at a loss of well north of a billion dollars,” Miklus said. The lost cargo could be spread among hundreds of insurers, each with the “unknown accumulation” of risk.

He added, “If you write a policy for an importer or exporter, you would rarely know what vessels they’ve been loaded onto. If a ship sank, an insurer could have three different affected clients.”

The way to account for accumulation risk is reinsurance, according to Miklus. He added, “It’s not a perfect answer, but at the end of the day, it’s why reinsurance exists, to protect against that spike loss.”

Elder and Keane cited increasing natural catastrophes as a problem for marine insurers.

“You see short-term corrections,” said Elder, citing Superstorm Sandy and flooding in Thailand. “People seem to forget what happened.”

The industry is getting better at using data analytics to get a handle on catastrophe risk and aggregation, but the marine insurance industry has built up an art to its underwriting, reported Elder.

Major sinking incidents haven’t ‘moved the needle’ for marine insurers... emerging are cyber and aggregation risks.

“Marine insurers are the last to really avail themselves of data analytics because there’s still really an art involved,” Elder said. “Every risk is different. You have to know who has the best port facilities, are they using the best shipping companies and is there any volatility in the port?”

## RELIANCE ON TECHNOLOGY

With oceangoing vessels relying more on technology and the industry becoming significantly computerized, insurers feel that aggregation risk could be potentially resolved, even as cyber risk becomes a concern for insurers covering ships that could be a target for hackers.

“Cyber risk and its potential impact on the marine industry is a growing concern for insurers,” explained Liberty’s Berisha. “Cyber response plans are becoming part of the overall marine risk review and analysis, and marine risk engineers are looking at a client’s ability to detect cyber abnormalities and threats, their incident response capabilities, their past breaches or near misses, and then the engineer incorporates specific recommendations into cyber response plans in the overall risk mitigation plan.”

Miklus of AIMU commented that cyber risk affects the marine industry not only at the ship level, but ports as well, in terms of operation of cranes, bills of lading, electronic records of cargo and more.

“You have to think about what a hack could mean,” he said. “Nothing’s happened yet, that anyone’s aware of.”

The marine insurance industry has taken steps to address cyber risk, while the shipping industry has been following guidance from the US Coast Guard.

Berisha told Advisen, “AIMU and other maritime insurance industry organizations are creating awareness through educational seminars, white papers and research, and the market is using new government initiatives like US NIST Cybersecurity Framework to determine the impact for specific marine lines like cargo, project cargo and hull.

Miklus reported that AIMU released a cyber exclusion for marine policies this past December, a move that has yet to be embraced by the industry.

“Given the competitive market, it’s been slow to gain acceptance from insureds and brokers,” Miklus said. “Insurers have been going for a risk control/risk management approach rather than flat-out exclusion.”

## OFFSHORE, OFF-TRACK

Miklus expressed concern for the marine insurance industry relating to the drop in oil prices and production. The supply chain servicing the oil industry, which includes marine insurers writing offshore oil drilling policies, feels the impact, he noted.

“They’re really struggling in the Gulf and Texas,” Miklus said. “Oil drilling and exploration expeditions are being cancelled, so there’s less business to write.”

Economic constraints due to a lack of supply need can put companies out of business or cause cutbacks on the repair and upkeep of ships, he added. Layoffs could also lead to workers compensation or Jones Act claims, extending the issue to lines related to, but outside of, marine coverage. “We watch for an increase in losses,” Miklus warned.

*As appeared on BRINK with the permission of Advisen.*

## "PLUMBING THE DEPTHS" OF MEGASHIP SUPER-SIZED RISK

Marcus Baker, Chairman of Marsh Marine Practice, and Stephen Harris, Senior Vice President of Marsh Marine Practice



Over the past 12 months, record-breaking, super-sized container ships spanning the length of four football fields and rising as high as 20 stories have placed great strain on the limits of modern port infrastructure, increasing risk and carrying complex cargoes sailing through areas of the world where the salvage industry is ill-equipped to handle such large potential casualties. The risks attached to these megaships are a major concern for operators, insurers, salvors and environmentalists alike.

Compounding the risk is the lack of accurate and updated maritime navigational charts needed to ensure these new megaships have the clearance to move safely.

In the 1970s, the largest container ships could carry up to 2,500 20-foot equivalent units (TEUs) of containers. A typical cargo container is 40-feet long, equaling two TEUs. Today, ships such as the *CMA CGM Benjamin Franklin* and *MSC MAYA* can carry 18,000 and 19,224 TEUs, respectively. There are already 20 such megaships on the high seas with a capacity of more than 18,000 TEUs, and another 52 are on order.

With the imminent opening of the expanded Panama Canal, commercial vessels of enormous proportions—in terms of length, width and depth—are already, or will soon be, plying waters around the world that have never before witnessed such vessels, or so many of them. From a commercial and economic perspective, this bodes well for maritime trade, as economies of scale should see transportation costs per unit of cargo reduce.

However, alongside this euphoria of new, wider waterways and larger vessels comes a plea to governments to invest more in the funding and the performance of systematic hydrographic surveys of national waters, and to collaborate with other nations to perform far more extensive bathymetric surveys of international waters, beyond their immediate areas of responsibility.

Since January 2016, the International Maritime Organization (IMO) has been granted powers to audit the performance of countries in the way they are fulfilling their safety of life at sea (SOLAS) obligations to provide safe passageways for vessels; however, the IMO has no enforcement power.

Commercial vessels of enormous proportions... are already, or will soon be, plying waters around the world that have never before witnessed such vessels, or so many of them.

Commercial vessel operators should also be encouraged to share the bathymetric data their vessels collect, as a matter of course, with international bodies to ensure safe passageways for increasingly larger vessels. We understand this is not always the case.

## UPDATED NAVIGATIONAL DATA NEEDED TO SUPPORT MEGASHIPS

Today, accurate bathymetric data is inadequate or nonexistent in large tracts of the world's oceans and seas. Large areas are either unsurveyed or have not been rechecked since old lead-line soundings, measured in fathoms, were taken nearly a century ago, when vessels literally "plumbed the depths." It is critical that governments and ports seeking the business of these megaships provide accurate bathymetric data to modern standards, where necessary, to ensure safe and navigable waterways.

