25
Maritime Activities

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Opposite page: Evening in Port Louis, Mauritius. © Peter Kuchar.

INTRODUCTION

Shipping is essential to the global economy, providing the most cost-effective means of transporting bulk goods over long distances. Around 80 per cent of global trade by volume and over 70 per cent by value is carried by sea and is handled by ports worldwide, with these shares being even higher in the case of most developing countries (UNCTAD 2014). Despite some decreases since the onset of the slowdown in the global economy in 2009, the volume of seaborne trade increased by 3.8 per cent during 2013 (UNCTAD 2014). Moreover, Lloyd's and others (2013) projected that – driven by increases in global population and GDP - it will rise from 9 000 million tonnes to between 19 and 24 000 million tonnes by 2030.

In January 2014, the global fleet of merchant ships of 100 Gross Tonnes had a combined tonnage of just over 1 690 million Gross Tonnes (UNCTAD 2014). This was an increase of 4.1 per cent over January 2013, which in turn was more than double that of 2001 (UNCTAD 2013). The capacity of the fleet is expected to increase by some 50 per cent by 2020 (DNV 2012).

Around 90 per cent of these vessels are cargo vessels comprising general cargo ships (4.9 per cent of tonnage), oil tankers (28.5 per cent), gas carriers (2.7 per cent), chemical tankers (1.4 per cent), bulk carriers (42.9 per cent), offshore (4.3 per cent), ferries and passenger ships (0.3 per cent) and containerships (12.8 per cent). This reflects an increase in the relative percentage of bulk carriers and container ships – at the expense of general cargo vessels and oil tankers (UNCTAD 2013, UNCTAD 2014). In contrast, oil tankers now make up some 80 per cent of the Western Indian Ocean (WIO) fleet – the majority registered in Tanzania - compared with 14.5 per cent in 2004 (see Figure 25.1).

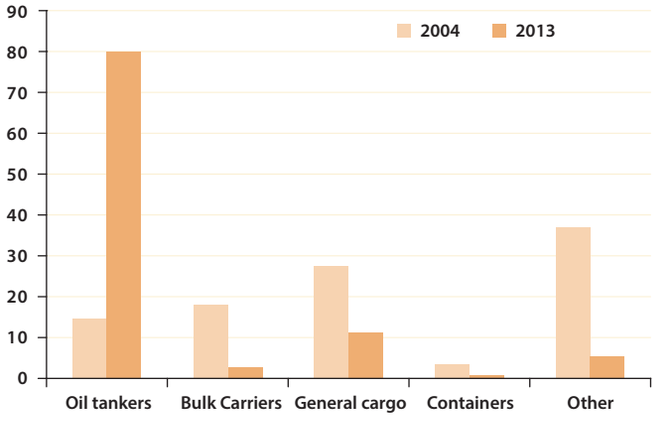


Figure 25.1. The makeup of the WIO fleet with the various vessel types shown as a percentage of the total fleet (based on data from UNCTAD reports).

The global fishing fleet numbers 21 589 ships with a Gross Tonnage of 9.438 million. Other fishing-related vessels (fish carriers, support vessels etc.) number 1 242 with a Gross Tonnage of 1.233 million (IMO 2012).

Some 6 per cent of the world trading fleet travels to ports in the Indian Ocean (UNCTAD 2006). In addition, vessels such as oil tankers frequently travel through the

