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Maritime security

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**Correction: Peter Danssaert and Brian Johnson-Thomas,
"Illicit Brokering of SALW in Europe: Lacunae in Eastern European Arms
Control and Verification Regimes", *Disarmament Forum* no. 3, 2009**

It has been brought to our attention that data provided by an official source of the Government of Montenegro referred to in the above-mentioned article contained a translation error. Page 38 of the article refers to the export of M72 mines. We have learned since publication that the source document had incorrectly translated "mortars" as "mines". Therefore the authors hereby retract statements concerning the Mine Ban Treaty. The version of the article that is available online has been corrected.

This issue focuses on maritime security—a multifaceted and complex topic that touches on some of the most critical security challenges of the moment. Armed non-state actors are exploiting busy shipping lanes for piracy and, some fear, for terrorist purposes. In this regard, there is rising concern about the security of sensitive materials in transit by sea. This issue of *Disarmament Forum* examines how these maritime security risks are being addressed. It explores efforts to minimize risks of WMD proliferation through regional and international cooperation at sea, for example, the Proliferation Security Initiative. It considers the extent of the threat posed by pirates and other non-state actors at sea—with a particular emphasis on the security of maritime shipping of sensitive materials.

Issue 3, 2010 will be dedicated to the topic of verification. How do verification regimes keep up with scientific and technological progress? What are the possibilities for verifying the Biological and Toxin Weapons Convention, a space weapons ban or a nuclear weapons convention? What is the role of civil society in verification?

In UN General Assembly resolution 63/67, Member States are called upon, *inter alia*, to establish appropriate national laws and measures to prevent illicit brokering and encouraged to fully implement relevant international treaties, instruments and resolutions to prevent and combat illicit brokering activities. Building on this resolution, as well as efforts undertaken by other relevant bodies, such as the 1540 Committee of the UN Security Council, Member States have many avenues of action open to them, from national measures to regional initiatives and international cooperation. As the General Assembly will return to the issue of preventing and combating illicit brokering activities at its sixty-fifth session, on 30 June UNIDIR held a half-day seminar dedicated to the topic of illicit arms brokering. Expert presentations were made on the characteristics of illicit brokering activities, the specific issues surrounding illicit brokering of conventional weapons as well as weapons of mass destruction and their related materials, and different approaches to international cooperation and assistance.

The European Union–UNIDIR project on Promoting Discussion on an Arms Trade Treaty has been successfully concluded. The primary objectives of the project were to increase awareness among national and regional actors, UN Member States, civil society and industry of the current international discussions around an arms trade treaty (ATT); to encourage a frank exchange of views among UN Member States, regional organizations, civil society and industry; and to help identify possible elements, the scope and the implications of an ATT. The 16-month project held six regional seminars, as well as meetings in Geneva, New York and Vienna. The final report of the project, as well as reports from each of the seminars, is available on UNIDIR's web site. A follow-on project is scheduled to begin in the coming months.

Once again, UNIDIR was active at the Fourth Biennial Meeting of States to consider the implementation of the UN Programme of Action on the illicit trade in small arms. UNIDIR researcher Kerry Maze was invited to make opening remarks on the issue of international cooperating and assistance. Ms Maze also presented findings from her latest study, *Searching for Aid Effectiveness in Small Arms Assistance*, at a lunch-time event on 16 June. The biennial meeting also served as an opportunity to promote the UNIDIR tool *Implementing the UN Programme of Action: A Checklist for Matching Needs and Resources*, which is now available in English and French. A Spanish translation is in production.

We welcome your feedback on the new format of *Disarmament Forum*, and look forward to your suggestions of how we can continue to improve the journal.

Security threats and challenges to maritime supply chains

Vijay Sakhuja

The current wave of globalization has had a profound impact on every state of the world, be it landlocked or coastal, resulting in greater access to resources, raw materials and markets. Much of this has been facilitated by a modern and burgeoning sea-based trading system. Today, nearly 80% of global trade is transported in ships' hulls. States have invested significant resources in maritime infrastructure, containerized trade, energy supply chains, information technology-driven cargo movements and processes accelerating financial transactions in order to harness the benefits of globalization. Further, most states have linked the hinterland with the littoral through a complex network of roads and rail, resulting in rapid movement of goods.

The United Nations Conference on Trade and Development's *Review of Maritime Transport 2009* notes that in 2008 world sea-borne trade increased by 3.6% to reach an estimated 8.17 billion tons, global fleet tonnage witnessed year-on-year growth of 1.19 billion deadweight tons (dwt), and world container port throughput grew by an estimated 4% to reach 506 million TEUs.¹ This is despite the global economic downturn—global GDP expanded by only 1.8% in 2008.²

While globalization may have acted as a catalyst for the growth of international commerce, it has also unleashed and aggravated disparity among regions, societies and people. In some cases, inequalities induced by globalization have created conditions for the rise of violent non-state actors that possess significant capabilities to challenge the emergent economic order. A careful examination of the impact of globalization reveals that the sea-based trading system is vulnerable to piracy, terrorism, illegal drug trafficking, gun-running, human smuggling, maritime theft, fraud, illegal fishing and pollution, which can all disrupt maritime supply chains to the heavy cost of the global economy.

Securing maritime supply chains against disruption thus presents an enormous challenge for the globalized world. States have invested significant political, diplomatic and military resources to ensure the smooth flow of commerce and chosen sophisticated security strategies and systems so as not to slow down international trade and impede economic growth. In essence, operational strategies are primed to ensure that trade flows unhindered and sea lines of communication are protected.

This paper examines the threat of piracy and terrorism to maritime supply chains. It begins by identifying the geography of operation of pirates and terrorists, i.e. littorals, and highlights the threats and challenges posed by non-state actors. It then elaborates on the regional and international cooperative initiatives targeting the problem of piracy and terrorism. Finally, the paper argues for a UN-mandated force for anti-piracy and counter-terrorism.

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Contested littorals

Littoral is an area where sea meets land. These spaces are rich in diversified marine living resources and are hubs of urbanization: nearly 60% of the world's population lives within 100km of the waterfront. A large number of cities with populations exceeding one million are located in coastal areas. The littorals are hubs of intense economic activity linked with maritime trade, which pivot on an intricate maritime infrastructure (ports, harbours, oil and gas terminals and rail/road system) as well as networks connecting the littoral with the hinterland. Such infrastructure provides the sinews for the economic growth and comprehensive development of the state.

Littorals provide the muscle for economic growth and development, but in some cases they can also be focal points of social dysfunction due to economic disparities. Lack of governance and an ineffective social security apparatus have in some coastal areas created favourable conditions for illegal activities.³ In the absence of good governance, criminal and subversive elements flourish and these can disrupt social harmony. Governance of littorals is thus a major challenge for civil security agencies.

Ineffective governance has also left the marine resources that littorals provide vulnerable to attack by unsustainable fishing, poaching and dumping of chemicals. These activities can generate tensions among states, and can even result in local populations taking up arms in an effort to protect their legitimate interests, as is the case in Somalia.

In essence, while littorals provide economic muscle, they are often areas of social disorder. The nexus between organized crime networks and terrorist groups with transnational capability can potentially exploit these spaces to conduct their operations, and this poses significant challenges for states.

Mapping sea piracy

Sea piracy has existed since ancient times and its scourge has been well documented. The Romans and the Greeks in the Mediterranean and the Srivijaya rulers in South-East Asia dispatched navies to fight pirates and protect trade. In more recent times, stories of sea piracy have generally been restricted to romanticism on the silver screen: audiences were exposed to glamorous swashbuckling pirate and buccaneer icons such as Blackbeard, Long John Silver, Anne Bonny and Black Sam Bellamy. However, over the last 20 years the menace of piracy has had a very real impact on international shipping, with horrifying incidents of hostage-taking and assault, of crew members traumatized, left adrift or even killed. The maritime community has consistently voiced its concern about the menace of piracy and called on states to bring order at sea for the safety of crews and the security of trade.

There are political, economic, social, legal and security reasons for the recent spurt in piracy, which include political instability resulting in lack of governance of the littorals, the absence of

political will on the part of states to fight piracy, poor socio-economic conditions pressurizing local populations to commit piracy for survival, inadequate military capability to respond, and the absence of a robust legal system to prosecute despite laws against piracy (pirates have long been *hostis humani generis*—enemies of mankind—under public international law, and the 1982 United Nations Convention on the Law of the Sea provides significant powers to states to prosecute pirates).⁴

Pirates have been active in Asia (South China Sea, South-East Asia and South Asia), the Persian Gulf, Africa (the Horn of Africa and the west coast), the Caribbean and Latin America. In recent times South-East Asian waters, particularly the Straits of Malacca, and the Gulf of Aden in East Africa have been the hot spots of sea piracy and attracted international attention.

The Straits of Malacca is a vital sea space connecting the Indian Ocean to the Pacific Ocean, which experiences a high density of shipping traffic. Over 60,000 vessels transit the Straits each year, carrying a variety of cargo including the critical energy needs of the Asia-Pacific countries. According to the London-based International Maritime Bureau (IMB), a global watchdog monitoring crime and malpractice at sea, in 2008 and 2009 only two incidents of attempted/actual piracy of armed robbery were recorded each year for the Straits of Malacca, which is in sharp contrast to the 38 attacks recorded for 2004.⁵

This is in part because in 2004 the littoral states of the Straits—Indonesia, Malaysia and Singapore—came under intense international pressure to ensure the safety of merchant traffic. The United States announced its involvement in policing the Malacca Straits with the Regional Maritime Security Initiative (RMSI),⁶ under which it planned to deploy Marines and Special Forces with high-speed boats to combat terrorism, piracy, gun-running and drug smuggling. Close on its heels, the Lloyd's Market Association and International Underwriting Association's Joint War Committee (JWC) declared the Straits of Malacca, along with several maritime areas in West Asia and Africa, prone to war, strikes, terrorism and related perils.⁷ There was a fear that Al-Qaida could attempt to use pirates as cover to carry out attacks on merchant shipping. The JWC announcement had a severe impact on shipping, with insurance companies levying higher premiums for ships transiting the Straits of Malacca. The littoral states instituted a series of proactive counter-piracy measures, including surveillance and reconnaissance of the Straits through coordinated sea and air patrols, intelligence sharing and security enhancement.⁸

Like the Straits of Malacca, the Gulf of Aden is an important sea passage that connects the Indian Ocean with the Mediterranean Sea through the strategic choke points of Bab-al-Mandab and the Suez Canal. The Gulf witnesses annual traffic of around 20,000 vessels. According to the IMB, the waters around Somalia and the Gulf of Aden are the major piracy hot spot; in 2006, there were just 20 reported piracy incidents, but in 2008 there were 111 attacks. The IMB annual report for 2009 notes that there were 196 incidents of attack on shipping, 46 vessels were hijacked, and 857 crew members taken hostage in the Gulf of Aden–Somalia.⁹

Piracy has been rampant in the Gulf of Aden, particularly off Somalia and Yemen, because of lack of governance in the littorals. Foreign fishing vessels have exploited this lack of governance: Somali waters have become poaching grounds for modern fishing fleets from Europe, Thailand, Yemen, even from as far as China and Korea, and the local fishermen, who rely on traditional fishing methods, have been deprived of their catch.¹⁰ Somali waters have even become dumping grounds for radioactive materials such as uranium, lead, mercury and industrial chemical waste.¹¹ The local fishing community, infuriated by these developments, has cited poaching as the primary reason for taking to piracy: it took it upon itself to protect the country's 2,300 nautical miles of coastline and the exclusive economic zone (EEZ) that extends 200 nautical miles into the sea.¹² The "Somali Marines" or "Ocean Salvation Corps", having first taken up arms against poachers, have moved on to targets unrelated to fishing such as merchant ships. Although Somalia's Transitional Federal Government acknowledges the problem of illegal fishing, it has argued that "... this does not justify these boys to now act like guardians. They are criminals. The world must help us crack down on them".¹³

A large number of Somali fishermen are actively engaged in the business of piracy and are now attacking and hijacking vessels as far as 1,000 nautical miles from the Somali coast on a regular basis, receiving huge sums in ransom money.¹⁴

Terrorism at sea and from the sea

During the last few decades, several terrorist groups have mushroomed across the globe. Notwithstanding the fact that the sea is a complex medium, and requires great mastery to conduct attacks, these groups have developed significant capability to conduct attacks at sea, under the sea and more recently from the sea. Nearly two dozen terrorist groups have been identified as having engaged in acts of terrorism at sea and have struck in Latin America, Europe, the Middle East, South Asia and South-East Asia.¹⁵

Significantly, the terrorist groups have kept pace with modern navigation technologies and developed innovative tactics to challenge maritime forces. They have successfully attacked a range of targets, from poorly secured platforms such as oil tankers and ferries to making forays against highly defended warships, port infrastructure and oil terminals. Besides lethal weaponry, some terrorist groups have carried out attacks by employing marine leisure equipment (scuba diving equipment and diving apparatus, sea scooters, speedboats and tourist submarines) and devices and explosives that have commercial use. These items are all easy to acquire without inviting suspicion, and can be effortlessly deployed at sea and underwater. There are fears that terrorists may smuggle an unsophisticated nuclear or radiological device into a ship or transport it by container and detonate it in a port, creating a doomsday scenario. We have already seen that the unconventional nature of the tools and innovative tactics employed by terrorist groups has at times overwhelmed security forces.

The Liberation Tigers of Tamil Eelam (LTTE) in Sri Lanka, Al-Qaida in Pakistan and Afghanistan (with strong links with other groups in Asia), Jemaah Islamiyah in South-East Asia, the Moro Islamic Liberation Front (MILF) and the Abu Sayyaf Group in the Philippines, and Hizbullah, Hamas and other smaller groups in the Middle East have all demonstrated a capability to attack targets either at sea or by sea successfully. Significantly, newer groups are also taking to the seas and exploiting the littorals to attack targets on shore: Lashkar e Toiba (LeT), a group based in Pakistan, has invested in maritime attack capabilities and successfully employed them to carry out attacks in Mumbai in November 2008.