While bathymetric and hydrographic survey work is seeking to provide more accurate information, the task is huge and the oceans are vast. The bathymetric data collected by commercial vessels as a routine part of their navigation is sometimes viewed as "intellectual property" by shipping lines and is not always shared for the safety of all. International bodies such as the IMO have no power to force governments to prioritize this work, nor can they exert pressure on shipping lines to share their data; however, with these megaships entering new waters, there needs to be more urgency demonstrated by some governments (both local and national) to ensure safer navigation and a more collaborative attitude among ship operators.

Nations need to accept a greater responsibility to survey international waters beyond their own national territories, which,

although often remote, are not necessarily always deep, with many deceptive and often unexpected shallows.

Navigation routes, such as those leading to or from the Panama Canal, have been the same for many years, with commercial cargo vessels following tried-and-tested pathways through the sea; however, the known safe depth for the navigation of many is only as much as the draught of the largest, deepest vessel ever to have used it. An extra four meters of depth that the newest megaships can draw could be the vital difference between uneventful navigation and a serious grounding or stranding, with all the perils of ship damage, crew endangerment, cargo loss and marine pollution that could result.

As container ships are the largest users of both the Suez and Panama Canal systems, these are the vessels that, having the ability and commercial reasons to navigate new parts of the world's oceans, are of most concern. Governments seeking to have large vessels use their ports and terminals will often be the first to blame the shipping industry when a serious grounding or stranding accident occurs in their waters. But how much of that blame should actually lay at a government's own doorstep, when it comes to ensuring hydrographic surveys meet modern standards (and, where necessary, the funding to do so), especially when it is known that increasingly larger vessels will be using their waters?

Let us not forget that the attempted—and ultimately unsuccessful—salvage of the *MV Rena* after it grounded on Astrolabe Reef in New Zealand in October 2011 resulted in one of the largest-ever protection and indemnity losses to the market. And the *MV Rena* was a very small container ship in comparison to the modern generation.

Many vessel operators have been viewing, with great interest, the increasingly viable Arctic routes between Asia and Europe as an alternative to the much longer (both in time and distance) routes via Singapore and the Suez Canal; however, the vessels that have, to date, successfully transited the Northern Sea Route (NSR) around northern Russia have been relatively small in size. Marsh has already voiced concerns about the potential risks of larger vessels using this route with greater frequency, but the knowledge that so few of the waters have been adequately surveyed for depth to modern standards adds to those concerns.

In addition, there is increasing talk of commercial use of the Northwest Passage (NWP) around northern Alaska and through the many islands of northern Canada, which still poses considerable risk, as some of the waters are even less bathymetrically assured than parts of the NSR. Only a handful of commercial vessels have ever successfully transited the NWP, yet some operators are already heralding those few successes to prove the NWP to be a major route for the future. The lack of hydrographic data for that whole region should remain a major concern for any sensible operator, echoed by similar warnings in the new Polar Code.

In light of all these factors, governments and ports seeking megaship business need to provide accurate bathymetric data to modern standards wherever necessary to ensure safe and navigable waterways for modern vessels to use.

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## HIGH-TECH "GHOST SHIPS" ON HORIZON FOR SHIPPING INDUSTRY

Brock N Meeks, Executive Editor at BRINK



The chronicles of maritime lore are punctuated with tales of ghost ships sailing the world's oceans, some nefarious, others randomly adrift. But a new kind of "ghost ship" has recently appeared, on purpose and purposeful, with no malice aforethought.

These new ghost ships are autonomous "drone ships," crewless vessels operated from afar.

The concept of autonomous ships has been around for decades and the general principles are well known. But until recently, the ideas rarely sailed beyond the drawing board nor advanced from back-of-the-envelope sketches.

The Rolls-Royce Blue Ocean team has developed a virtual-reality prototype of an unmanned cargo ship. Eventually shore-based, former sea-going captains will sit in fully automated command centers at the helm of hundreds of crewless ships, the company says.

Already in the North Sea, oil and gas supply ships use dynamic positioning systems with data collected from satellites, gyrocompasses and stabilizing sensors to hold position in rough seas when transferring cargo—also done by remote control.

"So there is a need for intelligent systems that can run themselves, with the crew becoming supervisors, concentrating on managing the exceptions when they arise and reviewing decisions with the human experience machines don't have," says Oskar Levander, Rolls-Royce vice president of innovation in marine engineering and technology.

Rolls-Royce teamed up with Tekes, the Finnish Agency for Technology and Innovation, in a project aimed at speeding the design and real world testing of unmanned ships. The Advanced Autonomous Waterborne Applications Initiative will produce the specifications and preliminary

"There is a need for intelligent systems that can run themselves, with the crew becoming supervisors."

**OSKAR LEVANDER**  
ROLLS-ROYCE

designs of the next generation of unmanned ships. The project will look at the business case for autonomous applications, the safety and security implications of designing and operating autonomous ships, the legal and regulatory implications and the existence and readiness of a supplier network able to deliver commercially available products in the short to medium term.

The EU is funding a US\$4.8 million study called the Maritime Unmanned Navigation through Intelligence in Networks (MUNIN) project, which is planning a prototype for simulated sea trials to assess the costs and benefits.

And there are the military applications. The Pentagon's research arm, the Defense Advanced Research Projects Agency (DARPA), is running the Anti-Submarine Warfare Continuous Trail Vessel program. It is developing nearly autonomous drone ships that are part of a "culture change" happening inside the US Navy, as described by US Navy Secretary Ray Mabus, during the US Navy League's Sea Air Space symposium in Washington last year.

"Unmanned systems, particularly autonomous ones, have to be the new normal in ever-increasing areas," Mabus said.

## CAN SAFETY, COST AND CLIMATE TIP THE SCALES FOR DRONE SHIPS?

On average at sea, a ship sinks once every four days and 2,000 to 6,000 mariners die from accidents every year.

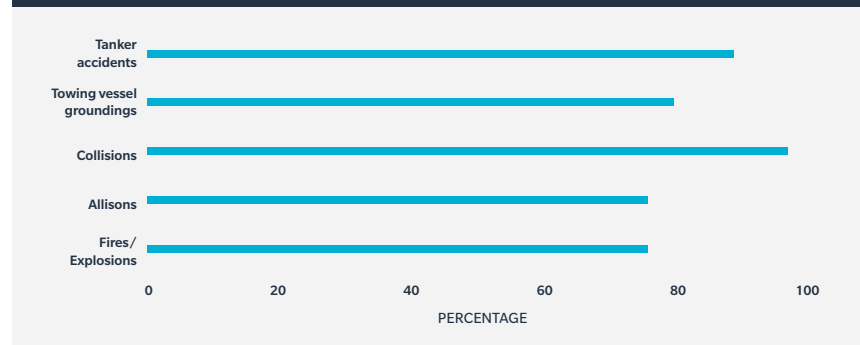
Sailing is an inherently human endeavor. No machine or computer algorithm will ever take the place of years of seafaring experience, the ability to "read the seas" or make snap decisions when lives are on the line.