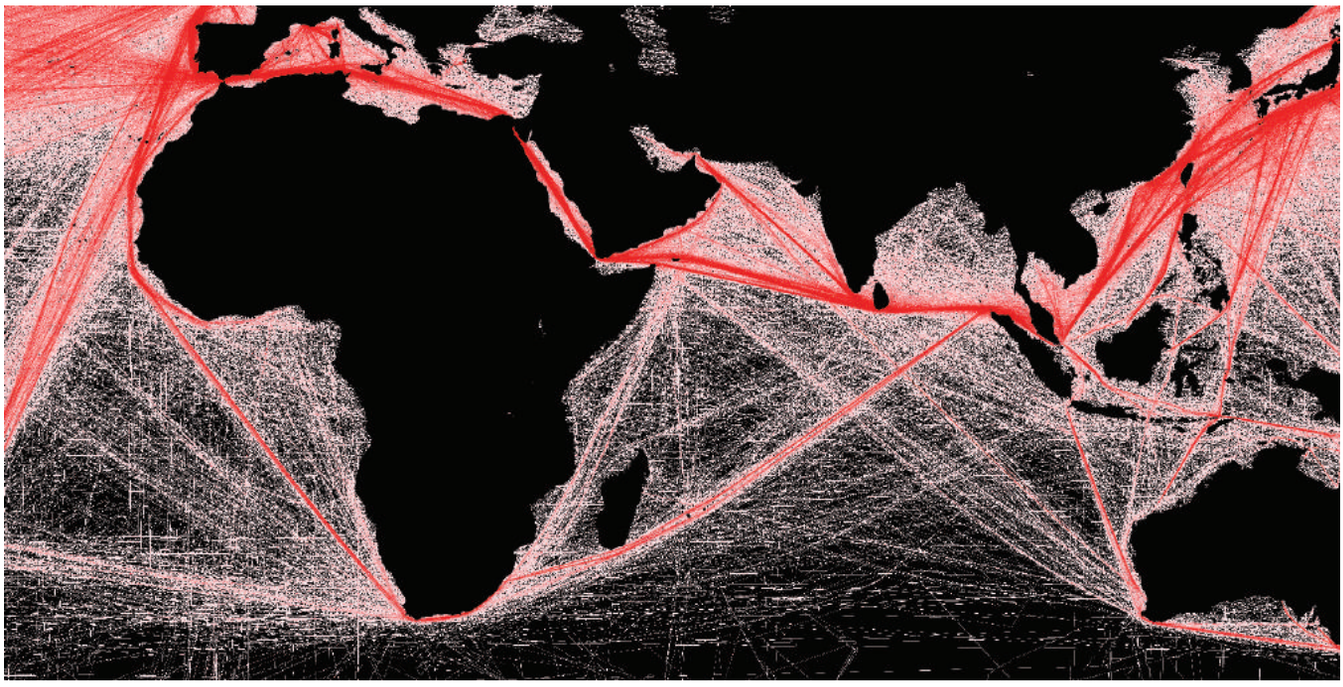


Figure 25.2. Relative commercial shipping density, at a scale of 1 km. © University of California, National Center for Ecological Analysis and Synthesis.

Western Indian Ocean (WIO) because it forms part of the route between the major oil-producing countries and their markets (see Figure 25.2). Other challenges in the region include piracy, the illegal dumping of toxic waste and potential impacts of climate change as a result of more frequent storm events and rising sea levels.

While ships are essential to the global economy, they have a variety of negative environmental impacts. These include:

- Pollution resulting from the ship's day-to-day operational activities;
- Pollution as a result of accidents;
- Impacts related to ship recycling; and,
- Translocation of invasive alien species primarily via ballast water and hull-fouling.

Internationally, operational pollution is regulated by the International Convention for the Prevention of Pollution from Ships (MARPOL 1973/78) which has a number of Annexes, each dealing with a specific type of ship-related pollution, including oil, garbage, sewage and air pollution. Accidental pollution, liability, and invasive alien species are covered by a number of other conventions and guidelines – all administered by the International Maritime Organisation (IMO).

Although the number of major oil spills has declined in recent years, vessels also carry a wide range of cargoes – including hazardous chemicals – which also pose significant risks in the event of accidents. It is estimated that the annual seaborne chemical trade will grow from some 151 million tonnes in 2005 to 215 million tonnes by 2015 (OSC 2006). Moreover, the growth of the world fleet has led to shipping lanes becoming more and more congested, thereby increasing the risks of accidents – particularly around ports. The risk of accidents is also likely to be further exacerbated by an increase in adverse weather conditions as a consequence of climate change.

Although passenger ships make up a very small proportion of the global fleet, the cruise industry has seen rapid growth in the past few years with over 20 million passengers cruising globally during 2012 (F-CCA 2013). It is estimated that cruise ships – which can carry up to 5 000 passengers and crew – can discharge around 100 000 litres of sewage a day. This excludes greywater such as laundry, shower, and galley sink wastes, which are produced in even higher volumes and which may include oils, nutrients, detergents, heavy metals, pesticides and even medical and dental wastes. This is of particular concern in that cruise ships frequently dock very close inshore in sheltered coastal environments.

With respect to invasive alien species, an analysis by Molnar and others (2008), drawing on information from over 350 databases and other sources, showed that for the 329 marine invasive species considered, shipping was the most common pathway (69 per cent), with others being aquaculture (41 per cent), canals (17 per cent), the aquarium trade (6 per cent), and live seafood trade (2 per cent).

Of the 205 species introduced via shipping – and for which sufficient information was available – 39 per cent were introduced by hull-fouling, 31 per cent via ballast water, and the remainder by either or both.

While there can be many direct and indirect impacts of invasive marine species, the principal consequences can be grouped into three main categories:

• Ecological impacts occur when the local biodiversity of the area and/or the ecological processes are altered by the invasive species;

• Economic impacts, including losses as a consequence of reduced productivity, and costs incurred for the prevention and management of invasive species; and

• Public health impacts: ballast water can transfer a range of species including bacteria, viruses and microalgae such as those that cause harmful algal blooms (HABS) with consequential health impacts.

In light of the likely increase of shipping in the region – and the heightened environmental risks – consideration needs to be given to developing policies on a number of issues including:

• The strengthening of Port and Flag state controls, particularly taking into account the fact that one of the objectives of the African Union's 2050 AIM Strategy is to increase African ownership of ships;

• Development of a regional maritime surveillance system;

• Pollution monitoring and reporting;

• Building awareness and addressing sources of marine litter;

• Adequacy of waste reception facilities in ports;

• Development of a regional approach to the management of ships as vectors of alien and invasive species; and,

• A coordinated response to potential impacts of climate change on the maritime sector.

STATUS OF MARITIME ACTIVITIES IN THE WIO

While developing countries continued to increase their contribution to seaborne trade during 2012, Africa only accounted for 787 million tonnes of global goods loaded (8.58 per cent) and 407 million tonnes unloaded (4.44 per cent), much of it from West Africa (UNCTAD 2013). Trends in key products for Eastern Africa are shown in Table 25.1.

While there has been a general increase in both imports and exports over the years, the most significant change has been in the African export of crude oil since 2006 and an associated decline in crude oil imports since 1990. With the recent discovery of additional reserves of oil and especially

Table 25.1. Seaborne trade volumes in Eastern Africa, excluding South Africa (millions of tonnes)*.