Until very recently, the LTTE (destroyed by the Sri Lankan military in 2009) was the only terrorist group endowed with the capabilities to be regarded as a small non-state sea power. It controlled ports and harbours and had an ocean-going fleet, a global trading network that supported its economy, a fishing fleet, shipbuilding yards and a navy. This navy, also known as the Sea Tigers, skilfully engaged in multi-vessel “wolf pack” attacks using high-speed boats against the Sri Lankan Navy. Its underwater capability was built around trained divers deployed as saboteurs to carry out attacks against naval ships; improvised sea mines similar to limpet mines; and semi-submersible “human torpedo” and submersible platforms such as mini-submarines. With this capability the LTTE exercised control in the waters off Jaffna in north-east Sri Lanka.

At sea, Al-Qaida is best known for its spectacular attacks against the USS *Cole* in 2000 and on the French tanker MV *Limburg* in 2002. Its operatives successfully rammed into these vessels with high-speed boats laden with explosives. The USS *Cole* incident forced navies across the globe to re-examine the changing nature of terrorist groups’ tools and tactics. Over the years, Al-Qaida operatives have developed a sophisticated knowledge of naval warfare. This revelation emerges after detailed documentation similar to a naval manual was discovered with Al-Qaida operatives. The documentation provides details for the use of limpet mines: the procedure for attaching them to a ship’s hull; the location for best effect in different types of ships; and the amount of explosive to be used.¹⁶ Al-Qaida’s interest in underwater capability is revealed in the interrogation of Abd al-Rahim al-Nashiri, nicknamed “Prince of the Sea”, an alleged Al-Qaida mastermind.¹⁷ In 2003, the Singaporean authorities arrested 15 suspected Islamic militants linked to Al-Qaida: elaborate plans had been drawn up to attack US naval vessels at Changi Naval Base.¹⁸

The Abu Sayyaf Group, based in Basilan Island, has been engaged in banditry and piracy in Philippine waters. It has a fleet of high-speed stealth boats fitted with machine guns. The group is responsible for the 2004 attack on Superferry 14, which killed over 100 people.

Until 2008, Lashkar e Toiba had always operated on land. It is plausible that it may have been encouraged to take to the sea by groups with maritime capability. In November 2008, LeT operatives left Karachi in an unknown vessel, hijacked an Indian fishing craft and killed some

of the crew.¹⁹ Just before reaching the Indian coast, the operatives boarded inflatable craft and landed on an unsecured waterfront of south Mumbai. The terrorists were in constant communication with their leaders in Pakistan through satellite telephones. They were proficient in using the Global Positioning System (GPS) for navigation, had good knowledge of the landing points in south Mumbai—obtained through open source digital maps—and were well trained in operating high-speed inflatable craft. Their plans included using hostages as shields to escape, again by sea.

In Palestinian territory, armed non-state actors have a history of carrying out operations at sea. In 1985, Palestinian guerillas hijacked the *Achille Lauro*, an Italian cruise liner, and demanded the release of a group of Palestinians detained in Israeli prisons. A US citizen was killed on board. The *Achille Lauro* incident led to the formulation of the 1988 Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation. More recently, in November 2002, Palestinian Islamic Jihad terrorists detonated a boat-bomb off the coast of Gaza, which damaged an Israeli patrol boat, and just two months later Palestinian operatives tried to blow up an Israel Navy vessel using a small boat-bomb. In 2006 Hizbullah successfully fired a C-802 surface-to-surface missile against the Israeli Navy's INS *Hanit*.²⁰ The ship was partially damaged; perhaps more disturbing was the knowledge that non-state actors are able to acquire high-end military hardware. Israeli military intelligence claims that Hamas is interested in acquiring C-802 cruise missiles from Iran.²¹

Some non-state armed groups even own merchant ships. For instance, the LTTE had acquired its own fleet of at least a dozen vessels registered in Honduras, Panama and Liberia to run a legitimate commercial activity as well as to facilitate the transport of military hardware, including arms and ammunition. Much of this cargo was transferred to smaller vessels on the high seas that could then be ferried to LTTE-controlled landing-points. The smaller vessels were also used to transport civilian cargo such as food grain, building materials and other general necessities of daily life. It is believed that Al-Qaida has a fleet of merchant vessels too, but this has not been corroborated by any hard evidence.

Reactions and response

Historically, states have deployed their militaries to protect overseas territories and trade and even built international coalitions to do so. In recent years, nations have established multilateral arrangements to fight non-state armed groups at sea, some of whom have political motives. There is a realization that the limitations for any individual state to respond unilaterally to multiple threats across the globe make cooperation or global partnerships important. It is generally agreed that such partnerships facilitate the rapid and most effective deployment of forces. However, in order to succeed, the partners need to have sufficient political and strategic interoperability to enable them to mandate naval forces to engage in joint maritime operations.

The “war on terror” has required the full spectrum of diplomatic, economic, military, law enforcement, intelligence and public opinion networks to work together. It has shown that common interests, values and a coordinated approach are critical to combat common security concerns. Further, it has emerged that even a country as powerful as the United States needs international support to obtain intelligence, undertake surveillance, track terrorists and physically reach its enemies.

Currently, warships from over two dozen navies from Asia, Europe, the Middle East, the Russian Federation and the United States are operating in the Gulf of Aden, under various joint task forces or independently, to fight pirates and terrorists. States have established a number of maritime arrangements that pivot on joint operations, multilateral exercises, intelligence sharing, training and capacity building. Maritime security concerns are being discussed in multilateral forums such as Asia-Pacific Economic Cooperation, the Association of Southeast Asian Nations Regional Forum, the Council for Security Cooperation in the Asia Pacific, the East Asia Summit, the Indian Ocean Naval Symposium, the Shangri-La Dialogue and the Western Pacific Naval Symposium.

The littoral states of the Straits of Malacca have instituted a range of counter-piracy initiatives such as joint sea patrols (MALSINDO), air patrols (Eyes in the Sky initiative, with the added participation of Thailand), intelligence sharing mechanisms and intergovernmental discussions on maritime security. It is widely acknowledged that these initiatives have been instrumental in the decline of piracy in the Straits of Malacca. In addition, the Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia (ReCAAP) is the first Asian intergovernmental agreement to enhance the security of regional waters and involves members of ASEAN as well as Bangladesh, China, India, Japan, the Republic of Korea and Sri Lanka.²²

While the Straits of Malacca is a success story, piracy in the Gulf of Aden remains worrisome. In the wake of a surge in attacks, the United Nations Security Council adopted four resolutions in 2008 calling upon states to provide assistance to Somalia to counter piracy in the Gulf of Aden and deploy naval forces.²³ Currently, Combined Task Force 151 (CTF-151, a multinational task force involving over 30 ships from a number of countries including the United States), European Union Naval Force Somalia (EUNAVFOR), and a number of ships and aircraft from several Asian countries (China, India, Japan, Malaysia, Republic of Korea, Singapore), Australia, Iran, the Russian Federation and Saudi Arabia are deployed in the Gulf of Aden–Somalia coast–Indian Ocean region to conduct counter-piracy operations and escort UN World Food Programme ships carrying humanitarian supplies for the Somali people. These navies operate individually and under multilateral naval arrangements and meet in Bahrain on a monthly basis under the Shared Awareness and Deconfliction (SHADE) arrangement.

As regards terrorism, several UN Security Council resolutions have called on states to cooperate and fight terrorism, such as resolution 1540 of 2004. Also, in the wake of the September 2001 attacks in the United States, a number of International Maritime Organization (IMO) initiatives have been introduced to make maritime trade more safe, secure and immune to disruptions, including the International Ship and Port Facility Security Code (ISPS). The Container Security Initiative (CSI) and the Customs-Trade Partnership against Terrorism (CTPAT), which both originated in the United States, are also being encouraged elsewhere in the world. The main purpose of these initiatives is to reduce the likelihood of maritime-vector terrorism. Some programmes have been less successful: the Proliferation Security Initiative to intercept illegal transport of weapons of mass destruction and related materials and the “1,000 Ship Navy”, which seeks to build a global partnership of maritime forces including merchant shipping, have not found favour among some states, who perceive the projects as intrusive, in violation of national laws, and only serving the purpose of certain countries.

A case for blue hulls

The international initiatives to combat piracy and terrorism have so far shown that states share a commitment to develop a broad and substantive agenda for mutual trust and confidence. They are particularly significant for those countries that do not possess the capability to deploy their navies in distant waters and require assistance to protect their maritime interests. However, it remains to be seen how long states are able to meet the UN call to fight terrorists, defeat pirates and provide safe passage to international shipping. After all, there are financial and operational constraints that must be overcome for prolonged deployment, and these are sure to weigh heavily on the minds of national planners.

Efthimios Mitropoulos, Secretary-General of the IMO, “would like to see governments committing sufficient numbers of warships, military aircraft and surveillance assets to the region [Somalia] and to co-ordinate their command and control under the auspices of a United Nations mandate.”²⁴ Mitropoulos even suggested a sea-based UN-mandated maritime force similar to forces deployed by the United Nations during crises onshore.

There is merit in Mitropoulos’s observations and suggestions for a UN-mandated anti-piracy and counter-terrorism force at sea. A force under the UN flag would be preferable to the international community because it would provide security assurance to smaller states that do not have large navies to patrol their waters or to escort their vessels through piracy-prone areas. However, the UN initiative is likely to be seen to fit uneasily within the traditional framework of UN operations: some may interpret a mandate for a naval force as an offensive military activity rather than peacekeeping. It is argued that the coast guard and marine police units would be more suitable for a UN maritime force. The participating units would have to be carefully chosen. Joint training under the United Nations could prove useful in terms of promoting an international mandate to conduct anti-piracy and counter-terrorism operations.

Concluding remarks

Piracy and terrorism originate in the littorals and, when political instability and poor governance provide ideal conditions for non-state actors to engage in illegal activity with relative impunity, can thrive. Littoral security is a vital dimension of national security and raises several issues and challenges for states that tend to focus their attention on land.

While the international community develops international coalitions, partnerships or concerts and strategies to fight piracy and terrorism, it is critical to invest political, diplomatic and economic resources to build the capacity of states that are experiencing chaotic littorals and require proactive governance tools. Political stability and a strong government in Somalia can help international efforts to fight piracy in the Gulf of Aden. Stronger, better governance will help furnish the robust legal instruments that are necessary to prosecute non-state actors.

Finally, the globalized world has entered the twenty-first century in a position of uncertainty and due to the rise of violent non-state actors that have posed several serious challenges and threats to the maritime enterprise, using violence with noticeable effect and exploring new tools and tactics to challenge maritime forces. Navies and other maritime security agencies will be under pressure to respond to operationally agile enemies who are constantly engaged in developing innovative strategies, tools and tactics to expand their reach and lethality.

Notes

1. United Nations Conference on Trade and Development, 2009, *Review of Maritime Transport 2009*, Geneva and New York, United Nations, pp. xiv–xv. TEU stands for twenty-foot equivalent units, a measure used for capacity in container transportation.
2. This is compared with 3.8% in 2007 (International Monetary Fund, 2009, *World Economic Outlook: Sustaining the Recovery*, Washington, DC, October, Table 1.1, p. 2).
3. For a discussion on the concept of “chaos in the littorals”, see Edward Hanlon Jr, 2000, “Taking the Long View: Littoral Warfare Challenges”, in Richard H. Shultz Jr and Robert L. Pfaltzgraff Jr (eds), *The Role of Naval Forces in 21st Century Operations*, Dulles, VA, Brassey’s, pp. 156–157). Also see W. Lawrence S. Prabhakar, 2006, *Securing India’s Littorals in the Twenty-first Century: Issues and Challenges*, Society for the Study of Peace and Conflict, Issue Brief no. 1, August.
4. See Article 105 “Seizure of a Pirate Ship or Aircraft”, United Nations Convention on the Law of the Sea, signed at Montego Bay, 10 December 1982.
5. International Chamber of Commerce, International Maritime Bureau, 2010, *Piracy and Armed Robbery Against Ships: Annual Report 1 January–31 December 2009*, Table 1, p. 5; International Chamber of Commerce, International Maritime Bureau, 2009, *Piracy and Armed Robbery Against Ships: Annual Report 2008*, Table 1, p. 5.
6. For more on the RMSI, see Joshua Ho, 2004, *Operationalising the Regional Maritime Security Initiative*, IDSS Commentary 18/2004, S. Rajaratnam School of International Studies.
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19. *Mumbai Terror Attacks (Nov. 26–29, 2008)*, available at <www.hindu.com/2008/11/29/stories/2008112901010101.htm>.
20. Alon Ben-David, "Hizbullah Hits Israel's INS Hanit with Anti-ship Missile", *Jane's*, 18 July 2006.
21. "Israeli Intel: Hamas to Receive Chinese Cruise Missiles from Iran", *World Tribune*, 27 January 2009.
22. For more on ReCAAP, visit <www.recaap.org>.
23. United Nations Security Council resolutions 1814 (2008) of 15 May 2008, 1816 (2008) of 2 June 2008, 1838 (2008) of 7 October 2008 and 1846 (2008) of 2 December 2008.
24. Cited in Robert Wright, "Plea for UN Force to Fight Aden Piracy", *Financial Times*, 2 November 2008.

Sea piracy: some inconvenient truths

Sam Bateman

The protection of shipping and sea lines of communication (SLOC) is a major maritime security issue for many countries around the world. With the vast bulk of international trade carried by sea, globalization has led to sea-borne trade growing at a faster rate than the world economy generally.¹

Another factor leading to a greater focus on SLOC protection is increased concern for energy security, especially among the economic powers of Asia. SLOC protection has long been a concern of European countries but the interest shown by the emerging powers of Asia is relatively new. China, India and Japan are all concerned for the security of supply routes, which pass through the shipping “choke points” created by the straits in South-East Asian waters.