"Let us say it right up front: It will not be possible [for an autonomous vessel to accurately deal with potentially catastrophic situations]," MUNIN said in a 2013 presentation during a Maritime conference. "We have to calculate with events

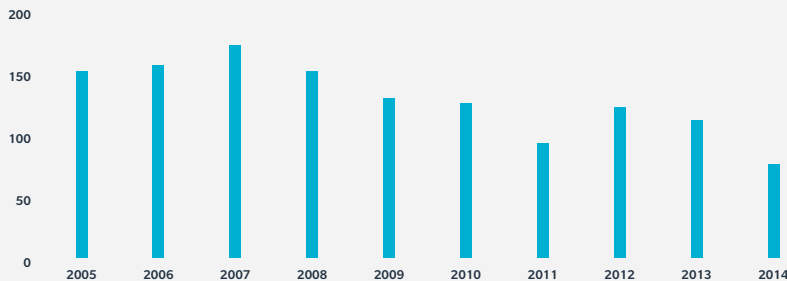
that will bring systems down. The issue is instead how do we design a fail-to-safe system that allows a graceful degradation into a safe mode that gives a reasonable assurance against a catastrophic outcome for people and environment?"

However, humans are responsible for the majority of accidents at sea. "Today's ship systems are technologically advanced and highly reliable. Yet, the maritime casualty rate is still high. Why?" asks Anita Rothblum, who works on human error and marine safety for the US Coast Guard. "It is because ship structure and system reliability are a relatively small part of the safety equation," Rothblum says. "The maritime system is a people system, and human errors figure prominently in casualty situations."

**FIGURE 1** Incident of human error in shipping accidents  
Source: US Coast Guard Research



**FIGURE 2** Frequency of shipping loses by year  
Source: Lloyd's List Intelligence Casualty Statistics



Even for unmanned and fully autonomous ships, some human interaction will take place in monitoring, remote control and maintenance. “If we ever so slightly can move decisions from the operator onboard, where stress and fatigue play a vital part, to less stressful programming and maintenance work, safety benefits might be gained,” write authors Thomas Porathe, Johannes Prison and Yemao Man in a paper for The Royal Institution of Naval Architects.

“Many facilities and systems on board are only there to ensure that the crew is kept fed, safe, and comfortable,” Rolls-Royce said. “Eliminate or reduce the need for people, and vessels could be radically simplified. Attitudes and ways of working will need to change, but safe operation is possible, particularly for vessels running between two or three fixed points.”

Cost savings are also high on the list as a justification for pursuing unmanned shipping. Crew costs amount to 44 percent of a large cargo ship, about US\$3,299 per day. “The potential savings don’t justify the investments that would be needed to make unmanned shipping safe,” Tor Svensen, chief executive officer of maritime for DNV GL, the largest company certifying vessels for safety standards, told *Bloomberg News*. “I don’t think personally that there’s a huge cost-

benefit in unmanned ships today, but technically it’s possible... my prediction is that it’s not coming in the foreseeable future.”

A recent concept in the shipping industry is “slow steaming,” the practice of reducing cruising speed to lower greenhouse gas emissions. A reduction from 16 to 11 knots could reduce fuel consumption by about 54 percent and carbon emissions by 1,000 tons, MUNIN calculates. Normally, this means increased costs for the charter and the crew, which will have to remain at sea for longer periods of time. An unmanned vessel wouldn’t have to worry about those crew costs.

Slow steaming has the potential to reduce emissions by 11 percent, close to the 15 percent target reduction set by the International Maritime Organization’s Marine Environment Protection Committee.

## HUGE REGULATORY HURDLE

Unmanned ships are currently illegal according to international seafaring conventions that mandate minimum crew and operations requirements.

MUNIN, however, believes that as long as a trained captain is in charge of the vessel—despite being housed in a shore-based control center—the legal and practical challenges of maritime law can be met.

“Maritime law has coped with changes from sail to propulsion, from oil to nuclear energy to gas, from loose cargo to containerization and it will cope again!” MUNIN stated during a June presentation on changes needed to adapt to unmanned vessels. “But the key message is: The law should not be, and will not be, an obstacle.”

If ships don’t comply with International Maritime Organization regulations they would be considered unseaworthy and ineligible for insurance, Andrew Bardot, secretary and executive officer of the London-based International Group of P&I Clubs told *Bloomberg News*.

Another major risk is that of hacking; a malicious attack on the control functions could result in catastrophic consequences, either on the high seas or entering or exiting a port. To thwart such risks, the industry is working on using encryption techniques to secure its communications and system.

“Many of the technology building blocks that will control the ships of the future are already available today, but there is still work to be done to develop marine solutions from them,” said Levander of Rolls-Royce. “Much in the way that sail gave way to steam powered ships, and coal gave way to oil, we will see increasingly sophisticated ships, highly automated and perhaps even unmanned and remote-controlled, plying the seas within the next two decades.”

*This article appeared on BRINK on July 30, 2015.*

## SHIPPING LOSSES DOWN: MEGASHIPS, CYBER POSE EMERGING RISKS

BRINK Editorial Staff



The global economy is critically tied to the safety of its international shipping vessels, with more than 90 percent of trade transported by sea. Last year's 75 total losses at sea is the lowest reported figure in a decade. 2014 also represented a substantial improvement in the shipping industry's 10-year loss average of 127. In all, shipping losses have declined 50 percent since 2005, "driven in part by a robust regulatory environment," according to the *Safety and Shipping Review 2015*.

The South China, Indo China, Indonesia and Philippines region had the most losses (17), followed by the Japan, Korea and North China (12) region. Cargo ships accounted for a third (25) of all losses, followed by fishing vessels (14).

The biggest shipping risk came from foundering (49), accounting for 65 percent of losses in 2014, followed by wrecked/stranded vessels (13). Fires resulting in total loss (4) were down 73 percent from 2013.

"While the long-term downward trend in shipping losses is encouraging, more work needs

to be done to improve the overall safety of vessels," the report said. "Recent casualties such as *MV Sewol* and *Norman Atlantic* have raised significant concerns over passenger ship safety."