	Goods loaded				Goods unloaded			
Year	Crude oil	Hydrocarbon products	Dry cargo	TOTAL	Crude oil	Hydrocarbon products	Dry cargo	TOTAL
1970	0	1.2	16.1	17.3	5.5	2.6	8.3	16.4
1980	0	0.9	6.3	7.2	6.2	2	9.9	18.1
1990	0	0.6	9.3	9.9	6.4	2.6	16	25
2000	0	0	7.2	7.2	0.7	4.8	19	24.5
2005	0	0	9.3	9.3	0.7	5.2	20.5	26.4
2006	11.8	1.1	29	41.9	2.1	7.7	18.2	28
2007	13.6	1.2	23.3	38.1	2.1	8.3	19.8	30.2
2008	19.7	0.8	27.8	48.3	1.8	7.9	23.8	33.5
2009	19	0.6	18.3	37.9	1.7	9.2	24.4	35.3
2010	19	0.5	29.5	49	1.9	8.6	26.3	36.8
2011	20	1	16.7	37.7	1.4	9.6	39	50
2012	22	1.1	16.8	39.9	1.5	10.4	42.1	54
Global								
1970	1 108.9	232.5	1 162.4	2 503.8	1 101	297.5	1 130.9	2 529.4
2012	1 785.4	1 050.9	6 329	9 165.3	1 928.7	1 054.9	6 200.1	9 183.7

*Data extracted from UNCTAD reports, noting that only regional data is available, and that South Africa is not included in this group. Global figures are included for comparative purposes.

gas in the WIO countries, the contribution of East Africa to oil and hydrocarbon products (especially methane) exports will likely grow in future (see Chapter 26).

African ports currently handle 6 per cent of global water borne cargo and 3 per cent of containers (AU 2012). According to the African Development Bank (2010), this will increase from 265 million tonnes in 2009 to more than 2 000 million tonnes in 2040, while transport volumes will increase six- to eightfold, with a particularly strong increase of up to 14 times for some landlocked countries (UNCTAD 2013).

There are 13 existing commercial ports in the region with several others either in the planning phase or under construction. The port at Lamu (Kenya), for example, is

BOX 25.1. LAMU PORT

Waterfront of Lamu old town, Kenya. © Kiunga Kareko.

The development of a port at Manda Bay in Lamu is a key component in Kenya's Vision 2030 Strategy for Growth and Development (http://www.lapsset.go.ke/lamu). It is intended to accelerate development of trade routes linking the Northern part of Kenya to South Sudan and Ethiopia. A feasibility study carried out by the Japan Port Consultants Ltd in 2010 found that the development of a port in Lamu would have "extensive irreversible environmental, social, and cultural impacts on what is a unique and culturally sensitive area". In terms of Kenya's Environmental Management and Coordination Act, 1999, the Ministry of Transport therefore commissioned an Environmental and Social Impact Assessment (ESIA) to determine in more depth the likely impacts of the first phase of the proposed development, establish a baseline, and advise on mitigation measures.

The ESIA anticipated a number of major impacts that included:

- Loss of water quality;
- Loss of mangrove habitat, degradation from pollution and changes in tidal flushing, and increased use as a resource;
- Displacement of artisanal fishers, reduction in accessibility to fishing grounds and landing sites, reduction of stocks;
- Negative effects on archaeological, historical and cultural impacts. It is predicted that the port is likely to alter the character of the Old Town of Lamu - a UNESCO Heritage Site;
- Human health and safety issues relating to the port construction work and the associated influx of migrant workers.

The ESIA report proposed the following in mitigation of the impacts:

- Practice less intensive dredging techniques;
- Development of an oil spill preparedness and response plan;
- Limit a loss of mangrove habitat by reducing the footprint of the port. Restoration of an equivalent area of mangroves at another appropriate site;
- Implementation of monitoring programmes for all relevant aspects of the port and port environment;
- Empowerment of local fishers to operate in deeper waters. This can only be achieved through the provision of fisheries equipment and infrastructure;
- Development of protocols for the preservation of artefacts found during the construction process;
- Significant expansion of local health facilities.

Some sources criticised the ESIA citing issues relating to inadequate research methods and public consultation, incomplete baseline information and description of impacts, insufficient assessment of project alternatives, and impractical and even harmful recommendations on measures to mitigate impacts as contained in the ESIA (www.savelamu.org).

Reference:

Extracted from Ministry of Transport: Kenya (2013). ESIA Study Report for Construction of the First Three Berths of the Proposed Lamu Port and Associated Infrastructure. Final Report. 216 pp.

Table 25.2. Container port throughput (TEU's)*.

	2003	2004	2010	2011	2012
Kenya	331 000	404 000	696 000	735 672	903 000
Madagascar	95 000	105 000	141 093	149 135	155 101
Mauritius	381 000	290 000	332 662	350 624	417 467
Mozambique	Not available	Not available	254 701	269 219	279 988
Reunion	Not available	Not available	Not available	Not available	224 000
South Africa	237 4000	2 670 000	380 6427	3 990 193	4 424 254
Tanzania	204 000	256 000	429 285	453 754	471 904
TOTAL	3 385 000	3 725 000	5 660 168	5 948 597	6 875 714
Global	299 280 432	336 858 116	540 816 751	580 022 280	601 722 123
% of global	1.131%	1.105%	1.047%	1.026%	1.14%

*Data from UNCTAD Reports, with the exception of Reunion, which is from Simon (*pers. com.*). NOTE: Figures for South Africa include all ports, not just those on the east coast.

under construction, while construction on that proposed for Bagamoyo (Tanzania) is expected to start before the end of 2015. The ports serve as hubs for traffic emanating from, and destined for Europe, Asia, the Americas and the east and west coasts of Africa. In addition, there are a number of smaller ports and harbours.