SLOC protection has thus become a major reason for the expansion of naval forces in Asia and the growth of naval budgets. However, it may serve as a politically acceptable justification for naval expansion when real motives could be the fear of military threats from other countries, realist competition between rising powers, and the Mahanian use of naval forces to project national power and influence.²

Threats of piracy and armed robbery against ships are a particular manifestation of the need for SLOC protection. This was first evident around 2004 after an upsurge in attacks in the Malacca and Singapore Straits, which led to considerable international pressure on the littoral countries to increase safety and security in those waterways. With an improved situation in South-East Asia, international attention has shifted to waters off the Horn of Africa, where there has been a significant increase in attacks by pirates from Somalia. Meanwhile in South-East Asia, attacks have increased in the southern part of the South China Sea.³

While piracy is undoubtedly a major problem in some parts of the world, it must be kept in perspective. A piracy attack can make a good media story, but it often overdramatizes the original event and its implications. The attack on the chemical tanker *Dewi Madrim* in the Malacca Straits in March 2003 is such an example. The robbers did not steal anything, which led to stories that the attack was a case of prospective terrorists practising operation of a “large vessel” in crowded shipping lanes.⁴ However, the size of the vessel is rarely mentioned. The *Dewi Madrim* was in fact very small, only 737 gross registered tons (GRT),⁵ and no great skill would have been required to drive her.

The costs of sea piracy to the global economy are also often overstated to achieve more dramatic impact. The costs that have been quoted range from US\$ 1 billion to as much as

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\$50 billion, and are “probably way off the mark”.⁶ The reality is that global sea-borne trade has been little affected overall by the incidence of piracy, with the top end of the market especially, in terms of value of ships and cargoes, carrying on business as usual. The global financial recession has had an infinitely greater impact on the international shipping industry.

To borrow from the title of Al Gore’s critically acclaimed movie on global warming *An Inconvenient Truth*, the situation with piracy is marked by three leading inconvenient truths. The first is that apart from the pirates themselves, many organizations gain from piracy and exploit the threat of piracy to promote their own interests. The second is that despite the major international efforts to counter piracy off the Horn of Africa, attacks persist. The third is that although there are regular calls from the shipping industry for greater efforts by international agencies to counter piracy,⁷ the industry itself could be doing more to ensure that merchant ships are not vulnerable to attack. Before discussing these issues in turn, this article reviews the global situation with regard to piracy and armed robbery against ships.⁸

Current situation

Table 1 shows the number of acts of piracy and armed robbery against ships (actual and attempted) worldwide between 2003 and 2009. By far the greatest concentration of these incidents was off the Horn of Africa and in the Red Sea, with attacks attributed to Somali pirates (217 incidents). The global increase in the number of attacks in 2009 was entirely due to this situation.

Table 1. Global piracy: actual and attempted attacks, 2003–2009

Location	2003	2004	2005	2006	2007	2008	2009
South-East Asia ^a	187	170	118	87	78	65	67
South Pacific		1			2		
Indian Subcontinent	87	32	36	53	30	23	29
Americas	72	45	25	29	21	14	37
Somalia/Gulf of Aden ^b	21	10	45	20	44	111	217
Nigeria	39	28	16	12	42	40	28
Other Africa	33	35	19	29	34	38	25
Rest of World	6	8	17	9	12	2	3
Total	445	329	276	239	263	293	406

Sources: International Chamber of Commerce, International Maritime Bureau, 2008, *Piracy and Armed Robbery against Ships: Annual Report 2007*; International Chamber of Commerce, International Maritime Bureau, 2010, *Piracy and Armed Robbery against Ships: Annual Report 2009*.

Notes: ^a South-East Asia includes attacks in the South China Sea and Viet Nam, which appear under the Far East in the IMB data; ^b Somalia/Gulf of Aden includes attacks in the Red Sea, Arabian Sea, Indian Ocean and off Oman, all of which are attributed to Somali pirates.

Elsewhere the situation has steadily improved over recent years. In the waters off Nigeria, which have been another high-risk area, there has been some improvement with 28 incidents in 2009 as compared with 40 in 2008. South-East Asian waters were a major area of concern in the early 2000s, but have since improved. The situation in these waters in 2009 shows little change from that of 2008 (67 attacks in 2009 compared with 65 in 2008). However, there have been major changes within the region itself: there has been a marked fall in attacks in Indonesian waters (15 attacks in 2009 compared with 28 in 2008), and a big increase in attacks in the South China Sea (13 as against 0 in 2008), and a small increase in Malaysian waters and the Singapore Strait.

Types of piracy

There are marked differences in the types of attacks that occur in the three main current piracy hot spots—Somalia–Gulf of Aden, South-East Asia and Nigeria, with 217, 67 and 28 attacks respectively in 2009 (representing over three-quarters of the total global attacks during the year). Several different types of piracy and armed robbery against ships might be identified, varying according to region.

Off the Horn of Africa, the attackers are well organized and their strategy involves hijacking ships and crews for ransom. The ransom paid is typically in excess of US\$ 1 million—US\$ 3 million in the case of the large oil tanker *Sirius Star* hijacked in 2008. US\$ 3.3 million was reportedly paid in November 2009 to secure the release of the large and sophisticated Spanish fishing vessel *Alakrana* and her crew.⁹ The pirates appreciate that ship-owners and insurance companies will pay the ransom and that patrolling navies will not use force to recover a ship that has been successfully hijacked due to the risk of casualties among hostages and among the warship's crew. There have been few casualties so far among the crews of ships hijacked in these waters, who are normally relatively well looked-after by the pirates.

The situation is different off Nigeria, where attacks are usually much more violent. Vessels, particularly ones associated with the offshore oil and gas industry, are attacked in coastal waters and rivers. There is frequent loss of life as heavily-armed pirates attack ships and kidnap crew members and other personnel for ransom. The ships themselves are not hijacked.

In South-East Asia, the risk is mainly of opportunistic petty theft from ships at anchor or in port. This type of piracy occurs in and around ports in Indonesia, the Philippines and Viet Nam. A second type of piracy in the region occurs when ships are underway in confined waters such as the Malacca and Singapore Straits and the Indonesian and Philippine archipelagos. The pirates board vessels to steal cash and valuables. Although the pirates are armed, violence is not normally used unless resistance is offered.

A third type of piracy committed in South-East Asia is the theft or hijacking of an entire ship. In the 1990s, some ships were hijacked with the objective of giving them a false identity and

turning them into “phantom ships” with fraudulent registration documents. However, creating a phantom ship has become difficult: the introduction of the International Ship and Port Facility Security Code, requiring ships to have a ship identification number and a continuous synoptic record, which provides a record of a ship’s movements, changes of name, owner, etc., has made it much harder to falsify registration documents for a ship. Nevertheless, smaller ships, such as tugs, barges and small product tankers, which do not have to meet these requirements, are occasionally hijacked in South-East Asia and may be recycled for service under another name.

In contrast, ship hijackings by Somali pirates are not about creating a “phantom ship”. The pirates are not interested in selling off the ship’s cargo, or in using the ship for further service. Their only interest is in holding the ship, her crew and her cargo until such time as a ransom is paid for their release.

Vulnerability of ships

The vulnerability of ships to piracy and sea robbery depends on factors such as the type of ship, its size, speed, freeboard (the height of the deck above the water level) and voyage. Ships successfully hijacked by Somali pirates tend to be older and smaller vessels. Of the 47 vessels successfully hijacked off Somalia in 2009, 24 were under 5,000 GRT; 4 were between 5,000 and 10,000 GRT; 8 between 10,000 and 20,000 GRT and 11 over 20,000 GRT. Of the 11 largest vessels, all were bulk carriers with the exception of one very large crude carrier (VLCC), and one listed as a general cargo ship, but possibly also employed in a bulk trade. The largest ship hijacked during this period was the Greek-flag VLCC *Maran Centurus*, hijacked off Somalia on 29 November 2009. Smaller ships are easier to attack because they have a lower freeboard and are usually slower, with fewer crew than a larger vessel.

Sub-standard ships tend to be more vulnerable than well-operated and maintained vessels, which are more likely to be taking all the precautions against attack recommended by the International Maritime Organization (IMO) and ship-owner associations. The IMO often draws attention to the number of sub-standard ships engaged in bulk trades and often operating within complex ownership structures that obscure the true background of a vessel.¹⁰ The author has heard anecdotal reports that Somali pirates may target vessels that appear to be sub-standard.

Ship safety and security, regardless of flag, depends fundamentally on efficient operation and maintenance with a properly qualified and well-trained crew, and on being managed by a company that strictly observes all applicable regulations and guidelines.¹¹ The flag state is ultimately responsible for ensuring its vessels meet national regulations and the requirements of international agreements to which it is a party, but port state control (PSC) provides a useful safety net. Port state control involves the inspection by the officers of a national maritime authority of foreign vessels visiting the country’s ports to ensure compliance with the international maritime safety and marine pollution prevention conventions. Regional

memorandums of understanding (MOU) provide harmonized systems of PSC, with regional databases that facilitate effective data exchange on inspections and agreements on target inspection rates for the ports of participating countries.

It may be relevant that the Indian Ocean Memorandum of Understanding on Port State Control, to which most successfully hijacked ships are exposed, appears less effective, in terms of inspection rates, than other major MOUs, for example the Paris MOU for Europe and the Tokyo MOU for the Asia–Pacific region.¹² Thus the Horn of Africa may be an area where sub-standard ships are prevalent.

A poor PSC record (indicated by the number of detentions or deficiencies detected at recent PSC inspections) may be considered an indication of a sub-standard ship, as can age. While there will be exceptions, an older ship is more likely to be sub-standard. A ship may start her life with a reputable company, but over the years will be bought and sold, perhaps changing her name and flag and progressively ending up with less responsible owners. It is significant therefore that the average age of the three main classes of commercial ship (i.e. general cargo vessels, bulk carriers and all types of tanker) hijacked by Somali pirates during 2009 was higher than the global average for that class of ship.

Leaving aside the fishing vessels, yachts, tugs and dhows, 30 commercial vessels were hijacked off the coast of Somalia during 2009. Of these, 8 were general cargo ships with an average age of 25.1 years (as compared with a global average age for general cargo ships of 17.1 years); 8 were tankers with an average age of 22.7 years (global average age is 10.1 years); 11 were bulk carriers with an average age of 15.7 years (global average age is 12.7 years); and 3 were container ships (average age 15.3 years as compared with a global average of 9.0 years). The oldest ship hijacked was the 36-year-old 4,932 GRT general cargo ship *Sea Horse* taken off Somalia in April 2009. This ship also had a poor PSC record, with several detentions over recent years for excessive deficiencies, and may have been scrapped since its hijacking.¹³

While it is not always the case, a large merchant vessel travelling at its normal operating speed and taking all appropriate precautions should not be successfully attacked. The pirates will therefore do what they can with the intimidating use of weapons to persuade a vessel to slow down or stop. The successful attacks on two VLCCs, *Sirius Star* and *Maran Centaurus* (attacked in 2008 and 2009, respectively), appear an exception to this principle, but other considerations may explain the successes. Information after the event suggests the *Sirius Star* was steaming slowly or stopped at the time of the attack. The *Maran Centaurus* is relatively old (14 years)¹⁴ and, when attacked, she was not proceeding in any recognized maritime corridor.¹⁵ These considerations serve to highlight the importance of analysing the circumstances of individual attacks rather than taking a generalized view of causal factors.

Bulk carriers also appear an exception to the principle that larger vessels are difficult to attack when proceeding at their normal operating speed. Attacks have occurred on some bulk carriers while apparently underway.¹⁶ There are three factors that help explain this. First, bulk carriers

are generally slow compared with other types of vessel, and have a low freeboard when laden. Second, bulk carriers are relatively unsophisticated vessels and have the reputation for lower standards of ship maintenance and crew proficiency than ships such as tankers and container ships with higher value cargoes. The crew may be less vigilant and security conscious.

The third factor is the way in which bulk carriers are employed. The author's analysis of ship voyage records shows that at the time of being attacked, many bulk carriers were on a slow passage, or possibly unemployed and waiting for a new spot charter.¹⁷ That means they might well be stopped while proceeding slowly or even loitering in potentially high-risk areas, including off the Horn of Africa and in South-East Asian waters.¹⁸ Rather than paying off crew and leaving the ship at anchor, a ship-owner may prefer to keep a vessel fully crewed in expectation of further employment. Instead of paying the costs of anchoring the ship in a secure anchorage, the owner may direct the ship to remain at sea. These are trends that may have been accentuated by the impact of the global financial crisis on the international shipping industry.¹⁹

South-East Asia

Most attacks in South-East Asia are on vessels at anchor, in port, or entering or leaving harbour. These attacks are minor and are best countered by more effective policing by port authorities. The successful attacks at sea are on small ships or larger vessels that are stopped or proceeding slowly. Most high-value sea-borne trade is carried in larger vessels that are transiting the region, but it is mainly smaller, more vulnerable vessels carrying trade within the region or local fishing and trading vessels as well as cruising yachts that are attacked. Larger vessels gain considerable protection from their size and speed. Most large, modern merchant ships engaged in international trade travel at speeds in excess of 14 knots, and it is difficult for small craft to attempt to approach them at this speed.

Two locations in South-East Asian waters can be identified as regional hot spots, where the number of incidents is increasing. The first area is the southern part of the South China Sea near Tioman Island and Aur Island off the east coast of Malaysia, and near Mangkai and the Anambas Islands in Indonesia. There were four attacks off Aur Island in 2009 (three tugs and barges and one general cargo ship), but the last attack occurred in June 2009. This apparent improvement in the latter half of the year might be attributed to increased patrolling by the Malaysian Maritime Enforcement Agency. However, the situation off Mangkai and the Anambas Islands remains serious, with 13 attacks in 2009. These attacks are usually "hit and run", under cover of darkness, with parangs and pistols as the main weapons. The pirates are normally satisfied if they access the ship's safe, seize any valuables and rob the crew.