The trend toward larger ships "raises concerns about whether risk management needs reviewing after an 80% capacity increase in just a decade," the report says. "Larger ships could also mean larger losses. The industry should prepare for a loss exceeding US\$1 billion in future featuring a container vessel or even a specialized floating offshore facility."

And cyber risk is becoming/has become becoming a looming threat. The dependence on e-navigation, the interconnectivity of the maritime sector and low-levels of cyber security awareness, combined with the prospect of unmanned shipping, "means ships and ports could become enticing targets for hackers in the future," the report says, noting that a malicious cyber event could lead to a "total loss" with "substantial insurance claims for hull, cargo and protection and indemnity underwriters."

The risk of piracy is diminishing as well—down seven percent in 2014—the fourth consecutive year of improvement. Meanwhile, geopolitical risk continues with a sharp uptick in activity, putting "increasing pressure on the shipping supply chain." The risk from increased geopolitical instability is an area that continues to increase, the report says.

*This article appeared on BRINK on April 8, 2015.*

"While the long-term downward trend in shipping losses is encouraging, more work needs to be done to improve the overall safety of vessels."

**SAFETY AND SHIPPING  
REVIEW 2015**

## BLUE ECONOMY: TAKING CHARGE OF A NEW FRONTIER IN THE INDIAN OCEAN REGION

Narnia Bohler-Muller, Acting Executive Director at Africa Institute of South Africa, Human Sciences Research Council



In many respects, the blue economy is the new frontier for the Indian Ocean Rim Association (IORA) member states, all of which are coastal or island states. IORA is an ideal platform to encourage member states to cooperate and share their experience and expertise in harnessing the massive potential of the blue economy. However, current governance and management of marine and coastal ecosystems does not necessarily inspire confidence. The challenges facing the Indian Ocean region include:

- ▶ Climate change, including ocean acidification, sea-surface temperature change, the rising of sea levels and high-impact natural disasters.
- ▶ Pollution from coastal areas that are highly populated.
- ▶ Overfishing and illegal unreported and unregulated fishing.
- ▶ Piracy, drug trafficking, human trafficking and other forms of transnational crime.

A “blue economy” is vital to a thriving “green economy,” a core aspect of the UN Conference on Sustainable Development 2012 and Rio+20, which focuses on growth in income and employment driven by public and private investments that reduce carbon emissions and pollution, boost energy and resource efficiency and prevent the loss of biodiversity and ecosystems. The blue economy takes this one step further: It advocates that a green economy will not be possible unless the seas and oceans are a key part of these new business models.

The first Blue Economy Conference for member states of IORA, held in Mauritius in September 2015, set as its priorities the development of fisheries and aquaculture, renewable ocean energy, seabed exploration and minerals as well as seaport development and shipping.

The conference concluded by committing to:

- ▶ The sustainable use of marine resources.

The blue economy... advocates that a green economy will not be possible unless the seas and oceans are a key part of these new business models.

- ▶ Cooperation in data collection on the ocean environment.
- ▶ Sustainable development of the ocean economy.
- ▶ The empowerment of women.
- ▶ Focusing on micro, small and medium enterprises.
- ▶ Creating a favorable business environment.

## GLOBAL AND REGIONAL SUSTAINABLE DEVELOPMENT

The total amount of revenue or so-called “gross marine product” derived from the oceans amounts to US\$2.5 trillion. This essentially makes the ocean the seventh largest economy in the world. As such, Sustainable Development Goal 14 deals with the “conservation and sustainable use of the oceans, seas and marine resources for sustainable development.” Among the targets are reducing pollution, protecting marine and coastal ecosystems, minimizing the impacts of ocean acidification, regulation of harvesting and ending overfishing, as well as illegal, unreported and unregulated fishing. By 2030, the target is to increase the economic benefits to Small Island Developing States and least developed countries through the sustainable use of marine resources, including sustainable management of fisheries, aquaculture and tourism.

The start of African Union Summit held in Johannesburg, South Africa on June 8, 2015, coincided with World Oceans Day. Member states of the AU expressed the need to improve Africa’s relationship with the seas and recognized that healthy oceans and the prosperity and security of people (especially women) are intertwined.

AU Agenda 2063 aims at “a prosperous Africa based on inclusive growth and sustainable development.” This includes the continent’s blue economy: It outlines that “Africa’s ... ocean economy, which is three times the size of its landmass, shall be a major contributor to continental transformation and growth.” Further, one of the goals of the AU’s 2050 Integrated Maritime Strategy is to encourage states to create a blue economy that would foster wealth creation through coordinated and sustainable maritime industries such as fishing, shipping and resource extraction. The AU has also declared that 2015 to 2025 will be Africa’s “Decade of Seas and Oceans.”

In the Southern African Development Community, the importance of taking a broad approach to ocean governance and sustainable development offers crucial lessons for other oceanic states. The Benguela Current Convention—signed by South Africa, Namibia and Angola in 2013—encourages coordinated policy-making that does not limit countries to only considering their own maritime territories, but also prioritizes holistic environmental perspectives on (human) security.

From civil society, action has come from the Global Ocean Commission’s 2014 report, *From Decline to Recovery: A Rescue Package for the Global Ocean*, as well as The Economist’s Third World Ocean Summit 2015. The latter summit included a keynote address by Nkosazana Dlamini-Zuma, chairperson of the AU Commission. Her message was clear: Achieving a balance between ocean health and economically sustainable development is challenging but necessary. Many parts of the oceans are threatened and need protection, but essential changes

are only likely to occur if the oceans are also valued as a source of future African prosperity.

## NEW THINKING

New thinking and an integrated approach are needed to further the goals of the blue economy. International and regional organizations such as the UN and AU must continue to encourage member states to seriously consider and contribute to improving ocean governance.

Ultimately, it is at the national level where action is most needed. The island states of Mauritius and the Seychelles are implementing their own blue economic policies, and encouraging lessons can be learned from them. In South Africa, the Department of Environmental Affairs leads Operation Phakisa, which aims to develop a local ocean economy that would contribute billions of rands to the country’s GDP and create thriving maritime industries. South Africa’s challenge is to ensure that implementing Operation Phakisa does not further harm our oceans.

*This article appeared on BRINK on September 22, 2015.*

## DEVELOPING A BLUE ECONOMY IN CHINA AND THE UNITED STATES

Michael Conathan, Director of Ocean Policy at Center for American Progress, and Scott Moore, International Affairs Fellow at Council on Foreign Relations



As the world population balloons toward more than 9 billion people by 2050, nations will need new resources from a finite amount of space to meet soaring demand.