Trade in containerized goods has grown rapidly over the past few decades and comprised 16 per cent of global seaborne trade by volume (155 million TEU's) in 2012 (UNCTAD 2013). Of this only around 1 per cent is handled by ports in the WIO region (see Table 25.2). The top container ports in the region include Durban, Mombasa, Port Elizabeth, Port Louis, Dar es Salaam, Toamasina and East London. Several of these have become important as regional trans-shipment hubs resulting in significant increases in throughput.

ENVIRONMENTAL IMPACTS OF MARITIME ACTIVITIES IN THE WIO

Operational pollution from ships

The majority of countries in the region are Party to MARPOL and most of its Annexes (see Table 25.3 below) with the exception of Annex VI which deals with air pollution. The majority are also Party to the Conventions dealing with liability for oil spills as well as the International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) which deals with cooperation in case of oil spills. On the other hand, only two countries are presently Party to the Ballast Water Management Convention.

There is effectively no data available on any form of operational pollution from ships in the region. Moreover, an assessment of national marine pollution monitoring in the region under WIOLaB (which focussed on land-based sources) (De Mora 2006) reported that none of the countries in the region has a comprehensive national marine pollution monitoring programme with most monitoring that does take place being linked to specific projects or sites (eg outfalls).

Similarly, there has been no specific assessment of litter from vessels. However, an assessment of marine litter in the WIO Region (UNEP and others, 2008) concluded that:

- Marine-based sources of litter do not appear to be as significant as land-based sources although the WIO is heavily trafficked by commercial shipping and fishing vessels. However, loss of fishing gear and dumping of garbage from fishing boats is widespread;
- None of the islands or coastal states can afford to effectively police their territorial waters or exclusive economic zones;
- Because of the nature of the ocean currents, litter dumped almost anywhere in the Indian Ocean can be transported for thousands of kilometres;
- The major constraints to effective waste management, and thus to reducing marine litter, are inadequate awareness about impacts and/ or a shortage of funds to deal with it.

Apart from impacts on human health and tourism, marine litter affects biodiversity as a result of ingestion, entanglement (especially of turtles, seabirds and mammals) and smothering – for example, on coral reefs. Some countries do keep records of, for example, animals found entangled while Kenya has produced a Sea Turtle Strategy which identifies marine litter as a threat (Kenya Wildlife Service 2009).

Table 25.3. Membership of WIO countries to relevant IMO Conventions (X = Party)

Convention	Country								
	Com	Kenya	Mad	Maur	Moz	Sey	Som	SA	Tanz
MARPOL 73/78 + Annexes I (oil) & II (bulk noxious liquids)	X	X	X	X	X	X		X	X
MARPOL Annex III (packaged goods)	X	X	X	X	X			X	X
MARPOL Annex IV (sewage)	X	X	X	X	X				X
MARPOL Annex V (garbage)	X	X	X	X	X			X	X
MARPOL Annex VI (air pollution)		X							
CLC Protocol 1992 (liability)	X	X	X	X	X	X		X	X
FUND Protocol 1992 (liability)	X	X	X	X	X	X		X	X
OPRC 1990 – response cooperation	X	X	X	X	X	X		X	X
Ballast Water Management Convention - 2004		X						X	

Shipping accidents

The International Tanker Owners Pollution Federation (ITOPF) maintains a database of spills from tankers going back to 1967. The only major oil spill listed by ITOPF in the WIO region since 1967 is the Katina P, a Greek tanker which spilled an estimated 13 000 tonnes of #6 heavy fuel oil in the Mozambique Channel after suffering hull damage on passage from the Persian Gulf in 1992 (www.itopf.org).

The IMO has a database on shipping casualties but it relies on reports from the countries, and for the majority of WIO countries there are either no reports, or reports which provide minimal information. Table 25.4 below summarises the information from a report prepared for the Agulhas Somali Current Large Marine Ecosystem project (ASCLME) (Jackson 2011).

Invasive alien species (IAS)

Information on marine invasive alien species and harmful algal blooms (HABs) in the WIO region is fairly limited largely due to the fact that it is a relatively new field and only a few assessments targeting alien species have been conducted. One exception is the marine invasive species survey conducted in Port Victoria during 2005, under the SCMRT-MPA, IUCN and NIWA (see Bijoux and others, 2008). The study found four species that were non-native, out of about one hundred identified, and provided a sound baseline from which future monitoring can be undertaken.

The majority of alien species that have been recorded in the WIO region are thought to have been introduced either via bio-fouling on ships, or as deliberate introductions for mariculture purposes. Of the alien species identified, only a few are thought to have significant invasion potential. These include the Asian mussel (*Musculista senhausia*), the oyster (*Crassostrea gigas*), the European Green crab (*Carcinus maenas*), and a barnacle (*Balanus glandula*). The Crown-of-thorns Starfish (*Acanthaster planci*) is considered to be cryptogenic and is impacting on coral reefs in the region (Awad 2011).

HAB events have been reported from Kenya, Mauritius (including Rodrigues), Somalia, South Africa and Tanzania. However red tides and other HAB events are known to occur throughout the region usually associated with the beginning of the northeast monsoon season in East Africa (Awad 2011).

Table 25.4. Shipping casualties in the WIO region (as reported to IMO).