The second area of concern is the eastern approaches to the Singapore Strait off Tanjung Ayam and Tanjung Ramunia in Malaysia. Thirty incidents occurred in 2009, all involving ships

at anchor. The anchorage, in Malaysian waters, is a preferred location for ship-owners to lay up their ships or take on bunkers (fuel) as they do not have to pay anchorage fees.²⁰

Indirect benefits of piracy

The first inconvenient truth with the current situation is that apart from the pirates themselves, many organizations actually benefit from piracy. The media gets a good story. Marine insurance companies increase their premiums even though the insured vessel might be at relatively low risk of attack. For example Lloyd's, the world's largest insurance market, currently lists extensive areas of the Indo-Pacific region as war risk areas, including Djibouti, Somalia and adjacent areas of the Indian Ocean, the Gulf of Aden, Yemen, Pakistan, Sri Lanka, the ports of Balikpapan and Jakarta in Indonesia, the Sulu archipelago and the north-east coast of Sumatra.²¹

Ship hijackings off Somalia have also created a new business for private security companies, who arrange the payments of ransom monies for a large fee recoverable from insurance. Private security companies win all-round from piracy, conducting risk assessments, offering protection services for ships and crews, even deploying armed escort vessels.²² Their activities are supported by the United States, which has made it mandatory for US-flag vessels in high-risk areas to embark private security guards. The admiral in command of US naval forces in the Middle East has praised the actions of private security guards who thwarted a second attack on the US-flag container ship, *Maersk Alabama*.²³

Navies benefit from piracy too. At a time when the budgets of most Western navies are under pressure, piracy allows navies to demonstrate their utility. As the executive overview to the latest *Jane's Fighting Ships* observes, "the pirates of Somalia have performed at least one useful purpose over the last year: they have provided a much needed reminder of the importance of the sea and of potential threats to global security".²⁴

The naval operations to counter piracy provide justification for sustaining or increasing naval spending. While Western navies are facing a tighter budgetary environment, the same is not the case for Asian navies. Over the five years from 2003 to 2008, China's defence budget grew by a massive 12.1% in real terms per annum, the Republic of Korea's by 6.7% per annum, India's by 3.8%, and the Association of Southeast Asian Nations' by 4.1%.²⁵ Naval capabilities figure prominently in these larger defence budgets. The opportunity costs of this increased spending are high, particularly in a world concerned about fundamental problems of poverty, hunger, disease, overpopulation, climate change and the degradation of the global environment.

Indeed, the cost of the naval operations off the Horn of Africa is much higher than the quantity of humanitarian assistance being delivered to Somalia. EUNAVFOR Somalia–Operation Atalanta, the European Union's anti-piracy operation off Somalia, is reported to cost about US\$ 735 million a year.²⁶ On the basis of those costs and taking into account the extent of

operations by the US Navy and other navies, the total cost of naval operations in the area would be approaching US\$ 2 billion per year. To put these costs in perspective, the United States contributed US\$ 150 million of humanitarian assistance to Somalia in 2009;²⁷ and the total value of international humanitarian assistance to Somalia in 2008 was US\$ 542 million.²⁸

Deploying warships to counter piracy off the Horn of Africa may also serve the foreign policy objectives of governments. The region is politically unstable but vitally important as a source of energy. Many countries, major powers in particular, have an interest in establishing a strategic presence and influence there. Some warships may remain on station even if piracy, as it may be, is effectively eradicated in the area: France and the United States already have naval facilities in the Horn of Africa region, and a senior Chinese naval officer has suggested that China establish a permanent base in the Gulf of Aden to support its anti-piracy operations.²⁹

Inadequate anti-piracy measures

The responses to piracy off the Horn of Africa include multinational naval patrols, the establishment of a Maritime Security Patrol Area in the Gulf of Aden with an Internationally Recommended Transit Corridor protected by warships, the option of escorted convoys, improved arrangements for surveillance and information sharing among participating navies and a series of IMO meetings that have promoted cooperation and developed a Code of Conduct among littoral countries covering matters such as the prosecution of offences.³⁰ The UN Security Council has adopted several resolutions relating to Somalia and these have helped facilitate cooperation to suppress piracy in the area, for example the deployment of naval forces and the investigation, trial and punishment components of repression efforts “unprecedented in scope and authority for the international community to counter a threat in the maritime domain”.³¹

Despite all these measures, attacks in the waters off the Horn of Africa continue. The naval operations have several limitations. Most warships have restrictive rules of engagement and they lack the national legal authority to arrest pirates and bring them to trial.

The most serious limitation, however, is the lack of resources in terms of the number of ships and surveillance aircraft covering the piracy-prone waters off the Horn of Africa that now include large areas of the north-west Indian Ocean around the Seychelles.

For the United States and NATO countries, counter-piracy operations are a lower priority than the conflict in Afghanistan. Comprehensive air surveillance is a basic requirement but there are insufficient military patrol aircraft. The United States has deployed surveillance drones to the Seychelles but these do not provide a visible deterrent to pirates. However, modern warships and military aircraft with their sophisticated military equipment are in many ways an “overkill” for anti-piracy operations. Cheaper and less well-armed coast guard vessels and aircraft would be quite sufficient for the task. A cheaper option would be to use civilian aircraft under charter

perhaps to the United Nations.³² Finally, many merchant ships fail to take all appropriate precautions against attack. For example, there are still slow and vulnerable vessels sailing in the area independently of the escorted convoys.³³

Industry's contribution to piracy

The third inconvenient truth is that while the international shipping industry is the victim of piracy, it also pursues practices that facilitate piracy. This problem has been exacerbated by the global financial crisis and the associated shipping recession.³⁴ The measures taken by some ship-owners in response to the economic downturn have contributed to the resurgence of attacks in South-East Asia, as well as possibly to attacks off Somalia.

For example, there are larger numbers of laid-up ships with skeleton crews in anchorages that are prone to acts of armed robbery against ships, such as in Malaysian waters in the eastern approaches to the Singapore Strait.³⁵ Laid-up ships are major problems for port authorities and maritime law enforcement agencies responsible for security in the anchorages used by laid-up ships.

Instead of reducing the crew and laying up a ship, a ship-owner may prefer to keep it in service waiting for its next charter. This may be particularly the case with bulk carriers due to the unpredictable nature of their employment, which typically involves single voyage "spot charters" rather than long-term contracts. Laying up a ship is a major business decision that, as well as taking a ship out of service, might involve significant costs, for example, immobilizing engines and paying off crew before their contracts have expired. As an alternative to paying off a ship and leaving it at anchor, a ship may be loitering at sea, unsure where the next charter may be coming from, and could find itself in high-risk areas in the southern part of the South China Sea or off the Horn of Africa.

Ship-owners are also tempted to cut corners by employing cheaper crews, reducing crew numbers and lowering maintenance standards. This cost-cutting could increase the risks of accidents at sea, including groundings, collisions and ship losses, with greater risks of marine pollution and vulnerability to piracy. Underpaid and overworked seafarers are not conducive to maritime security.

The IMO is the international agency responsible for shipping safety and security. It has done good work in helping littoral states to establish a regime for safety and environmental protection in the Malacca and Singapore Straits, and in facilitating cooperation in countering piracy off the Horn of Africa. However, it has not addressed the maritime security consequences of the downturn in global shipping, including issues such as the role of the flag state and the ship-owner in countering piracy. This is partly because flag states and ship-owners are powerful interest groups at the IMO, and effectively control the work of the organization.

Conclusions

Piracy is a serious issue, but it is all too easily oversimplified in terms of numbers of attacks and responses required. It is a complex problem that needs to be kept in perspective. As a previous commander of naval operations off the Horn of Africa recently observed, the piracy problem in this area is “overpublicized”.³⁶ Piracy is prone to exaggeration and obfuscation about the true interests and contributions of stakeholders. There are some inconvenient truths about sea piracy that need to be appreciated.

Some countries are using sea piracy for their strategic advantage, but others may lose out. A senior Yemeni minister recently noted that “internationalizing the Red Sea” with the increased presence of foreign warships posed “a real threat on Yemen’s security and stability in particular and on the region in general”.³⁷ The threat of piracy is also used as justification for naval spending. In direct terms, this leads to an environment of increased naval activity that is potentially destabilizing, with greater numbers of aircraft, warships and submarines at sea, including in areas such as the seas of East Asia, where sovereignty disputes and bilateral tensions already exist. In indirect terms, defence spending has a high opportunity cost as it diverts resources from important programmes for economic development, social improvement and poverty alleviation.

For the international shipping industry, the direct economic losses as a consequence of piracy are relatively low, although insurance premiums for ships passing through piracy-prone areas have increased. Much depends on the quality of a ship and her crew. A valuable ship with a valuable cargo is more likely to be operated by a well-trained and motivated crew who will take all precautions against being successfully hijacked.

Insufficient attention has been given to the responsibilities of flag states and ship-owners in preventing piracy. The depressed state of the international shipping industry has led to greater numbers of unemployed or underemployed ships and cost-cutting measures that are contributory factors to the increase in piracy. Flag states should be more proactive in ensuring ships are not vulnerable to attack, and the IMO might look more closely at the problem of sub-standard ships, their vulnerability to attack and the consequences of the shipping recession for maritime security.

Notes

1. United Nations Conference on Trade and Development, 2008, *Review of Maritime Transport 2008*, Geneva and New York, United Nations, Figure 1, p. 3.
2. The eminent American maritime strategist, Alfred Thayer Mahan, promoted the notion that control of the sea by maritime commerce and naval power were fundamental elements in the power and prosperity of nations. Geoffrey Till, 2004, *Sea Power – A Guide for the Twenty-First Century*, London, Frank Cass, pp. 39–45. Numerous recent writings have reflected on the possible impact of Mahan’s thinking on the contemporary maritime strategies of the rising naval powers of Asia: China, India and Japan. See, for

- example, Toshi Yoshihara and James R. Holmes, 2006, "Japanese Maritime Thought: If Not Mahan, Who?", *Naval War College Review*, vol. 59, no. 3, pp. 23–52.
3. Jermyn Chow, "Sea Piracy Hits Five-year High in Waters near Singapore: Worst Affected Vessels are Tankers and Large Container Ships", *The Straits Times*, 21 September 2009.
 4. For example, Simon Elegant, "Dire Straits", *Time*, 29 November 2004; and Cindy Hurst, "Liquefied Natural Gas Tankers Remain Giant Terror Targets", *The Cutting Edge*, 16 June 2008.
 5. Yun Yun Teo, 2007, "Target Malacca Straits: Maritime Terrorism in Southeast Asia", *Studies in Conflict and Terrorism*, vol. 30, no. 6, p. 547.
 6. Peter Chalk, Laurence Smallman and Nicholas Burger, 2009, *Countering Piracy in the Modern Era: Notes from a RAND Workshop to Discuss the Best Approaches for Dealing with Piracy in the 21st Century*, RAND document CF-269-OSD, RAND Corporation, p. 2.
 7. Carrie Levine, "Shipowners Want Protection from Pirates", *The National Law Journal*, 22 September 2009; David Hughes, "Shipping Industry Calls for New Thinking on Piracy", *Maritime Global Net*, 23 November 2009, at <www.mglobal.com/news/dailystorydetails.cfm?storyid=10453&type=2>.
 8. This article follows the International Maritime Organization in using the expression "piracy and armed robbery against ships" to describe incidents. This overcomes the limitation under international law that an act of piracy can occur only in international waters: this expression covers not only acts against vessels at sea, but also acts against vessels in port or at anchor, regardless of whether they were within national waters when attacked.
 9. "Somali Pirates Get \$3.3M Ransom, Free 36 Hostages", *The New York Times*, 17 November 2009.
 10. John King, 2005, "The Security of Merchant Shipping", *Marine Policy*, vol. 29, no. 3, p. 242.
 11. Francisco J. Montero Llácer, 2003, "Open Registers: Past, Present and Future", *Marine Policy*, vol. 27, no. 6, p. 513.
 12. By the end of 2008, 6 of the original 19 signatories to the Indian Ocean MOU had not become parties to the agreement, and of the 13 parties, 6 did not achieve their target inspection rates during 2008 and one did not report data. Under the Indian Ocean MOU, parties are committed to inspecting at least 10% of foreign ships visiting their ports. Indian Ocean MOU, *Annual Report 2008*, see especially p. 26, Figure 1; Memorandum of Understanding on Port State Control for the Indian Ocean Region, document MOU.Rev1.Oct 2000, Article 1.3.
 13. The global average age for the different classes of ship is taken from United Nations Conference on Trade and Development, op. cit., Table 11, p. 37 and the age of the ships hijacked and their PSC record were retrieved mainly from the database of the Indian Ocean MOU on Port State Control <www.iomou.org>, with some from the Riyadh MOU on Port State Control for the Gulf region <www.riyadhmo.org> and the Paris MOU for European countries <www.parismou.org>. Some ages of ships were from the World Shipping Register's Ships and Shipping Company database, at <<http://e-ships.net/index/A4.shtml>>.
 14. Age from the World Shipping Register, op. cit.
 15. Jason Straziuso, "EU: Hijacked oil tanker was outside corridor", *Associated Press*, 1 December 2009.
 16. A ship is underway if she is not anchored, secured to a buoy, made fast to the shore (e.g. alongside a wharf or jetty) or aground. A vessel stopped at sea is still regarded as being underway.
 17. A spot charter is a charter for a particular vessel to move a single cargo between specified loading port(s) and discharge port(s) in the immediate future. Bulk carriers are the modern "tramps" of the sea, often chartered for single voyages rather than operating on time charters covering several voyages. They may therefore loiter at sea waiting for a new charter.
 18. Of the 21 commercial vessels hijacked off the Horn of Africa in the first nine months of 2009, ten (including four of the six bulk carriers) appear to have been on very slow passages. The vessel database maintained by Lloyd's Marine Intelligence Unit (MIU) was used to identify the particular voyage a ship was on at the time she was attacked and features of her movements prior to the attack (typically a very slow passage from her previous port) that may have made her more vulnerable.