And as more people move to coastal regions, their minds will inevitably be drawn to the sea. After all, more than two-thirds of our planet is covered with ocean, and the seas boast tremendous economic development, transportation corridors, sources of oil and gas, and cornucopias of seafood.

Oceans also provide less-tangible benefits that are often difficult to quantify, including moderating the planet's climate by absorbing roughly 90 percent of the heat trapped by a thickening atmospheric blanket of carbon pollution.

They produce more than half of the oxygen we breathe. In coastal regions, healthy coral reefs and other wetlands ecosystems safeguard communities from storm surges and flooding events, sequester massive amounts of carbon, and filter out other pollution produced on land.

To sustain a 21st century population boom, we must balance marine economic development

with protection of the ocean's environmental services that have sustained life on our planet for millions of years. This report examines the different ways that two nations, China and the US, are approaching this dilemma by promoting a concept known as the "Blue Economy."

The Blue Economy represents a relatively new manner of describing ocean economic development that began to emerge first among many island nations, including tiny developing countries such as the Republic of Seychelles, as well as the archipelagic giant Indonesia, the fourth-most-populous country in the world. It's now gaining recognition in some of the world's biggest and most powerful nations, including China and the US, which have increasingly begun to turn to the concept of the Blue Economy to promote development of their ample ocean and coastal resources. Honing the Blue Economy's focus could ultimately pay dividends by allowing economic growth to blossom alongside environmental sustainability.

To sustain a 21st century population boom, we must balance marine economic development with protection of the ocean's environmental services.

China has not typically been at the top of the list of countries that relies most heavily on its ocean resources. Its exclusive economic zone, or EEZ—the area of ocean space over which a nation has sole right to extract resources including minerals and fish—is the subject of ongoing debate, with China claiming a vast area of the South China Sea that neighboring countries also claim. But China has sought to expand the economic contributions it receives from offshore resources.

The US, which boasts the largest EEZ in the world, has also looked beyond its shores to support its economy. Given both nations' economic clout, the US and China have tremendous potential to develop and implement policies that promote marine environmental protection and to prove that these strategies do not preclude the possibility of economic growth.

Yet as the Blue Economy emerges as a means of quantifying the economic benefit of ocean industries and resources, its true definition remains opaque. Adding up the contributions of all economic activity related to ocean and coastal ecosystems is a relatively simple means of drawing boundaries. But it fails to account for the reality that industrial development frequently comes with an environmental cost.

Offshore fossil-fuel extraction, for example, carries the risk of spills, which may lead to the degradation of natural resources and will increase emissions of carbon pollution and other greenhouse gases. In other cases, promoting one industry means preventing another; for example, an area designated for shipping lanes would be off-limits to construction of an offshore wind farm. As a result, the ocean economy cannot simply be relabeled the Blue Economy. The world needs a new definition of what constitutes a Blue Economy, both in order to

promote the economic benefits of ocean industries and to ensure sustainable development.

In January 2014, developing nations came together for two days in Abu Dhabi to explore and develop the concept of the Blue Economy under the auspices of the UN Sustainable Development Knowledge Platform. Their efforts were based on a concept paper that established the Blue Economy as a “framework for sustainable development.” It explained that “at the core of the Blue Economy concept is the de-coupling of socioeconomic development from environmental degradation... founded upon the assessment and incorporation of the real value of the natural (blue) capital into all aspects of economic activity.”

According to international law, countries have sole economic jurisdiction over ocean space that extends 200 nautical miles out from their shores. Small-island developing states have embraced the concept of the Blue Economy as a means of maximizing the benefits that accrue from their greatest asset: their marine resources. The Seychelles, for example, has a land area of 455 square kilometers, or 175 square miles—roughly three times the size of the District of Columbia. Yet it has dominion over an EEZ that encompasses more than 1.3 million square kilometers, or more than 514,000 square miles—nearly twice as large as Texas.

While island nations clearly have much to gain from improved management of their ocean resources, so do larger coastal nations, including the two economic leviathans: the US and China. In both nations, efforts are underway to better understand, define, and promote the Blue Economy. The report explores the concept's development, detailing the similarities and differences, and makes recommendations

Honing the Blue Economy's focus could ultimately pay dividends by allowing economic growth to blossom alongside environmental sustainability.



for how the United States and China can promote a collaborative understanding of how to value the ocean's natural resources around the globe.

The report also proposes three key recommendations to help the US and China account for the true value of robust marine natural resources and to boost cooperation as they increasingly look to their offshore regions for economic growth.

Specifically, the US and China should:

- ▶ Jointly develop a methodology to account for the long-term economic contributions of healthy coastal and ocean ecosystems.
- ▶ Establish joint initiatives under the US Department of State's EcoPartnerships program, incorporating ocean planning and blue technology clusters.

- ▶ Enhance and expand existing bilateral partnerships and develop new agreements to ensure sharing of best practices and consistency of oceanographic data collection and dissemination.

Leaders in both China and the US understand the need to boost economic growth, while curbing environmental degradation and reducing carbon pollution and other emissions that fuel climate change. Now, it's time for them to turn their attention to their vast areas of ocean space and implement policies that acknowledge the true economic and environmental opportunities that exist offshore.

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## MANAGING RISK IN THE EMERGING OCEAN ECONOMY: A VIEW TO 2030

Barrie Stevens Senior Advisor, International Futures Program for OECD



The maritime industry landscape is poised to undergo a profound transition. Long considered the traditional domain of shipping, fishing, and—since the 1960s—offshore oil and gas, new activities are emerging that are reshaping and diversifying maritime industries. The new “ocean economy” is driven by a combination of rising incomes, dwindling natural resources, responses to climate change, and pioneering technologies.

It holds considerable potential for innovation, jobs, and growth. But it is also characterized by a complex variety of risks that need to be carefully managed if the potential of the ocean economy is to be fulfilled.

While traditional maritime industries continue to innovate, it's the emerging ocean industries that are attracting most of the attention. These industries include offshore wind, tidal and wave energy; oil and gas exploration and production in ultra-deep water and exceptionally harsh environments; offshore aquaculture; seabed mining; marine tourism; and marine biotechnology.