Country	IMO database	Other Sources
Comoros	0	0
Kenya	0	Abuodha and Kairo (2001) - Mombasa Kenyan National Oil Spill Response Contingency Plan (2007) – around 30 spills in and near Port of Mombasa
Madagascar	1 (2001)	0
Mauritius	2 (2001/2003)	0
Mozambique	4 (2000/2001/2002)	0
Seychelles	1 (2008)	0
Somalia*	9 (1990 – 2009)	0
South Africa	9 (2001 – 2006)	Jackson (2011)
Tanzania	0	Mohammed and others (2008) – spill from Single Buoy Mooring near Dar es Salaam

*Many of these were incidents of piracy.

Environmental impacts of port activities

Ports are the interface between maritime and land-based activities and are generally located in sheltered environments such as bays and estuaries in close proximity to urban complexes. Such locations are invariably environmentally sensitive and can be negatively affected both by port construction and operations depending on the proximity to natural resources and the nature of the adjacent activities.

Although there is limited specific information on pollution in ports for most countries in the WIO region, the majority of the pollution hotspots identified during the WIO-LaB project were in or adjacent to ports. Dar es Salaam harbour, for example, was listed as a pollution hotspot, with sediments containing high levels of heavy metal and organophosphates (Mohammed and others, 2008). Similarly, Port Victoria was identified as a Category 2 hotspot for metals, microbiological pollutants and nutrients (Antoine and others, 2008). Studies conducted in Mozambique have shown the presence of heavy metals, particularly lead (Pb), in the Port of Maputo from discharges of the Matola and Maputo Rivers, as well as in Nacala Bay (Fernandes 1996, Anon Mozambique 2007). And, as mentioned above, the majority of oil spills reported in Kenya are in and around the port of Mombasa. A contributing factor is that many ports in the region lack adequate waste reception facilities for calling vessels.

Dredging takes place during both port construction and operational phases with the greatest long-term concern being the disposal of the dredged material. The dumping of waste at sea – including dredged material – is regulated under the London Convention/Protocol. Globally, dredged material from ports and waterways is the most common waste dumped with annual amounts of between 150 and 400 million tonnes. Of this, about 66 per cent arises from regular maintenance dredging, with the balance from capital dredging. Much of this is relatively clean, but around 10 per cent is heavily contaminated with toxic chemicals such as trace metals and hydrocarbons. Moreover, the disposal of large volumes of dredged material can cause physical smothering of benthic species and habitat alteration (http://londonprotocol.imo.org).

Although a number of the WIO countries are party to the London Convention/Protocol, only South Africa reports on the dumping of dredged material with volumes ranging from around 2 million to 24 million tonnes per annum between 2001 – 2009 (data provided by Y.Petersen, DEA).

The WIO-LaB project did, however, generate some general information on dredging activities. For example:

- Munga and others (2006) reported that the dredged material from the port and channels of Kilindini Harbour in Mombasa is disposed of in the adjacent deep waters beyond the reef. These sediments contain significant amounts of particulate material and associated chemicals such as nutrients, heavy metals and persistent organic contaminants;
- Dredging in Port Louis, is undertaken on an *ad hoc* basis in existing channels for maintenance purposes, as well as for strategic port development (Anon Mauritius 2009);
- The four most important ports in Mozambique are Maputo, Matola, Beira and Nacala. Poor land-use practices result in high levels of sedimentation in coastal environments and, as a result, frequent dredging of these harbours

and their entrance channels is needed. Surveys from 10 years ago showed that between 1.2 x 106 m^3 and 2.5 x 106 m^3 of sediments need to be dredged annually from the ports of Maputo and Beira respectively (FAO 1999).

SOCIO-ECONOMIC CONCERNS

The African Union's 2050 Integrated Maritime (AIM) Strategy identifies the African Maritime Domain as an opportunity for the growth and development of a maritime economy whilst acknowledging that this must be done in a sustainable manner. In addition to potential environmental impacts, there are a number of other challenges including piracy, the illegal dumping of toxic waste and potential impacts of climate change on shipping and port infrastructure.

Piracy

Piracy emerged as a problem in the region from around 2005, initially primarily off the coast of Somalia, but subsequently spreading into the Gulf of Aden, Red Sea, Arabian Sea and the Indian Ocean as far south as Mozambique (OBP 2012a, OBP 2012b). The number of attacks in the region peaked at 237 in 2011 – 54 per cent of the global tally – but dropped significantly in 2012/13 (see Table 25.5) as a result of efforts on the part of a number of organisations, including various United Nations agencies, the African Union, an European Union Naval Force and the governments in the region.

These activities have affected trade routes, fishing and tourism in the region, as well as affecting seafarers. Papers by Oceans Beyond Piracy (OBP is a project of the One Earth Future Foundation, the International Maritime Bureau (IMB) and the Maritime Piracy Humanitarian Response Programme (MPHRP)) have analysed both economic and human costs over the past few years. It was estimated that the cost of piracy was nearly $7 billion in 2011 with over 80 per cent of the costs being borne by the shipping industry, while governments accounted for 20 per cent of the expenditures associated with countering piracy. This fell to around US$ 6 000 million in 2012, but given the drop in the number of incidents, this actually represents a higher "per incident" cost (OBP 2012a).

In addition to the economic cost of piracy, it imposes significant hardships on seafarers, fishermen and their families as a consequence of physical and psychological trauma during and after attacks and/or periods of captivity as well as loss of wages (OBP 2012b).

Hostages are not limited to seafarers and fishermen but, in 2012, for example, included a journalist and three aid workers. There have also been costs to the Somali community such as the death of fishermen mistaken as pirates, involvement of disaffected youth in piracy, impacts on livelihoods, increased levels of alcohol and drug abuse, prostitution and decreased levels of development aid and investment.