19. Sam Bateman, 2009, "Maritime Security Implications of the International Shipping Recession", *Australian Journal of Maritime and Ocean Affairs*, vol. 1, no. 4, December, pp. 109–117.
20. Sam Bateman, 2009, *Increased Risks at Sea? Global Shipping Downturn and Maritime Security*, RSIS Commentary 100/2009, October, S. Rajaratnam School of International Studies.
21. The Joint War Committee of Lloyd's Market Association and the International Underwriting Association of London circulars listing risk areas can be found at <www.lmalloyds.com/AM/Template.cfm?Section=Joint_War1&Template=/TaggedPage/TaggedPageDisplay.cfm&TPLID=3&ContentID=3888>. The most recent at the time of writing was 25 November 2009.
22. "Splashing, and Clashing, in Murky Waters: Piracy and Private Enterprise. The Growing Role of Maritime Private Security Companies", *The Economist*, 22 August 2009.
23. Pauline Jelinek, "Admiral Praises Action off Somalia that Foiled Pirate Attack against Maersk Alabama", *Washington Examiner*, 18 November 2009.
24. Stephen Saunders, "Executive Overview: Fighting Ships", *Jane's Fighting Ships 2009–2010*, May 2009, p. 19.
25. Based on data from Commonwealth of Australia, 2008, *Defence Economic Trends in the Asia Pacific 2008*, Canberra, Defence Intelligence Organisation.
26. Gregory Viscusi, "EU Anti Piracy Mission may Need to Extend Range, Commander Says", *Bloomberg.com*, 11 December 2009.
27. USAID, Bureau for Democracy, *Conflict and Humanitarian Assistance, Somalia: USAID Humanitarian Assistance in Review, 1991 – Present*, December 2009.
28. Global Humanitarian Assistance, Total Humanitarian Assistance by Recipient, at <www.globalhumanitarianassistance.org/data-space/excel-data/total-humanitarian-assistance-0>.
29. "China Floats Idea of First Overseas Naval Base", *BBC News*, 30 December 2009.
30. IMO, no date, "Piracy in Waters off the Coast of Somalia", at <www.imo.org/home.asp?topic_id=1178>.
31. Brian Wilson, 2009, "Naval Diplomacy and Maritime Security in the Western Indian Ocean", *Strategic Analysis*, vol. 33, no. 4, July, p. 491.
32. For example, Australia uses civil chartered De Havilland Dash 8 aircraft with a range of different sensors and a surveillance information management system on board to undertake most maritime surveillance tasks in Australia's large exclusive economic zone. An estimate of the comparative costs of Royal Australian Air Force P3C aircraft and the Dash 8 aircraft in 1998–1999 found that the military aircraft were at least ten times as expensive as the civil aircraft. The Auditor-General, 2000, *Coastwatch: Australian Customs Service, Audit Report no. 38*, Canberra, Australian National Audit Office, p. 66.
33. The author observed this himself when he travelled through the area in September 2009 in the large and fast container vessel *CMA CGM Strauss*.
34. Sam Bateman, 2009, "Maritime Security Implications of the International Shipping Recession", op. cit.
35. Simon Parry, "Revealed: The Ghost Fleet of the Recession Anchored Just East of Singapore", *Daily Mail*, 28 September 2009.
36. "Former CTF-151 Commander Says Media Attention Dramatizes Somali Piracy", *Defence Professionals, defpro.news*, 8 December 2009.
37. "Experts Warn of Growing Piracy Threat in Yemen and Regional Countries", *Bernama.com*, Malaysian National News Agency, 8 February 2010, <www.bernama.com/bernama/v5/newsworld.php?id=474140>.

Civilian nuclear operations entail the transportation of sometimes substantial quantities of radioactive material. These can range from large quantities of weakly radioactive fresh fuel for power reactors, with the corresponding removal of highly radioactive spent fuel and operational wastes, to the shipment of small quantities of radioactive isotopes (“sources”) for medical, industrial or research purposes and their subsequent disposal. In relation to the civilian nuclear fuel cycle, there may also be relatively large quantities of radioactive material produced by “back-end” activities, such as the reprocessing of spent fuel to recover plutonium and then create mixed oxide, or MOX, fuel.¹ In between these extremes, there are occasional consignments of fresh and spent fuel to and from research reactors, together with the associated wastes. In many of these cases, circumstances will dictate that consignments are dispatched overland, or by air, but there are some cases where a substantial maritime component is entailed and where there will be particular security and safety concerns that arise from that. Traditionally, the focus of this concern has been on the possibility of accidents, which might result in environmental contamination or human harm, but more recently, and certainly since 11 September 2001, the locus of concern has somewhat shifted to risks that might arise from the activities of non-state armed groups, or terrorists (or even pirates). This is the focus of the present review.

Nuclear ships

As indicated above, much transportation of nuclear material is overland and thus beyond the scope of the present discussion, but there are prominent cases where dedicated ships are used, either on grounds of convenience or because of the long distances involved. In the cases of Sweden and Japan, all their significant nuclear sites are on the coast. In the former case, the Swedish Nuclear Fuel and Waste Management Company (Svensk Kärnbränslehantering AB) services sites using a specially built nuclear transportation vessel, the *M/S Sigyn*.² This carries spent fuel and operational wastes from the four power station sites to the various holding and disposal facilities. Japan carries spent fuel and waste from its rather larger number of nuclear power reactors to a central service site at Rokkasho on the north-eastern coast of Honshu using a small fleet of specially built ships. These vessels will also convey MOX fuel rods from the reprocessing of spent fuel at Rokkasho back to the power station sites when the manufacturing capability for this activity is completed. The extensive British civil nuclear support industry also services its customers in various places in Europe through the use of specially built or specially

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converted vessels.³ In these cases, the conditions of the sea voyage are such as to facilitate onward land transportation, which may mean that they are carried on the vehicles that will be used for onward transit. These ships are presently operated by International Nuclear Services, on behalf of the British Nuclear Decommissioning Authority, successor to British Nuclear Fuels Ltd.

Early in the development of its nuclear industry, Japan decided to reprocess its spent fuel in France and the United Kingdom. This necessitated the transfer of spent fuel from Japan to Europe and the subsequent return to Japan of separated plutonium (only once), the regular return of MOX fuel and the occasional return of high-level wastes. This gave rise to the development of ships dedicated to these voyages and the formation of a company, Pacific Nuclear Transport Limited (PNTL), to provide the ships. Again, the ships are operated by International Nuclear Services.

This activity has now been going on for more than 30 years. For the most part, spent fuel has been transported via the most direct route across the Pacific and through the Panama Canal to France or the United Kingdom, with return cargoes of MOX fuel taking a longer route around the tip of South Africa, across the Indian Ocean and north through the Tasman Sea. This latter route involves negligible time close to land, reflecting the higher security sensitivity of (plutonium-containing) MOX fuel.⁴ Consignments of high-level waste may take any of the three possible routes. Because of this long experience, PNTL ships were involved in the 2004 shipment of surplus weapon-grade plutonium from the United States to France and the subsequent return to the United States of a batch of MOX fuel for US reactors: a project that was known as "Eurofab".

Japan is building its own capacity to reprocess and use its commercial spent fuel, so it is likely that the trade with Europe may diminish with time. On the other hand, there are international trends that may increase the demand for maritime transportation. There is a reviving interest in civilian nuclear power around the globe and the volume of demand in particular regions, or by particular states, may be such as to justify service by sea. Like Japan and Sweden, states may plan to place all their major facilities on the coast.⁵ Economics and non-proliferation considerations, leading to international cooperation on fuel services, may also result in more shipment of nuclear materials (particularly back-end materials) by sea.⁶

A great deal of nuclear material is also transported by sea in containers on large container ships, where it is carried along with the usual variety of commercial cargo. These consignments will include refined uranium ore ("yellow cake") as well as other front-end materials, such as uranium hexafluoride and fresh fuel, all of which are characterized by low radioactivity. Container ships also transport smaller amounts of back-end material produced by the operation of research reactors, which do not require a dedicated ship. An example of this would be the Open Pool Australian Lightwater research reactor at Lucas Heights, south of Sydney. This is a 20 Megawatt pool reactor, which was built by contractors from Argentina, who supplied the original fresh

fuel. Fresh fuel now comes from a European source, and spent fuel is presently sent to France for reprocessing, from where there are periodical returns to Australia of conditioned waste (that is, radioactive waste that has been immobilized and packaged so that it is suitable for safe handling and disposal) and operational wastes. These are consigned by special shipping container but on ordinary commercial ships. Like power reactors, the mode of servicing for research reactors will generally depend on factors of convenience and security. Research reactors located near suitable ports and over water from their suppliers will frequently use shipping containers and commercial ships for both fuel supply and the return of spent fuel, as in the Australian case. For reasons of security the countries concerned will wish to avoid as far as possible public discussion of the precise arrangements.

The regulatory framework

All this movement of nuclear material around the globe is governed by a detailed set of guidelines, which arise from international conventions and the work of such international institutions as the International Maritime Organization (IMO) and the International Atomic Energy Agency (IAEA). These guidelines are implemented—often more rigorously than the guidelines themselves dictate—by the nuclear companies in the countries concerned and by the various domestic security agencies with which they cooperate. In the United Kingdom, this is the Office for Civil Nuclear Security, which is part of the Health and Safety Executive.

In the first instance, the international transportation of nuclear material is governed by the Convention on the Physical Protection of Nuclear Material, deposited with the IAEA.⁷ The Convention came into force in 1987 and the present number of parties is 142, including all major states, but there are parties with significant nuclear activity that are not signatories: for example, Iran.⁸ However, the Convention is only concerned with international transportation and specifically reserves the "rights of a State regarding the domestic use, storage and transport"⁹ For international transportation the Convention places responsibility on any exporting state to satisfy itself that nuclear material will be protected at levels specified in Annex I to the Convention. Crucially, Annex I lays out minimum levels of physical protection for nuclear material during international transport. In all cases there is a requirement for special precautions including, as appropriate, guards and barriers, and also advanced notification to appropriate authorities of all arrangements.¹⁰ States parties engaged in the international transfer of nuclear material are required to cooperate on the design and operation of systems of physical protection of nuclear material, both directly and through the IAEA.¹¹ They are also required to adopt domestic legislation criminalizing a range of activities regarding interference with the safe transfer of such material and to act in the event that an offender is within their jurisdiction. In addition, for the more sensitive Category I materials, there is a requirement for constant surveillance by escorts and conditions that assure close communication with appropriate response forces. There is also an amendment to the Convention, which was

adopted in 2005, and which would extend the protective regime, particularly in respect of terrorism. This, however, is not yet in force.¹²

The other United Nations agency that is relevant to these discussions is the International Maritime Organization, headquartered in London. Arising from its general concern for safety at sea, the IMO developed the International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-level Radioactive Wastes on Board Ships (or INF Code). The Code, which became mandatory in 2001, evolved a certification system for ships based on the amount of radiation produced by the cargo as a whole, which distinguished between three classes of ship: the highest category was designated INF3; INF2 and INF1 ships were, in turn, certified for smaller quantities of total radiation.¹³

The detailed requirements for the transportation of nuclear materials are contained in the IAEA's Regulations for the Safe Transport of Radioactive Material¹⁴ and The Physical Protection of Nuclear Material and Nuclear Facilities.¹⁵ These specify what the hazards may be from the various materials and the conditions under which they may be transported. Among the requirements for shippers of such materials is the formal preparation of threat assessments in relation to particular kinds of cargo on particular routes (called the Design Basis Threat, DBT). These DBTs combine intelligence on the likely intentions and capabilities of potential threat groups with knowledge of the security arrangements that are in place, including the availability of countermeasures and other contingency arrangements. For each voyage a specific Transport Security Plan is also required. Generally, it would be true to say that the maritime consignment of large quantities of sensitive nuclear material is attended by a great deal of thought and preparation, including considerable efforts to anticipate how parties intent on diverting or otherwise interfering with a shipment might proceed and to devise countermeasures. Of course, much of this cannot be revealed, and for obvious reasons. On the other hand, there is sufficient information in the public domain to address public anxieties on the matter effectively.

The threat from terrorists or pirates

The terrorist threat to shipments of nuclear material by sea was the subject of a detailed report by this author in 2006.¹⁶ This assessment was initiated because of publicly expressed concern about the Eurofab shipment and particularly a fear that it might be seized by terrorists, who might then make a bomb. In the event, the investigation was broadened to encompass other kinds of nuclear shipment and other ways that terrorists might exploit them.

Many of the envisaged threat scenarios begin with terrorists intercepting a shipment and then taking control of the ship. For the most sensitive of cargoes, i.e. those that contain a substantial quantity of fissile material, the relevant regulations stipulate ships that have a significant defensive capability. They have armed guards¹⁷ and they have escorts. In the PNTL case, where long ocean voyages are concerned, this requirement is discharged by using two identical

ships, both of which are fitted for heavy-calibre weapons and carry a group of specially trained security personnel and both of which are capable of carrying the consignment. The ships are also equipped with state-of-the-art surveillance capabilities, so that the prospect of being approached unnoticed is very small. And, of course, if an approach is noticed, the supposed assault craft are going to come under heavy fire. Some PNTL ships (and this included the Eurofab ships) are fitted with 30mm rapid-fire naval guns. Altogether, there is very considerable room for doubting that there are presently any terrorist groups that have the capability to take nuclear cargo carriers in these circumstances. Clearly, the same would apply to pirates who might intend to take a nuclear transport vessel and, perhaps, hold the ship and its cargo for ransom.

It might be thought that there would be ways to circumvent these defensive arrangements by using some kind of subterfuge to board the ship or ships. Terrorists might do this by taking advantage of nautical conventions that require ships to come to the aid of other vessels in distress, or by attempting to coerce crew members, or by contriving the placement of “sleepers”. This, of course, is the stuff of the Hollywood thriller but, in the circumstances of shipments on dedicated ships carried under the regulatory framework outlined earlier, it is implausible. Certainly, in the case of PNTL ships, crew turnover is very low, so the insinuation of a sleeper would have to be a long-term project, especially if that person were to have access to sensitive areas on the ship. PNTL ships also operate a two-key system, under which a single individual would not have access to sensitive areas without the acquiescence of another crew member with the appropriate clearance. Again, attempts to blackmail crew members into assisting an assault (like attempting to place a sleeper) would have to begin long before the ship goes to sea, and this lengthy period of time increases the risk of discovery. Just to complete the set of countermeasures to these possibilities, it might be noted that there are protocols that provide for what should be done in the matter of allowing on board persons who may appear to be victims of a maritime emergency.