The long-term potential for innovation, employment creation, and economic growth offered by these sectors is impressive. It ranges from offshore wind operations producing 175 gigawatts of power by 2035 and creating hundreds of thousands of new jobs, to scaling up marine aquaculture to help feed two billion extra mouths by 2050 to cruise tourism, a US\$120-billion-a-year industry projected to grow at eight percent annually.

But these maritime activities are unlikely to develop their full potential without effective management of the risks associated with them. These risks are linked to the ocean and coastal environment, but are also associated with potentially huge economic costs.

Each maritime sector harbors its own specific environmental and business risks, for instance:

Maritime activities aren't going to develop their full potential without management of the associated risks.

- ▶ A major oil spill in the Arctic would present current technologies with an insuperable clean-up problem if the oil were to seep under the ice cover and comingle with various other ice forms. It could well result in a ban on oil exploration and production for years to come.
- ▶ Tidal energy installations need to be balanced against the damage they may cause to natural habitats (for example, endangering marine mammals, depriving migratory birds of feeding grounds)—the cost of abandoning tidal energy projects can be considerable.
- ▶ Overly intensive marine aquaculture poses threats to coastal ecosystems.
- ▶ Coastal zones contain some of the world's richest and most fragile natural habitats, many of which are at risk from mass coastal and marine tourism—one quarter of coral reefs have been effectively destroyed and another two-thirds are under threat due to climate change and human pressures such as unsustainable tourism, coastal development and overfishing.
- ▶ Deep-sea mining is a concern in many quarters because of the potential damage to seabed biomass and pollution of the water column.

But there are also cumulative risks to the environment from the increasing competition for sea space and the lack of coordination of ocean activities within that sea space. Growing congestion creates crowded seas, suggesting a future of higher accident rates, more oil and chemical spills, and mounting tensions among the different maritime industries using the sea space.

## MANAGING ECONOMIC AND ENVIRONMENTAL RISK

It's becoming more apparent that the most appropriate way to manage both the economic and environmental risks is better management of the ocean space. Some countries in the advanced and emerging economies of the world are moving in that direction. Australia introduced marine parks many years ago in an attempt to protect its vulnerable coral reefs; China has operated a system of functional maritime zoning for some years now; Canada and the US have large stretches of ocean under marine management schemes; and Europe is strengthening and widening Maritime Spatial Planning (MSP). In the words of the European Commission:

*“Maritime Spatial Planning is a tool for improved decision-making. It provides a framework for arbitrating between competing human activities and managing their impact on the marine environment. Its objective is to balance sectoral interests and achieve sustainable use of marine resources in line with the EU Sustainable Development Strategy.”*

Looking around the world, however, ocean space management initiatives are far from being mainstream and, where they do exist, they often can't claim to be comprehensive. Either they are predominantly geared to protecting the ocean environment, or they fail to cover the full range of maritime activities in their seas, often excluding key sectors such as fishing or coastal and marine tourism. Comprehensive spatial planning is no easy task.

First, there are technical and scientific challenges, especially with respect to the difficulties encountered in data collection and use. The task of mapping environmental characteristics and species distribution, ecosystem goods and services, ecosystem vulnerabilities, the impact of human activities and their use of sea space often proves problematic. But science and technology are making encouraging progress with the help of earth observation, satellite tracking of vessels, and monitoring devices on the seabed and surface.

Second, MSP is a complex governance challenge. Effective management of ocean space requires the involvement of multiple stakeholders from multiple sectors: companies, co-operatives, coastal planners, scientists, local government, national government and local inhabitants

Significant advances in the coming years will require path-breaking efforts and innovations in governance tools and in the use of economic instruments, backed up by sophisticated technology to support the planning, management and enforcement of the agreed pattern of ocean use.

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## FEW SHIPS OR INSURERS ARE READY TO CARRY RISK OF ARCTIC PASSAGE

Marcus Baker, Chairman of Marsh Marine Practice, and Stephen Harris, Senior Vice President of Marsh Marine Practice



In October 2013, the bulk carrier *Nordic Orion* made the first-ever successful commercial transit of the Arctic's Northwest Passage (NWP), delivering a cargo of coal from Vancouver to Finland. The journey took around a week less than had it travelled via the Panama Canal, saving the operator both the toll fees and an estimated US\$80,000 in fuel costs. This was successfully repeated in the summer of 2014 by the Fednav icebreaking bulker *Nunavik*.

Global climate change—specifically the melting of sea ice—presents opportunities for international marine transportation networks in the Arctic, at least during the summer months. As well as the NWP, these include the Northern Sea Route (NSR) (which runs along the “top” of Russia) and the Arctic Bridge (which starts in Churchill, Canada, crossing the northern Atlantic Ocean and eventually ending in Murmansk, Russia). However, while these routes offer alternatives to the Panama and Suez canals, they pose new risks from these traditional routes.

Today, the majority of ships and their crews are not ready, the support service facilities are not in place, and the risks involved are not understood at a level to enable underwriters to price insurance for Arctic transit by those inexperienced in these waters, with either clarity or certainty.

Extreme climate and weather conditions create unique hazards, including floating ice, thick fog and violent storms. Despite new safety features, vessels remain vulnerable to ice damage, machinery breakdown, grounding, stranding and more. The harsh environment also creates challenges for crews, few of which have been trained for or have experience in such conditions. And should a vessel run into difficulty, help is likely to be a long way away.

The international shipping industry is anxious to start maximizing the opportunities afforded by Arctic navigation given the mathematical savings in time and distance. But it is not simply a question of mathematics. The marine insurance industry—whose collaboration

is essential to the commercial viability of Arctic transit—holds a host of safety and navigational concerns, which may limit or prohibit the possibility of rapid growth in Arctic transit for the foreseeable future. The adoption of the Polar Code by the International Maritime Organization last year was welcomed by the insurance industry as a positive step, setting out recommended hull structural and senior officer training standards, but it will not be implemented until 2017 and questions remain over the bank of experienced personnel who could provide the effective training required, and the salvage and rescue infrastructure that exists in often remote areas, should an accident happen.

Meanwhile, published loss data to date does not bode well. In its latest *Safety and Shipping Review 2015*, Allianz Global Corporate & Specialty paints a worrying trend: From 2002 to 2007, the number of reported maritime incidents in Arctic waters averaged just seven losses per year. That number rose significantly as traffic increased. Between 2009 and 2013, the yearly average of incidents in Arctic waters rose to 54. In 2014 alone, despite a noticeable reduction in NSR transits, the number of reported incidents in Arctic waters rose to 55.