On the positive side, recent initiatives have expanded the scope of co-operation around piracy from just heightening security against piracy to increasing investment in the creation of economic opportunities for Somali communities (OBP 2012b).

Illegal dumping

Since the collapse of the Somali regime in 1991 there have been numerous reports of illegal dumping activities off of the Somali coastline, some allegedly involving European companies. These resurfaced after the Asian Tsunami in December 2004, during which a number of containers of toxic waste were broken open and/or deposited onto the

Table 25.5. Numbers of attacks by Somali pirates*.

Location	2009	2010	2011	2012	2013
Gulf of Aden	117	53	37	13	6
Kenya	1	0	1	1	1
Mozambique	0	0	0	2	2
Red Sea	15	25	39	13	2
Somalia	80	139	160	49	7
Tanzania	5	1	0	2	1
Arabian Sea	1	2	0	0	0
Indian Ocean	1	0	0	0	0
TOTAL	220	220	237	80	19

*Data from the International Maritime Bureau's Piracy Reporting Centre: www.icc-ccs.org

shore. The 2005 UNEP Report "After the Tsunami" contains the following extract: "*Somalia is one of the many Least Developed Countries that reportedly received countless shipments of illegal nuclear and toxic waste dumped along the coastline. Starting from the early 1980s and continuing into the civil war, the hazardous waste dumped along Somalia's coast comprised uranium, radioactive waste, lead, cadmium, mercury, industrial, hospital, chemical, leather treatment and other toxic waste. Most of the waste was simply dumped on the beaches in containers and disposable leaking barrels which ranged from small to big tanks without regard to the health of the local population and any environmentally devastating impacts.*"

Further reports (Hussein 2010, Greenpeace 2010) contains statements suggesting that some 400 containers of toxic waste were "buried" in the quays of El Ma'an Port during its construction in the late 1990s.

The matter was raised again at a meeting in February 2010, on counter-piracy strategies coordinated by the United Nations Political Office for Somalia and Department of Political Affairs. It was subsequently raised in the UN Security Council in the context of discussions on piracy leading to the adoption of UN Resolution 1976 (April, 2011) which, amongst other things requested: "… *the Secretary-General to report within six months on the protection of Somali natural resources and waters, and on alleged illegal fishing and illegal dumping, including of toxic substances, off the coast of Somalia, taking into account the studies on this matter previously conducted by the United Nations Environmental Programme and other competent agencies and organizations, and expresses its readiness to keep the matter under review.*"

The toxic waste off Somalia is reportedly impacting on the health of local people, animals and the environment and any containers remaining in coastal waters pose a significant threat to the WIO region as a whole.

Climate change

The global fleet is estimated to contribute some three per cent of global carbon emissions (UNCTAD 2012, Wright 2013). At the same time, climate change is likely to have significant impacts on maritime activities as a consequence of, for example, increased frequency of storm events and rising sea level. Impacts may include more frequent shipping accidents, increased costs of port maintenance and disruption of port operations from both the seaward-side and hinterland supply chains (McEvoy and Mullett 2013). These concerns need to be factored into plans to expand maritime activities in the region.

CAPACITY

Given the potential environmental impacts of shipping, it is important for the WIO countries – in addition to monitoring the impacts themselves - to have the capacity to regulate ships, provide them with appropriate maritime services (such as navigational aids) and respond to shipping accidents.

Port and Flag State Control

Comoros, Kenya, Mauritius, Mozambique, Seychelles, South Africa and Tanzania are now parties to the Indian Ocean Memorandum of Understanding for Port State Control which was finalised on 5 June 1998. The Memorandum came into effect in April 1999, and as of September 2013 has 17 members (www.iomou.org). Madagascar and Somalia are not currently parties to the agreement.