Notwithstanding all these considerations, it will now be assumed, for the sake of argument, that the ship has been taken. Again there are a number of possibilities regarding what might happen next. Most obviously, in the case of plutonium cargoes, there might be an attempt to remove the sensitive material from the ship. Again, the conditions of shipment make removal a formidable problem. As provided for in the regulations, plutonium-containing material is carried in massive forged-steel casks, weighing in the order of 100 metric tons, and of such a dimension in regard to the hold-space that their end-lids cannot be removed until they are taken from the hold.¹⁸ For this, the terrorists are going to have to supply their own, very substantial, lifting equipment. This requirement will also apply to the removal of the hatch covers. On-board cranes that are available for this purpose on other voyages are deliberately removed for the most sensitive cargoes.

The ship (or ships) will need to be taken to a port with appropriate facilities, which raises two further problems. Where would this port be and what are the chances of getting there

without being intercepted? This will be particularly problematic since the position of the ship and its cargo will have been continuously monitored from the outset of the voyage and the fact that its progress has been interfered with will have been known from the very beginning of the assault. It might be imagined that all global location systems had been disabled and continuing messages of reassurance had been dispatched on schedule. But, even here, it should be noted that the security agencies and shipping companies of the dispatching state will have devoted considerable effort to anticipating such intentions and the chances that they could be successfully carried through are extremely small.

The foregoing discussion assumed that the ship was taken in mid-ocean, which is the reason for the highest level of security and particularly for those measures whose object is to introduce a substantial element of delay into any efforts to divert the cargo. In the case of coastal cargoes of the most sensitive materials, the ships involved are much closer to support capabilities, which, of course, are on stand-by. In a similar way, overall security arrangements for other cargoes will generally take into account the sensitivity of the material being carried as well as a general assessment of the security threat. While shipments of high-level waste from reprocessing cannot be made the basis of a nuclear explosive device, they could, in principle, be used to make a radiological weapon or to contrive a significant environmental contamination. The security measures taken ensure that there are enormous problems in contriving these scenarios, if the starting material is a substantial consignment on a dedicated ship. To begin with, the radiation levels of the material are so high that it must be carried in massive transportation flasks, which implies all the difficulties described above for MOX fuel, with the additional danger for terrorists or pirates of receiving a lethal dose if and when they get to open them. In addition, there is the problem that the radioactive material (fission products) is held in solid ceramic glass, which would make it difficult to remove.

Beyond these scenarios, there are those that entail using the whole ship and cargo as the basis for contriving some sort of radiological event by somehow dispersing the nuclear contents in the environment by explosion or fire. Presumably this would take place close to land, or in harbour. Again, there are enormous technical difficulties in achieving this. The transportation casks are manufactured to provide great resistance to fire (and emersion) and are rigorously tested to ensure that this is so. If that were not enough, the ships themselves have considerable fire resistance. The only thing that might be done is to assault the vessel with an explosive-laden fast assault craft, as in the case of the USS *Cole* (October 2000), or to attack using an aeroplane. In none of these cases are the transportation flasks likely to be breached, although depending on the explosive burden in each case, there might be significant damage to the ship. The PNTL vessels are double-hulled so that sinking is very improbable, but an attack of this kind would undoubtedly be a media event. It is highly unlikely, however, to be a nuclear event.

Those who speculate about the danger that terrorists might make and detonate a nuclear explosive device are usually thinking of the possibility that they might get hold of highly

enriched uranium (HEU).¹⁹ HEU denotes uranium that is enriched in the isotope uranium-235 beyond the natural percentage of 0.7% to at least 20% (the remainder is uranium-238), though this level of enrichment, at the bottom of the range, is some way from a suitable material for nuclear detonation purposes. Enrichments in the order of 80% or higher are required for the fabrication of the sort of crude weapon to which terrorists might aspire. Theoretically, there are two marine locations where HEU might be found. One of these is new fuel rods on a nuclear-propelled submarine (though not all have fuel of this very high enrichment). Readers may speculate for themselves about the difficulty that may be had in getting hold of these. The other source is fresh fuel for research reactors that are still operating on fuel of this sort of enrichment. Precisely because of the proliferation danger of this material, such reactors have been progressively replaced by newer models that operate at much lower enrichment.²⁰ Such cargoes of weapon-suitable material as still persist will not generally contain sufficient by themselves for bomb fabrication (and, of course, it would need to be extracted from the fuel assembly). As noted earlier, such cargoes will be in a special shipping container and are likely to be “buried” deep under other containers on a commercial ship. In this case, pirates or terrorists might take the ship (assuming it came within their range and no special protective precautions were taken) but they would need to take it to a container port to get at the cargo, supposing in the case of pirates that they actually knew what was there. It may be presumed that these matters would be addressed in a Transport Security Plan. In the case of known piracy hot spots, such as off the coast of Somalia, these plans could include arranging closer support from one of the many warships in the region, but taking a wider berth might be a better option. To judge by recent events, with ships taken more than 1,000 nautical miles from the Somali coast, this might need to be a very wide berth indeed.

Conclusion

There is continuing concern about the possibility that terrorists might get hold of nuclear material and make a nuclear-based weapon of some kind. This is serious enough for us to keep under constant review the circumstances under which such materials are held and transported. As far as the maritime movement of substantial quantities of such materials is concerned, it is the case that large quantities, and particularly proliferation-sensitive materials, will be carried on dedicated ships, which offer enhanced security measures that are mandated by international agreement. In this case, the security threat is more theoretical than real since, as is well known, terrorists and pirates prefer “soft” targets: the panoply of security measures employed on these ships is such as to make them a very hard target indeed. Not only are the ships extremely well defended and externally supported but the nature of the transportation packaging is such as to present an insuperable barrier to the removal of the nuclear cargo. The bottom line here is this: if terrorists do make and detonate a nuclear explosive device, they will not do it through snatching a nuclear cargo on the high seas. In so far as there is a risk that terrorists get hold of nuclear material to make some sort of weapon, they are very much more

likely to obtain this material from on land, although their prospects are not very good there either. This is where the focus of security concern needs to be.

Similarly, scenarios that entail the use of ship and cargo together as some kind of radiological weapon seem implausible in the light of the manifold obstacles to achieving any substantial effect. However, in this case, there is (as noted above) every possibility of a media event, which would present a problem for the various authorities and for which it would be prudent to prepare.²¹ None of this is a reason for complacency. But it is a reason for having confidence in the security arrangements that attend the maritime shipment of major nuclear cargoes, built as they are on a continuing review of the technical possibilities and on the capabilities and intentions of terrorist groups.

The matter of piracy is different. As indicated, there is a possible threat to shipments of nuclear material on commercial container ships (with all the caveats earlier noted). Under present circumstances, and without the precautions which were the subject of earlier speculation, this could result in the ship being taken, with the nuclear material then falling into pirate or terrorist hands: a very undesirable outcome. The answer to this is perhaps beyond my brief here. It would require the international community to get serious about the Somali piracy problem by adopting more effective policies and rules of engagement for its military forces.

Notes

1. The fission process, which is at the heart of nuclear energy production, is precipitated and maintained by a flux of neutrons. These not only initiate the fission of uranium-235 atoms but they also convert uranium-238 atoms into plutonium isotopes, including plutonium-239, which is also fissile and can be used for energy production. Reprocessing extracts the plutonium from spent fuel, which is then mixed with depleted uranium (uranium-238) to make mixed oxide fuel. Front-end and back-end refer to the activities undertaken in the nuclear fuel cycle before and after the nuclear fission process.
2. For details of the vessel, routes and conditions of transportation of the radioactive material, see <www.skb.se/upload/publications/pdf/SKB%20Transport%2028.2.08.pdf>.
3. By contrast, the equally extensive French civil nuclear support industry uses largely land transfer to support its European customers.
4. The route around Cape Horn is also a possibility (according to company documents) but has never been used for MOX fuel shipments. The route that passes by the tip of Africa and through the Tasman Sea (between New Zealand and Australia), in particular, accounts for the long-time interest in this trade from persons in New Zealand, including the present author.
5. There is an advantage to doing this that has nothing to do with the transport of nuclear material. Nuclear power plants need copious amounts of cooling water. Locating them by the sea makes supplying such a need easy, and it avoids the necessity of large, unsightly cooling towers.
6. See the recent article on this topic by Mohammed I. Shaker, 2008, "The Internationalization of the Nuclear Fuel Cycle: An Arab Perspective", *Disarmament Forum*, no. 2, pp. 33–41.
7. Signed at Vienna and New York, 3 March 1980, entry into force 8 February 1987, document INFCIRC/274/Rev.1
8. To download a copy of the Convention and see its current status, go to <www.iaea.org/Publications/Documents/Conventions/cppnm.html>.
9. Convention on the Physical Protection of Nuclear Material, Article 2(3).

10. There is no requirement for states to provide information regarding arrangement if it would “jeopardize the security of the State concerned or the physical protection of nuclear material” (Convention on the Physical Protection of Nuclear Material, Article 6(2)).
11. The IAEA maintains an Office of Nuclear Security for precisely this purpose.
12. “Nuclear Security—Measures to Protect against Nuclear Terrorism, Amendment to the Convention on the Physical Protection of Nuclear Material”, document GOV/INF/2005/10-GC(49)/INF/6, 6 September 2005. This amendment requires ratification by two-thirds of states parties (approximately 95 ratifications) for entry into force. As of July 2010 it has 39 contracting states, and 22 ratifications.
13. For more details of the code, see the IMO’s web pages at <www.imo.org/safety/mainframe.asp?topic_id=354>. The code was adopted by and is reproduced in IMO resolution MSC.88(71), 27 May 1999, document MSC 71/23/Add.1, at <www.imo.org/includes/blastDataOnly.asp/data_id%3D15456/88%2871%29.pdf>.
14. IAEA, 2009, Regulations for the Safe Transport of Radioactive Material, Safety Requirements no. TS-R-1, Vienna, at <www-pub.iaea.org/MTCD/publications/PDF/Pub1384_web.pdf>.
15. IAEA, The Physical Protection of Nuclear Material and Nuclear Facilities, document INFCIRC/225/Rev.4 (Corrected), at <www.iaea.org/Publications/Documents/Infcircs/1999/infcirc225r4c/rev4_preface.html>.
16. Ron Smith, 2006, *Terrorism and Maritime Shipment of Nuclear Material*, at <www.pntl.co.uk/pdf/Terrorism_Nuclear_Cargo.PDF>. The study was carried out with the cooperation and support of the nuclear companies in Japan, France and the United Kingdom, who are responsible for most of the present transportation of nuclear material on dedicated ships. These are, respectively, the Overseas Reprocessing Company of Japan; Areva, France; and British Nuclear Fuels Limited (now the Nuclear Decommissioning Authority). Through them the author was able to meet with officials responsible for preparing cargoes and conducting the shipments as well as persons in the various security agencies in the countries concerned, who were responsible (in concert with the relevant company officials) for making security arrangements. The author was also able to see the facilities and technology for handling the various cargoes, including the ships and the technology associated with packaging them for transportation, as well as the training and equipment of the security personnel involved.
17. The United Kingdom’s armed guards are members of the Civil Nuclear Constabulary, which is responsible for guarding nuclear establishments in the United Kingdom and for providing the security force on board ships of Pacific Nuclear Transport Limited. Other countries with a nuclear industry have corresponding organizations but the Civil Nuclear Constabulary is the only one with a sea-going component. For this purpose, other countries will tend to use military or paramilitary forces as required.
18. For further details of the conditions of transportation, the ships and the characteristics of the transportation flasks see the PNTL web site, <www.pntl.co.uk>, as well as the site of International Nuclear Services, <www.innuserv.com>.
19. See, for instance, Matthew Bunn and Anthony Wier, 2005, “The Seven Myths of Nuclear Terrorism”, *Current History*, April, pp. 153–161. In contrast to using HEU, attempting to use a plutonium cargo to make a nuclear explosive device faces much greater problems at the weapon design stage.
20. This is the focus of the United States Government’s Global Threat Reduction Initiative.
21. On the basis of numerous discussions with officials involved in preparing for these shipments, the author would not be at all surprised to discover that such plans were already in existence.