While both hull and protection and indemnity (P&I) insurers have a wealth of information and data on the traditional risks involved in shipping, there are several risks associated with Arctic navigation that still need to be identified and measured to accurately assess the risk. For long-established operators in the Arctic and Antarctic regions,

insurers may take a more willing approach. However, as more “untested” and inexperienced operators decide to navigate through these waters in a bid to reduce time and bunker costs, concerns for this type of operator grows. Limited or non-existent historical loss records for inexperienced operators make it difficult for underwriters to establish premium rates and for insurers to develop comprehensive assessments of the risks involved in sailing through the Arctic.

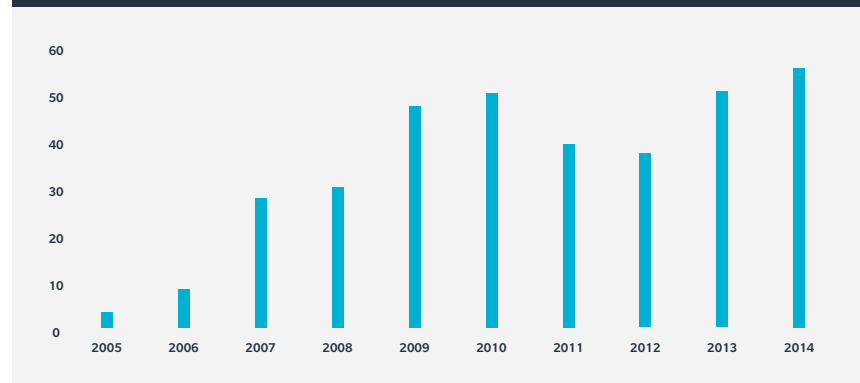
## INSURERS' STRUGGLE TO SORT OUT RISK COULD STIFLE ARCTIC ROUTE GROWTH

Arctic navigation presents hull insurers with considerable risks, which increase the possibility of groundings, strandings, machinery breakdowns, ice damage, heavy weather damage and even fire, should machinery break down or pumps fail to operate. If a vessel does suffer an incident, there are serious concerns over the distance to adequate salvage services or repair facilities, especially in the eastern part of the NSR.

What might start as a small incident could quickly escalate if adequate assistance is unavailable or if large, difficult-to-replace parts are not carried on board. Any incident will also face a ticking clock as winter inevitably returns, creating possibly catastrophic consequences for a stricken vessel that cannot be removed quickly.

**FIGURE 3 Arctic Waters – Number of incidents, including total losses**

Source: Lloyd's List Intelligence Casualty Statistics Analysis: AGCS



P&I insurers face similar, though somewhat different, concerns. Whereas hull insurance is normally limited to an insured ship, P&I insurance extends coverage to include wreck removal, pollution, salvage, crew injury and hospitalization, among others. The limited salvage equipment and search-and-rescue capabilities at certain points along both the NSR and the NWP, concern insurers that all of these risks could prove extremely costly, if an event were to occur.

Without any hard facts on preparedness, it will be difficult, if not impossible, for underwriters to put a price on an insurable risk with confidence, or even to agree to cover a voyage in the first place.

Use of the NSR accounts for a comparatively small percentage of the total global marine transport activity, and to date the NWP has only been used by a few vessels.

Nevertheless, these levels appear set to increase significantly over the coming years, and it would seem inevitable that hull and P&I insurers will be more frequently asked to consider allowing vessels to navigate the northern waters.

Underwriters' concerns surrounding remoteness, limited salvage support services, and other risks means that it is not at all certain that they will accommodate such requests, simply by operators agreeing to follow the Polar Code. Negotiations will need to be handled carefully by those who have been studying and engaged in the issues of this region.

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## MANAGING GROWING ENVIRONMENTAL RISKS FOR PORTS AND TERMINALS

Janice Kowell Senior Vice President, Global Marine Practice at Marsh, Chris Smy, Managing Director, Global Environmental Practice Leader at Marsh



Any number of unforeseen problems can lead to costly environmental losses for US ports or land-based terminals.

The energy sector, for example, is increasingly using marine terminals and shore-side facilities to store and transport oil products, exposing operators to a greater potential for environmental risks, including regulatory violations or scrutiny, increasing probability of a sudden pollution event, or the discovery of previously unknown contaminants during expansion projects.

### OPERATIONAL AND LEGACY RISKS

Daily operations at ports and terminals—from vessel berthing to the handling of cargo — frequently result in oil and other hazardous material releases. These releases can hurt an organization's bottom line via:

- ▶ Cleanup and disposal costs and regulatory fines, which can extend into the hundreds of thousands of dollars or more. For example, in August 2014, a terminal operator entered into an agreement to reimburse the US Environmental Protection Agency (EPA) for costs incurred by the agency following an incident that released at least 200,000 gallons of liquid fertilizer at a site adjacent to the Elizabeth River in Chesapeake, Virginia.
- ▶ Lost revenue if a port or terminal is forced to shut down some or all of its operations following an environmental release. In September 2014, for example, a fire that ignited chemically treated wood—releasing smoke and toxic gases such as benzene and naphthalene—took more than 24 hours to extinguish, forcing the closure of container terminals for a weekday shift at a major West Coast port complex.

Daily operations at ports and terminals—from vessel berthing to the handling of cargo — frequently result in oil and other hazardous material releases.

What's more, the legal issues associated with a release can take years to resolve. For example, an incident involving a tanker that leaked 263,000 gallons of crude oil into the Delaware River in 2004—later determined to be caused by an abandoned anchor along the path used by ships to approach a New Jersey port—is still in litigation. At issue is the terminal operator's potential liability and exposure to the vessel owner's gross recovery claim of US\$180 million.

Other activities can also lead to environmental exposures. For example, ports and terminals are frequently situated on reclaimed, low-lying land, with historically imported fill, which contains hazardous material that can disrupt construction projects. Liquid bulk tanks with connecting pipelines are subject to sudden and accidental pollution exposure arising from structure failure or gradual ground seepage and surface leakage.

Legacy issues, including leaks and accidental release from past operations that were not properly addressed at the time, can also present sizable risks. Even activities occurring decades ago can lead to significant losses, and activities conducted by past tenants or unrelated businesses that are no longer viable entities can increase an operator's liability exposure. These legacy claims can result in waste disposal activity required under the Comprehensive Environmental Response, Compensation, and Liability Act ("Superfund") or toxic tort occupational disease claims arising from worker exposures to toxic substances. A merger, acquisition, or expansion project can also result in financial losses years after the transaction or construction has been completed.