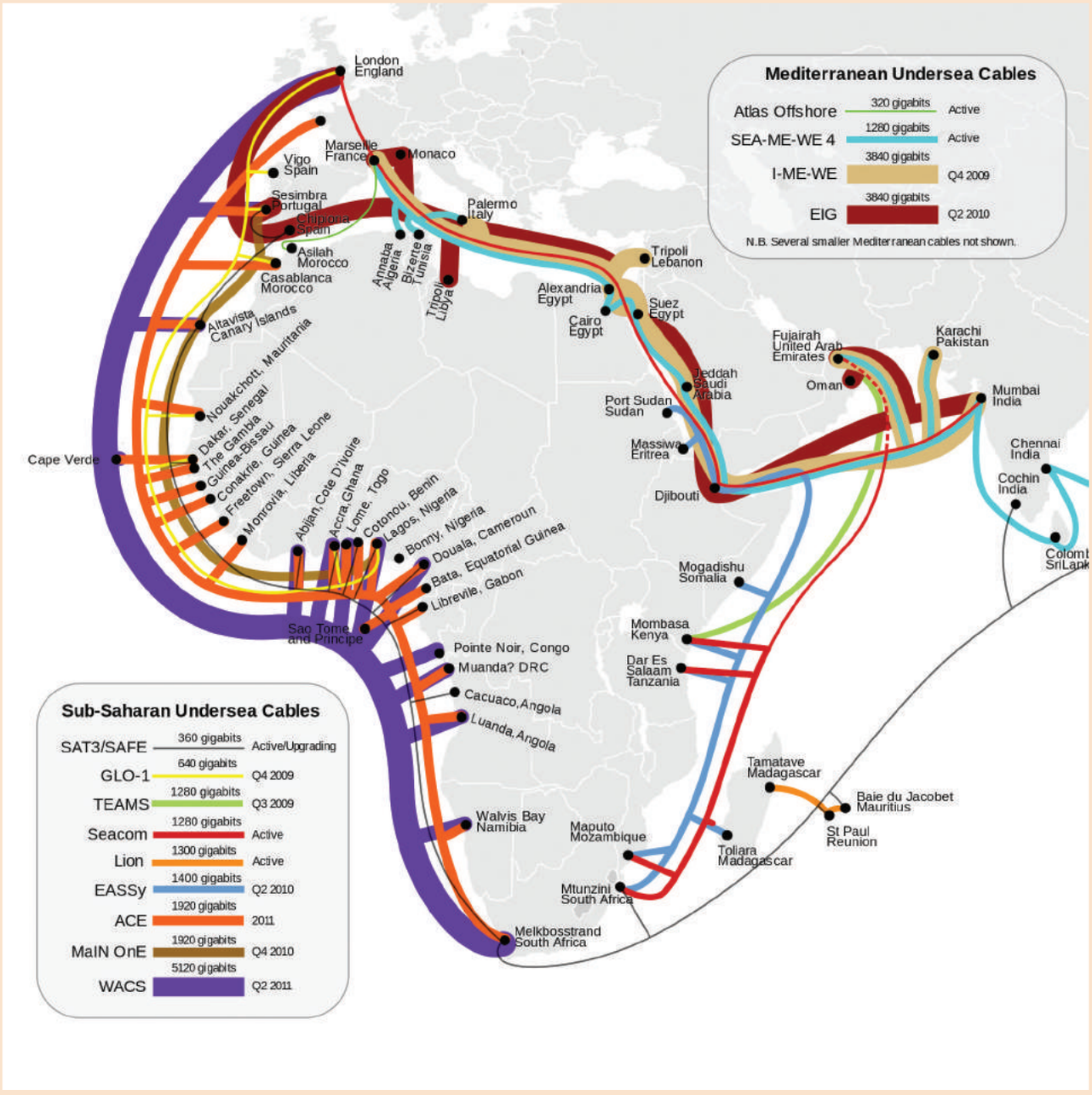
Of the WIO countries, only South Africa has implemented a comprehensive port state control system, which aims to verify whether foreign flag vessels calling at the ports of the state comply with applicable international conventions and with national laws. This issue was addressed to some extent through the WIO Marine Highway project which ran training courses on various aspects of Port State Control (Guy 2013). Training courses have also been organised by the Secretariat of the Indian Ocean MoU.

This does seem to have led to an improvement, with

Table 25.6. Port State control inspections in selected WIO countries.

Country	No. of inspections in 2003	No. of inspections in 2012	No. of deficiencies in 2012	No. of detentions in 2012
Kenya	0	123	328	6
Mauritius	1	2	0	0
South Africa	264	222	294	7
Tanzania	0	2	8	0

BOX 25.2. SUBMARINE CABLES



Network of submarine cables along the East African coast. © Shuttleworth Foundation.

Submarine communications cables are laid on the sea bed between land-based stations to transmit telecommunication signals across stretches of ocean, often between continents. The installation of submarine fibre optic cables significantly enhances opportunities for international connectivity through increased bandwidth and higher transmission speeds. Moreover, they are significantly cheaper than satellite. They therefore offer major socio-economic benefits while the environmental concerns can be addressed through improved planning and mitigation.

The past few years has seen a proliferation of submarine telecommunications cables servicing the region from the original SAT 3 which was laid in 2001 but which only connected to Mtunzini on the South African coast, Reunion and Mauritius. Since then the following cables have been added to the network that connects Africa with the world:

- SEACOM – 2009 (www.seacom.mu);

- The East African Marine System (TEAMS - 2009) (www.teams.co.ke)
- Lower Indian Ocean Network (LION – 2009)
- Eastern African Submarine Cable System (EASSy – 2010)
- Seychelles East Africa Submarine Cable (SEAS – 2011)
- LION 2 – 2012 (www.lion-submarinesystem.com).

Submarine cables are landed onshore while the cable itself is laid on the seafloor. The cable traversing the intertidal zone is generally buried before connecting to land-based telecommunications networks. There are potential environmental concerns relating to the deployment of the cable, as well as the presence of the cable within the ecosystem it traverses. Some of the concerns include:

- Potential damage to coral reefs and associated organisms as a consequence of the movement of inadequately secured cables. Movement may occur as a result of currents and storms, or when cables are snagged by fishing gear or anchors;
- Sedimentation and turbidity caused during cable-laying operations;
- Their impacts on resource-use as a result of:

o The imposition of exclusion zones to protect the integrity of the cables which may be damaged as a result of, for example, trawling activities;

o The dissection of, for example, trawling grounds, into sections which are too small to be viably trawled. Telkom SA, for example, required an exclusion zone of one nautical mile on either side of the EASSy cable in the Mtunzini area of the east coast of South Africa which led to objections from the prawn fishers with quotas in the area (Scherzer, 2009); and

- Impacts on other activities and infrastructure in the vicinity of the cable route including mariculture activities, fish aggregating devices, archaeological resources, anchorage facilities and recreational activities (CSIR, 2000).