The Proliferation Security Initiative

Jeffrey Lewis
Philip Maxon

In November 2002, a ship from the Democratic People's Republic of Korea (DPRK) but under Cambodian flag, the *M/V So San*, put to sea. Although the ship's manifest listed the cargo as cement, United States intelligence believed that the ship carried illicit goods related to weapons of mass destruction (WMD). As the ship steamed toward Yemen, US officials determined that Combined Task Force 150, created to carry out maritime security operations in the Horn of Africa region, could stop the vessel. On 9 December, almost 1,000km off the coast of Yemen, two Spanish warships participating in Combined Task Force 150, the *Navarra* and *Patino*, encountered the *So San*. After radio contact, the *So San* failed to fly its flag, as required under international law. The Spanish ships ordered the *So San* to stop. As the *So San* ignored the command to halt, the *Navarra* fired three warning shots. Yet the *So San* continued, until Spanish snipers shot out the vessel's mast cables, enabling seven Spanish Marines to descend from a helicopter onto the ship's deck. The Marines quickly subdued the DPRK crew without incident. Beneath the sacks of cement mix that were listed on the ship's cargo, the Marines found 15 Scud B missiles, 15 conventional explosive warheads, 23 containers of rocket fuel, and 85 barrels of unidentified chemicals. The Spanish radioed to a nearby US ship, the *USS Nassau*. Explosives experts from the *Nassau* boarded the *So San* and the United States took possession of the ship.¹

The interdiction of the *So San* triggered a debate in Washington. The Bush Administration, in its search to articulate a muscular response to the spread of WMD, had been emphasizing counterproliferation activities such as interdictions. From mid-2002 administration officials, including Under Secretary of State for Arms Control and International Security John Bolton, had highlighted the increased focus on interdictions to "combat" proliferation in their testimonies before Congressional committees.² Toward the end of 2002, President Bush signed two classified National Security Presidential Directives (NSPDs) emphasizing "effective interdictions": NSPD 17, "National Strategy to Combat Weapons of Mass Destructions" and NSPD 20, "Counterproliferation Interdictions".³ The government established a Policy Coordinating Committee (PCC), under Robert Joseph, to manage interdictions.⁴

At first, the interdiction of the *So San* must have seemed heaven-sent—the administration released an unclassified version of NSPD 20 on the same day that it announced that Spanish warships had stopped a DPRK vessel carrying illicit cargo. Quickly, however, the limits to interdiction became apparent. Yemeni officials announced that the missiles were the final instalment of a 1999 purchase from the DPRK and argued that the United States

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had no legal authority to seize them. The United States claimed that the shipment violated a commitment by Yemen not to purchase ballistic missiles from the DPRK.⁵ Over a two-day period Vice President Dick Cheney and Secretary of State Colin Powell had intensive telephone conversations with the Yemeni President Ali Abdullah Saleh and his Foreign Minister in an effort to persuade Yemen to drop its claim to the missiles. President Saleh refused and, facing a major row with an ally assisting in the combat against Al-Qaida, President Bush agreed to release the missiles, so long as Yemen did not pass them to Iraq or to terrorists and it affirmed that this was the final purchase from the DPRK.⁶ The final outcome was a public relations disaster, highlighting the weakness, not the strength, of the administration's emphasis on interdictions. One administration official remarked that the decision to release the missiles was particularly painful, as the money Yemen paid went directly to the DPRK's nuclear programme. Another official noted that President Bush was a "very, very unhappy man".⁷

In the wake of the failed *So San* interdiction, the National Security Council's PCC for interdictions undertook a "lessons learned" study, led by John Bolton and Robert Joseph.⁸ It prompted the development of a new counterproliferation initiative to coordinate intelligence, law enforcement and export controls to interdict shipments of WMD and delivery systems. The administration, wary of international legal regimes, modelled the new initiative on existing coordination with the United Kingdom on interdictions. After reaching out to a small number of key allies, including Portugal, Spain and the United Kingdom, President Bush unveiled the new approach, the Proliferation Security Initiative (PSI), in a speech in Poland in May 2003.⁹

The PSI: an activity, not an organization

Over the next four months, the United States and 10 allies (Australia, France, Germany, Italy, Japan, Netherlands, Poland, Portugal, Spain and United Kingdom) would meet three times to flesh out the new initiative. They agreed on intelligence sharing operations, common export control laws, and establishing a Statement of Principles.¹⁰ The Statement of Principles was agreed on 4 September 2003 in Paris. Members pledged to:

- interdict transfers of WMD and related materials to and from states and non-state actors of proliferation concern to the extent of their capabilities and legal authorities;
- develop procedures to facilitate exchange of information with other countries;
- strengthen national legal authorities to facilitate interdiction efforts; and
- take specific actions in support of the interdiction of suspected cargoes of WMD or related materials.¹¹

The PSI does not create laws or regulations: the interdictions are carried out under existing export control laws. Indeed, US government officials are fond of saying that the PSI is "an activity, not an organization".¹² So, for example, countries do not "join" the PSI, but they may "endorse" the Statement of Principles. Ninety-seven countries have endorsed the PSI, the latest being Saint Vincent and the Grenadines on 11 May 2010.¹³

Despite the relatively large number of countries endorsing the PSI, at first policy direction mainly came from what was known as the “core” group—informally defined as those countries invited to the major PSI-related meetings. The core group comprised the original 11 participating states plus, after 2004, Canada, Norway, the Russian Federation and Singapore.

As the core group expanded, coordination became more difficult, so in 2004 the parties decided to disband the group and instead utilize the 20-member Operational Experts Group (OEG) for high-level political guidance as well as more technical activities.¹⁴ The OEG had been established in December 2003 as a forum to discuss implementation of the PSI, focusing on policy coordination among military, law enforcement, intelligence, diplomatic and legal bureaucracies.¹⁵ OEG members meet at least annually to agree on export control lists, coordinate intelligence sharing and law enforcement measures, and plan joint exercises.¹⁶ Meetings involve all 20 members, and each meeting is chaired by a different country.

Between September 2003 and January 2010, PSI members conducted 45 exercises.¹⁷ Exercises managed by the OEG are multinational and held in a country of the OEG’s choosing. PSI members may either choose to participate or to observe each exercise with the consent of the host state. Non-PSI members may observe the exercises.¹⁸ States may also host regional or national exercises. The most recent exercise was PSI Regional Operation Leading Edge in Abu Dhabi, United Arab Emirates, on 24–28 January 2010. It involved all 20 OEG members and 10 other PSI states. The operation had three phases: a simulated search and seizure of a naval vessel, port security activities, and a table-top session on legal and customs issues.¹⁹

Does the PSI matter?

But do PSI activities prevent or deter proliferation? It is impossible to answer this question. We have only two reference points—the world before and the world since the PSI—and many intervening variables. For example, a recent decline in ballistic missile exports from the DPRK has been suggested as a possible argument that PSI activities have had a systemic effect on proliferation. Yet a careful study by Joshua Pollack finds many reasons for the declining market for DPRK ballistic missiles, largely emphasizing a drop in demand.²⁰

An indirect measure of the effectiveness of the PSI might be the number of interdictions. This is certainly the measure that US government officials have used anecdotally. For example, in May 2005, then Secretary of State Condoleezza Rice claimed that PSI members had cooperated on 11 successful interdictions since August 2004.²¹ Robert Joseph, then Under Secretary for Arms Control and International Security, claimed that PSI members had helped to interdict more than 30 transfers of WMD material and equipment between 2005 and 2006.²² In 2009, Acting Deputy Assistant Secretary of State for International Security and Nonproliferation Tony Foley claimed that PSI members stopped a shipment for Iran’s heavy water programme, stopped Scud propellants being transported from the DPRK to a Middle Eastern state, and refused overflight rights to DPRK aircraft heading to Syria, possibly carrying ballistic missile

components.²³ A former administration official has claimed PSI members had conducted about 50 interdictions between 2003 and April 2009.²⁴

However, an increase in interdictions could be the result of many things, including an increase in proliferation. Conversely, a decline in interdictions could indicate that PSI activities have deterred sales. Even at an anecdotal level, how can we determine if an interdiction would have occurred without PSI? For example, some US officials, in discussing the contribution of PSI, refer to the interdiction of the *BBC China*, a German-owned ship bound for Libya with centrifuge components supplied by the A.Q. Khan network. The United States and German governments prevailed on the German owner of the ship to direct it to the Italian port of Taranto, where Italian officials boarded the vessel and seized the cargo. US officials have described the interdiction as a success for the PSI, although other officials have argued that the coordination predated the announcement of the PSI.²⁵ When pressed on the issue of the *BBC China*, one US official argued that the normative effect of having endorsed the PSI led German authorities to take existing export control laws seriously. There may be something to this argument, but it is a matter of judgement, not evidence.

Ultimately, it is impossible to know whether an interdiction would have occurred without the facilitation of the PSI. Interdictions are carried out under existing export controls, UN Security Council resolutions, or national legal authorities. They may or may not have been carried out under the PSI.²⁶ It is similarly unclear how to assess the actions of PSI observers such as India, which reportedly denied passage to a DPRK plane heading to Iran at the urging of the United States.²⁷

Improving PSI

In 2006, the US Government Accountability Office (GAO) issued a classified report on PSI recommending that members establish clear procedures and performance indicators to measure the result of PSI activities.²⁸ In a subsequent GAO report in 2008, it was stated that the government identified three measures of effectiveness for the PSI: the number of states that endorse the PSI, the number and complexity of PSI exercises and the number of bilateral shipboarding agreements.²⁹ These are indirect measures that tell us about the vitality of the PSI endeavour. They do not tell us about its overall effectiveness, but they do provide useful clues.

In terms of endorsements, the PSI has relatively broad support. Yet the geographic distribution of members is heavily skewed toward Europe and the developed world. More than half the countries endorsing the PSI are located in Europe. And roughly one-quarter are members of the Organisation for Economic Co-operation and Development, the club of developed countries. Large, influential states such as Brazil, China, Egypt, Indonesia, Malaysia, Pakistan and South Africa have not endorsed the PSI. Overall, about 50% of world shipping (by tonnage) goes through ports in countries that have not endorsed the PSI.³⁰

In Asia, 68% of shipping goes through ports in countries that have not endorsed the PSI.³¹ Many of these states are traditionally sceptical of US non-proliferation efforts and China, Indonesia, Malaysia and Thailand have been vocal sceptics of the PSI. Chinese officials, in particular, see PSI as an extension of hard-line US policies on the DPRK. The United States' interdiction of a Chinese ship, the *Yinhe*, in 1993 may also influence China's view. The *Yinhe* was interdicted on the grounds that it was carrying chemical weapons precursors, but a Saudi-US search of the ship revealed no illicit cargo.

Given that a substantial portion of the A.Q. Khan network operated out of Asia (for example, the centrifuge parts seized on the *BBC China* were manufactured in Malaysia), and given proliferation concerns regarding the DPRK and Myanmar, the limited support for the PSI in Asia remains a problem.

The number of endorsements may also be a poor measure if those states outside the OEG do little more than express vague support for the PSI. One major GAO recommendation for the US government was that it should engage states outside the OEG.

The class difference among the 20 states participating in the OEG and the other 76 countries that have endorsed the PSI is evident in the distribution of exercises. Only 8 of 45 exercises have been hosted by non-OEG states. The United States alone has hosted 12 exercises. Only 11 of the 45 exercises have occurred outside of North America and Europe.³² This in no way demeans the value of the exercises that have occurred, but it seems clear that more exercises may not be better, unless they involve those states on the front line of the battle against proliferation.

The final measure—the number of states that have signed bilateral shipboarding agreements with the United States—is encouraging. The agreements allow for more operations on suspected vessels. Today, most ships are registered in what are called flag of convenience (FOC) states in order to avoid taxes, save on wages or avoid government regulations.³³ FOC vessels make up more than 50%, based on tonnage, of the world's merchant shipping vessels, with the top three FOC states being Panama, Liberia and the Bahamas.³⁴

Nine states have signed shipboarding agreements with the United States: Bahamas, Belize, Croatia, Cyprus, Liberia, Malta, Marshall Islands, Mongolia and Panama.³⁵ The agreements allow US officials to board ships in any location, including the high seas, if the ship or flag nation does not decline inspection within two hours. (If the ship does decline, the United States authorities cannot board. In practice, however, this would be considered an admission that the ship was carrying illicit materials.³⁶) While the major FOC states have signed shipboarding agreements with the United States, smaller FOC states like Antigua and Barbuda, Cambodia, DPRK, Georgia, Honduras and Sri Lanka have not. Ensuring that the United States has bilateral shipboarding agreements in general, and with FOC states in particular (the most pressing of which would be with Antigua and Barbuda and Cambodia), is a relatively high priority for the Proliferation Security Initiative.

What future for the PSI?

Those states that participate in the Operational Experts Group largely appear satisfied with the PSI. No state has withdrawn from the PSI. For a “coalition of the willing”, the PSI has exhibited remarkable staying power. This is no mean feat.

The remaining challenge is twofold: first, expanding the initiative beyond its current confines by increasing the number of states that endorse the PSI, particularly in Asia; and second, deepening the involvement of those endorsing states that do not participate in the OEG. The priority is to secure the support of important regional powers, which share a common scepticism of the PSI as a Bush Administration effort intended to advance parochial US interests with regard to the DPRK and Iran under the guise of non-proliferation. This caricature—fair or not—is reinforced by the lack of criteria for participation and policies for governance. Where the United States sees an ad hoc approach that allows for flexibility, other countries see subservience to the arbitrary and capricious whims of Washington.

Most proposals for reforming the PSI seek to remedy this perception by establishing a more formal organizational structure. One proposal is to establish an informal secretariat similar to the Point of Contact, based within the French Foreign Ministry, that provides documents and plans meetings for the Missile Technology Control Regime (MTCR). Much like the PSI, the MTCR is a voluntary regime of states that establishes common export control laws on missile technology to discourage missile proliferation. It has 39 participants, whose representatives meet monthly to exchange policy ideas and organize annual plenary meetings.³⁷

Another proposal is to lodge the activity within the 1540 Committee, the United Nations committee responsible for implementation of UN Security Council resolution 1540 (2004). Resolution 1540 does not specifically mention interdictions, but it creates broad obligations for states to control technologies relating to WMD.³⁸ Because the PSI relies on existing international legal authorities, the broad obligations established under resolution 1540 create a rationale for PSI-like activities. The implementation committee provides a forum for states to exchange information and monitor the development of national capabilities as broadly directed by the resolution.³⁹

Each approach offers distinct advantages. The Missile Technology Control Regime is the most straightforward comparison. The 1540 Committee, on the other hand, has the advantage of universality and the legitimacy of the United Nations.

US officials have expressed concern that any institutional reform along these lines would reduce the flexibility of the United States and its partners in combating proliferation. This reflects the view, mistaken in our opinion, that legal regimes constrain actors, rather than empower them. We believe the opposite is the case: in both human society and international relations, the freedom to act is maximized by the rule of the law. This is the dominant view in much of the world. Traditionally, great powers have used treaties and international legal

regimes to enhance their power and ability to act. This is, ultimately, the lesson of the *So San* interdiction that the Bush Administration failed to learn: the United States and Spain might have the warships, snipers and Marines to stop a ship, but this is all useless without the legal authority to hold the cargo.

Ultimately, the Proliferation Security Initiative will be measured not by its flexibility but its universality. As long as Brazil, China and other major powers remain outside the PSI framework, proliferant states will have substantial opportunities to continue importing and exporting dual-use goods to support illicit weapons programmes. Securing the support of these major states will require combating the impression that the PSI is the American Club of the High Seas.