## REGULATORY SCRUTINY

While Superfund can be a significant regulatory burden, it's not the only form of regulation that port and terminal operators must contend with. For example, the EPA is proposing revisions to its definition of "navigable waters," which would expose operators to new water pollution risks under the Clean Water Act.

There's also been a proliferation at both the federal and state level of natural resource damage assessments (NRDAs), which can extend pollution liability well beyond cleanup, containment, removal, and disposal. If assessed, an NRDA can create a long-tail financial responsibility that lasts for several years after cleanup is completed and results in fines, penalties, and other expenses in the tens of millions of dollars. For example, the EPA recently assessed an NRDA penalty of US\$11.5 million and required wetland restoration after the rupture of a pipeline at an oil refinery operating at a major New Jersey port that resulted in the release of 600,000 gallons of oil into abutting wetlands.

## MANAGING ENVIRONMENTAL RISKS

Port and terminal operators can take several steps to manage their operational and legacy risks to mitigate potential losses. This generally includes a detailed analysis of key risks, planning to address likely emergencies, and considering the purchase of insurance.

Organizations should start by performing a risk mapping and catastrophic failure analysis, which can identify known risks from various likely emergency scenarios. With this information, organizations can then design strategies to prevent or reduce the probability or

Organizations should start by performing a risk mapping and catastrophic failure analysis, which can identify known risks from various likely emergency scenarios.

impact of accidents or other release situations—for example, ensuring the structural integrity of equipment used to store or transport oil and other chemicals, and ensuring that redundant control systems are in place.

These loss analyses will guide an organization to determine specific areas to address. For example, if a chemical spill has a high probability, the operator should focus on monitoring, detection, containment, and removal procedures. If the probable risk is associated with exposure of residents, effective evacuation and communications planning should be the primary risk drivers.

New expansions, construction and other capital projects can create environmental risks that require effective planning and environmental assessments to obtain required federal, state, and local permits. A similar risk assessment approach—understanding all potential hazards associated with such projects, and how they should be qualified and quantified—is essential to determining appropriate strategic solutions.

Marine operations risk managers have historically recognized their risk exposures inherent in shore-side and waterborne operations and have transferred many of them to commercial marine and environmental insurers. Coverage for sudden and accidental pollution liability is included in a variety of marine liability insurance products.

Although these policies often provide robust insurance coverage, there are some exceptions—for example, marine pollution liability policies typically exclude coverage for fines, penalties, and punitive damage, and may provide only limited coverage for legacy risks.

Some environmental insurance products may provide broader coverage—for example, pollution legal liability insurance can provide coverage for historic and current operations at an insured property, and includes coverage for civil fines and penalties and natural resource damage. And contractor's pollution liability insurance can respond when a contractor causes contamination as a result of its operations or when a contractor's operations exacerbate preexisting contamination.

But simply purchasing separate marine and environmental insurance policies without thoughtfully integrating them can leave an organization vulnerable. Ports and terminal operators should work with their insurance advisors to carefully coordinate placement of their marine and environmental insurance policies, ensuring that coverage gaps are properly filled and that their interests and understanding of key risks and policy language are aligned with those of their insurers.

Ultimately, these steps can help ports and terminal operators to better safeguard their operations and protect their bottom lines.

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## BAD NEWS FOR THE "BLUE ECONOMY"

BRINK Editorial Staff



Even grade school children know the oceans are choked with plastic, but until recently there were no good estimates of just how bad the situation is. It turns out that the best guess is 5.25 trillion pieces of plastic—from large to micro-particles—weighing in at about 269,000 tons.

“That’s like 38,000 African Elephants or stacking 2-liter water bottles from here to the moon and back, twice,” Marcus Eriksen, leader of the scientific study making those estimates, said during a recent online Q&A session for Reddit.

Eriksen’s five-year study found plastic in every ocean his team examined, even in the most remote regions of the globe.

Ocean plastic eventually congregates at “gyres,” where currents converge, and ends up falling victim to the elements: The sun makes the plastic brittle, and the waves act like huge blenders or shredders, producing smaller and smaller pieces that eventually get absorbed through the food chain, settle on the ocean floor, or swirl around in a kind of ocean-going plasticized soup.

### BAD NEWS FOR THE "BLUE ECONOMY"

“However, we stress that our estimates are highly conservative, and may be considered minimum estimates,” Eriksen says in his report.

All this results in bad news for the so-called “blue economy” that is built on the strength and vibrancy of the world’s oceans. Half the world’s population lives within 62 miles of a coast—this includes two-thirds of all cities over 2.5 million people. By 2025, it’s estimated that 75 percent of the world’s population will live in coastal areas. At risk are the vast economic benefits the ocean provides, an estimated US\$7 trillion annually.

If something isn’t done to decrease the flow of plastic into the ocean then we’ll face continued pollution of marine food webs, including fish we harvest to feed the world, Eriksen said.

According to a UN concept paper on the blue economy, globally 350 million jobs are linked to marine fisheries, with 90 percent of fishers living in developing countries. The value of fish traded by developing countries is estimated at US\$25 billion, making it their largest single trade item.

“We suspect that more animals are killed by vagrant plastic waste than by even climate change—a hypothesis that needs to be seriously tested,” wrote Charles J. Moore, a captain in the US Merchant Marine and founder of the Algalita Marine Research and Education Institute.

And, even though there’s no reasonable way to remove all the plastic from the water, there should be an emphasis on manufacturing reusable plastics, Eriksen said.

“All solutions must happen upstream. Better waste management means smarter products designed for it,” Eriksen said. “I urge the plastics industries to go for 100 percent recovery of their products, or 100 percent environmental harmlessness.”

The American Chemistry Council, a trade group for the plastics industry, issued a statement saying, “America’s plastic makers wholeheartedly agree that littered plastics of any kind do not belong in the marine environment.” The organization went on to point out several ongoing industry efforts aimed at stemming the flow of plastics into the ocean, including the Global Declaration and its 185 projects that have been completed or are ongoing in various parts of the world.

But Eriksen doesn’t agree that the ACC is doing enough. He wants to see problem items phased out altogether. “For the last decade the ACC has fought source reduction, even for products like plastic bags, microbeads, and styrofoam cup and plates,” he said. “These items cost taxpayers a lot of money to deal with, so we want them phased out in favor of smarter alternatives. This is the frontline conflict we have with industry, it’s more recycle bins vs. phase outs of problem products.”

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