To a large extent, these impacts can be mitigated by investigating alternatives during the Environmental Impact Assessment process and selecting those which are optimal. For example:

- In the case of the EASSy cable, a route was selected in consultation with the prawn fishers which had limited impact on the trawling ground;
- In the case of the SEAS cable between Seychelles and Tanzania, the cable was buried in the shallow water section (0 – 1000m) to limit impacts to the construction period (and prevent snagging of the line) (African Development Bank, 2010).

Approvals granted for cable installation can also include a requirement for repair and/or restoration in cases where damage has occurred.

A regional approach should be taken to the planning of submarine telecommunications cables in future with a view to limiting the number of cable lines while at the same time enabling access to the benefits they provide.

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an increase in the number of countries undertaking inspections, as shown in Table 25.6 (data from the 2012 Annual Report of the Indian Ocean MoU/ www.iomou.org).

Surveillance of shipping lanes

As far as can be ascertained, South Africa is the only country in the region with an active surveillance programme for oil spills at sea. This is focussed on the shipping lanes although there is also provision for reconnaissance flights during incidents as well as *ad hoc* flights for other purposes eg research.

Munga and others (2006) reported that the responsibilities of the Kenyan Navy include the patrolling of Kenyan waters, while those of the Oil Spill Mutual Aid Group (OSMAG) under the Ministry of Transport and Communications include overseeing oil spill surveillance. However, it is unclear whether there is an active surveillance programme.

In Mozambique, the Marine Arm of the Ministry of National Defence is responsible for surveillance of the maritime area, although other institutions such as the Police, Fisheries and Maritime Authorities, also play a role in surveillance activities (Gove 2011). The extent of such surveillance is unknown.

Similarly, in terms of the Maritime Zones Act, 1977, the Seychelles Coast Guard is responsible for surveillance in the EEZ. This includes oil spill surveillance although the Coast Guard have no planes and have to utilise the planes from the Island Development Company (Nageon de Lestang and Carolus 2011, Nageon de Lestang *pers. comm*).

Provision of Navigational Aids

Although all the countries in the region have some charts and other aids to navigation, part of the rationale for the GEF-World Bank Western Indian Ocean Marine Highway project (World Bank 2003) was that many of the charts were out of date as a consequence of underground seismic activity in the area. Moreover, the technology used to compile the charts and for other aids was obsolete in a number of cases. These issues were addressed by the project and the development objective was to "*... increase the safety and efficiency of navigation…by establishing a demonstration marine highway to guide ships around environmentally sensitive areas and through selected busy sea lanes and by supporting widening the regional agreement on port state control and implementation of its provisions*" (World Bank 2003).

Although the project concluded that the establishment of a marine highway in this area was not feasible, it did contribute significantly to the improvement of navigational aids in the region through the following activities:

- Surveys of various shipping routes including port approaches;
- Updated information included into various nautical charts;
- Provision of training on hydrography, marine cartography and electronic navigational charting;
- Repairs to various aids to navigation; and
- Training on aids to navigation and maintenance thereof (Guy 2013).

Oil spill response

The Nairobi Convention includes a Protocol concerning Co-operation in Combating Pollution in Cases of Emergency in the Eastern African Region the main objective of which is to facilitate the development of regional arrangements for the effective combating of major spillages of oil or other harmful substances from ships. Other obligations in terms of the Protocol include:

- The development of national contingency plans and pollution response capabilities;
- The distribution of information to the other Parties regarding their national organization and their competent national authorities;
- Informing the other Parties of all pollution incidents; and
- The provision of assistance to a Party which so requests.

A draft Regional Contingency Plan was developed under the WIO Marine Highway Project (World Bank 2013). According to the draft plan: "*The purpose of the Regional Contingency Plan is to establish, within the framework of the Emergency Protocol and according to the obligations of the Contracting Parties under this Protocol, a mechanism for mutual assistance, under which the competent national Authorities of the countries concerned will co-operate in order to co-ordinate and integrate their response to marine pollution incidents either affecting or likely to affect the territorial sea, coasts and related interests of one or more of these countries, or to incidents surpassing the available response capacity of each of these countries alone.*"

The plan hinges on the establishment of a Regional Coordination Centre (RCC) for Marine Pollution Preparedness and Response in the Western Indian Ocean. The Centre will act as the Secretariat for the plan and be responsible for its ongoing maintenance. The Centre has been designed, but is yet to become operational (World Bank 2013).

All countries in the region – with the exception of Somalia - have National Oil Spill Contingency Plans. In the majority of cases these were either developed and/or updated by the Regional Oil Spill Contingency Planning Project or the WIO Marine Highway Project (World Bank 2013).

CONCLUSIONS AND RECOMMENDATIONS

The recent discovery of significant additional oil and especially gas resources in the WIO region, together with a more general increase in trade and the AU 2050 AIM Strategy, suggests that it is highly likely that maritime activities are set to increase significantly in the region. This, together with factors such as climate change, heightens the environmental risks and points to the need to urgently develop

regional policies on:

• The implementation of Flag and Port state controls and the need to develop capacity in this regard;

• Regional co-operation around maritime surveillance which could be extended from the current co-operation around combatting piracy to include illegal, unregulated fishing, oil spills and other ship-related pollution, amongst others;

• Scientific monitoring and reporting of pollution levels and incidents;

• Prevention and control of alien and invasive species introduced by ships;

• The provision of adequate waste reception facilities at ports;

• Building awareness of the impacts of marine litter and increasing capacity to address the sources thereof;

• Response to the potential impacts of climate change on the maritime sector including, for example, the inclusion of climate change concerns into risk assessments and the development of Climate Adaptation Plans for ports;

• Financial mechanisms to provide for the required management activities.

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