Notes

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11. The Statement of Principles is available at the US Department of State web site, <www.state.gov/t/isn/c27726.htm>, as well as the web sites of other participating states.
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Building awareness of sea-dumped chemical weapons

Joshua Newman
Dawn Verdugo

The SS *LeBaron Russell Briggs* sailed for the last time on 18 August 1970. Its cargo bay held, among other materiel, more than 12,000 M55 rockets, each of which was loaded with a little less than 5kg of sarin. US soldiers bored into the hull of the *Briggs*, allowing the incoming seawater to force it downwards. The vessel came to rest just over 5,000m from the surface of the Atlantic Ocean, 400km east of Cape Kennedy, Florida. The sunken ship represented the end of Operation CHASE (Cut Holes and Sink 'Em), a US Department of Defense programme that disposed of unwanted munitions at sea.¹ To the custodians of chemical warfare (CW) materiel,² burial at sea seemed a better solution than disposal on land. At the time, a sea-bottom depository, far removed from populated areas, represented a reassuring sense of finality that land burial could not guarantee. In the aftermath of two world wars, more than one million tons of CW materiel came to rest on sea-bottoms throughout the world.³

The Chemical Weapon Munitions Dumped at Sea (CWMDS) database, created by researchers from the James Martin Center for Nonproliferation Studies at the Monterey Institute of International Studies, aggregates open-source accounts of nearly 50 years of CW materiel sea-dumping.⁴ This article presents a short overview of the scale of the CW materiel problem and examines the persisting environmental and human health concerns resulting from the materiel still on the sea-bottom. Following this, it discusses the CWMDS database and how it helps to address these concerns, and briefly considers potential means for taking the project forward.

Chemical weapons dumped at sea

Faced with mountains of dangerous CW materiel, many policy makers considered sea disposal a safer alternative to land-based options, such as burial or incineration. The rationale for such activities was based on the belief that the vastness of the sea would mitigate any environmental or health risks posed by the CW agents. Many expected that the agents would lose toxicity over time through natural chemical decomposition, or if somehow released (e.g. through casing failure), would become so diluted that any remaining toxic properties would become negligible.⁵

From 1918 to 1970, the United States was responsible for dumping more than 350,000 short tons⁶ (hereafter, tons) of surplus, damaged and captured CW materiel.⁷ Other countries also

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participated in sea dumping, especially after the Second World War, when CW materiel was confiscated from Germany by France, the Soviet Union, the United Kingdom and the United States. Each country bore responsibility for disposing of the materiel found in its respective zone. The Western Allies relied heavily on sea disposal for this obsolete materiel. During this period, under orders of the United States occupation authority, Japan also dumped CW materiel off its coast. It should be noted that more documentation exists regarding the dumping performed by the United States (locations, amounts and kinds of materiel) than for the activities performed by any of the other states.⁸ The materiel ranged from small to massive quantities of munitions and/or canisters, and was dumped in the Atlantic, Arctic, Indian, Pacific and Southern Oceans. Obsolete, damaged or malfunctioning conventional weaponry was frequently dumped as well.⁹

Contrary to expectations, this materiel has not remained inert on the sea-bed. Dumped munitions have been found floating or washed ashore. In 1946, during transport from La Serpe to Manfredonia Bay (Italy), a number of mustard bombs fell into the water. While some were recovered and dumped further out to sea, "later, bombs were discovered floating nearby and in the harbor ...".¹⁰ A similar case occurred in the Gulf of Mexico in the same year, when a mustard bomb was recovered after having washed ashore. It was a remnant of 33 munitions that had earlier been dumped 32km off the coast by the United States.¹¹ More recently, in 1983 fishermen trawling in shallow waters (not more than 200m) off the coast of Cape Moreton, Australia recovered a one-ton cylinder of sulfur mustard.¹²

Cases of encounters with sea-dumped CW materiel such as these intensified public fear of damage to marine and human life, as well as to coastal environments. These fears led to an international effort to legally end the practice of sea-dumping CW materiel. The last acknowledged US incident—the scuttling of the *SS LeBaron Russell Briggs* in 1970—terminated the United States' sea disposal practice for such materiel;¹³ the US Ocean Dumping Act entered into force in 1972.¹⁴ The International Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (also called the London Convention) entered into force in 1975 and currently there are 86 states parties.¹⁵ Both laws prohibit the sea disposal of certain types of hazardous waste. In those countries possessing a CW materiel stockpile, more acceptable land-based chemical disposal and destruction methods have replaced sea-dumping.

Legislation helped to ensure that there would be no increase in CW materiel on the sea-bed: but hundreds of thousands of tons of materiel, already dumped, remain at the bottom of the sea and may pose a latent threat to marine and human life. CW materiel dumped at sea before 1985 is considered "abandoned chemical weapons" by the Chemical Weapons Convention (CWC)¹⁶ and states parties are not required to declare or destroy abandoned chemical weapons; (the only declarations required for abandoned chemical weapons are for those buried on a state's territory after 1976).

Corroding and/or damaged containers pose too great a danger to warrant their retrieval from the sea-floor, therefore remediation (which might include recovery of the munitions or containers, in-place destruction, area quarantine or application of encapsulation devices) and clean-up efforts have not been actively pursued by any country. Instead, a handful of studies monitoring the environments around known dump sites have been performed, and new efforts, discussed below, are under way.¹⁷ Sea-dumped CW materiel has already caused casualties, and with time it is likely that the dangers posed by this materiel will only increase: we remain ignorant of the effects that human disturbance of the sea-bed, such as deep-sea trawling, may have on dumped CW materiel,¹⁸ and researchers have witnessed leaking containers—which is not entirely surprising considering that much of the materiel has sustained more than 50 years' exposure to corrosive and turbulent marine environments.¹⁹

Environmental and human health concerns

Because its density is greater than sea-water and its solubility in water is low, sulfur mustard agent leaked from a container can persist as globules on the ocean floor. The unique properties of each marine environment can cause chemical reactions that lead to the formation of salts on the surface of exposed or leaked sulfur mustard agent, perhaps prolonging its toxicity.²⁰ Several casualties and deaths among fishermen have resulted from exposure to such salt-encrusted sulfur mustard globules, which easily become ensnared in fishing nets. For instance, in Bari Harbour, in the Adriatic Sea, a total of 230 mustard exposure cases have been recorded (the most recent in 1997).²¹ Fishermen trawling in the vicinity are most often the victims of exposure. The sulfur mustard responsible for the damage most likely came from CW materiel carried by the American freighter SS *John Harvey*, sunk by German aircraft in 1943, and CW agents dumped by US forces a few years later. The 1997 case is particularly worrisome because it provides evidence that sulfur mustard remains toxic after nearly 50 years—even after having leaked into a marine environment. Mustard globules caught in fishing nets near Japan account for over 100 cases of injury and 4 known deaths.²²

There are little data on the environmental damage CW agents can cause. Little was known at the time that the decision was taken to dump CW materiel at sea, and this situation has not changed significantly. The risks may be higher today than when the dangers of the dumped materiel were first acknowledged because containment failure, due to corrosion, is thought to occur after 50 years;²³ dredging, fishing or underwater pipeline construction may speed the degradation of containers; and some CW agents may maintain toxic effects for longer than originally thought.

Recent scientific investigations suggest that the geochemical characteristics of sea-water may potentially extend the potency of some CW agents while yielding harmful degradation products from others.²⁴ If released into the marine environment, some CW agents' lifetimes are expected to be in the order of seconds to days (phosgene, cyanogen chloride), limiting their toxic effects after release.²⁵ Other CW agents' lifetimes when located in deep marine

environments are still relatively unknown (hydrogen cyanide).²⁶ Of most concern are the nerve agents (e.g. sarin, VX), the blister agent sulfur mustard (1, 1'-thiobis[2-chloroethane]) and arsenic-containing irritants (Clark I, Clark II and adamsite), because they are predicted to persist for long periods in ocean waters.²⁷ CW agents of low water solubility could potentially accumulate in sufficient concentrations in sea-water to cause harm, but it is hard to predict. It is difficult to gauge lifetime and toxicity: the pH, temperature, pressure and chemical composition of marine environments can all affect dumped CW agents and all vary greatly by location. The effects of leaked CW agents on the environment and the local ecosystem are not clear: the potential for bioaccumulation of leaked agents in fish, for example, which could eventually enter the human food supply, is still being assessed.²⁸

Recent risk mitigation efforts

In light of past exposures, and in preparation for those in the future, US policy makers have suggested activities that aim to further assess the dangers posed by CW agents in the seas and to catalogue exact locations of known CW materiel dump sites. To achieve the first aim, the US Congress enacted the John Warner National Defense Authorization Act for Fiscal Year 2007, which enjoins the US Department of Defense to research CW materiel dumping and assess the associated health and safety risks posed to marine and coastal environments surrounding the United States.²⁹ One project, the Hawai'i Underseas Military Munitions Assessment Project, funded under the Act, joins researchers from the University of Hawai'i and the US Department of Defense for the purpose of studying the health and environmental risks posed by the tons of lewisite, mustard, cyanogen chloride and cyanide dumped in the 1940s at sites near O'ahu. The team has been collecting samples for analysis, although the final report has not yet been published.³⁰

Achieving the second aim is proving to be a more challenging endeavour. Data on sea-dumping activity is hard to obtain. Many dumping incidents were vaguely documented, often lacking precise details about locations and types, some were not documented at all.³¹ Generally, disposals that took place in the years following the Second World War are better documented than those which occurred earlier. Even when documented, locations can be difficult to verify, taking into account the potential drift of materiel resulting from years of exposure to ocean currents. However, since clean-up or retrieval of CW materiel is considered unlikely, providing the public with easily accessible and up-to-date information regarding known dump sites seems worthwhile.³²

The Chemical Weapon Munitions Dumped at Sea project

The CWMS database contains information about 127 locations where CW materiel has been dumped. The CWMS team drew upon a wide range of sources, the majority of which are records and reports from governments, international organizations and academia. The types of dumping varied greatly. Beaufort's Dyke, a 3km-long gorge located between Northern Ireland

and Scotland, for instance, represents one end of the spectrum—a total of 180,000 tons of CW materiel has accumulated at this site from several separate disposals.³³ The other end of the spectrum includes “accidental” sites, where leaking munitions were pushed overboard as an emergency measure to avoid exposing a ship’s crew to their contents. The CWMDS database also contains accounts of more than 70 scuttled ships.

The CWMDS project’s purpose is to raise public awareness of sea-dumped CW materiel. The database will serve to warn fishermen, marine engineers and the general public to avoid disrupting areas thought to contain dangerous substances. Therefore the project’s primary objective was to select an easily accessible platform that would provide users with an accurate sense of the scope and size of dumping. The ideal platform would also allow users to view each site in relation to geographic reference points in order to contextualize the potential for human encounters with dump sites. The team envisaged three-dimensional representation as the best possible choice for data mapping. Google Earth was selected to map the dump sites as it is compatible with all the most popular computer operating systems and it already has a large number of users.

The CWMDS database also aims to inspire the conception of solutions to the problems caused by these dumps. By gathering all the data in one accessible location, and by mapping the data in such a way as to provide a thorough overview of the problem, CWMDS hopes to increase support for and facilitate the development of an effective response to the problem of CW materiel dumped at sea.

Taking CWMDS forward

The data have been plotted and the public are now able to “see” CW materiel sea dumps. What should be done next? One option is to make the data accessible to Global Positioning System (GPS) receivers. This would help fishing vessels, divers and others who frequently encounter the sea-bed to avoid locations that could potentially be polluted by CW materiel. Dissemination of the data could be aided by partnering with non-profit or government agencies that serve these groups. The usefulness of such a system depends on three partially known factors: the precision of the data, the ability to acquire more data and the relative importance of the data.

Data precision

Currently, the precision of the mapped dump sites varies greatly: data points range from quadrilaterals defined to minutes and seconds, through notes describing the cardinal directions taken by disposing vessels, to the body of water only being named.³⁴ Clearly, for somebody using a GPS receiver to check for the location of dump sites at sea, flagging an entire body of water would be too inexact to be meaningful. Researchers need either to utilize image transparency—or some similar graphic means—to indicate the precision of each data point or to acquire more detailed information to demarcate dump sites more accurately.

Data acquisition

CWMDS would benefit greatly from more precise data regarding the location of many dump sites, but the team is not currently in a position to gather information through direct measurements. The gathering of additional information on a poorly documented site depends upon our researchers' ability to interview witnesses or persons who documented a particular disposal site, or to gain support from groups—scientific, governmental or other—willing to obtain or provide new information from direct observations. The willingness of state and intergovernmental organizations to carry out remediation efforts depends greatly upon both generalized awareness of the issue and its perceived importance. At present, momentum toward remediation remains ensnared in a paradox. Public concern cannot be wrought because the potential dangers remain unquantified; the dangers are not being quantified due to a lack of interest by policy makers, which stems from the absence of public concern. We hope that by providing an interesting means to understand the issue, the CWMDS will help bring an end to this paradox.

Relative importance

Human fatalities have resulted from exposure to sea-dumped CW agents.³⁵ However, the CWMDS project team has refrained from reporting any aggregate numbers regarding casualties or deaths because of uncertainty about precise numbers. Rather, most of the data sources noted in the CWMDS focus upon locations and quantities of dumped materiel. As noted above, the current data regarding the health and environmental impacts of CW sea-dumping are limited, and the subject requires more and better data and further analysis. With more data on health and environmental issues, it will be possible to calculate the threat posed by these dump sites and thus the relative importance of locating—and publicizing the location of—CW materiel dump sites.³⁶

Expanding the project

Conventional weapons materiel (and occasionally radioactive materials) was often disposed of alongside CW materiel.³⁷ The quantity of CW materiel disposed at sea, while immense, pales in comparison to the millions of tons of conventional munitions so disposed, and any attempt at remediation efforts in the oceans also needs to be cognizant of sea-dumped radiological material—a subject that has not received enough scientific attention. Expanding the mapping of dump sites and the analysis of the threats they pose to include radioactive material and large-scale conventional materiel dumps would be a valuable endeavour.

Concluding remarks

Moving beyond qualitative accounts of CW materiel disposal at sea is a difficult task. However, it is important, given the dangers posed by dumped CW munitions. The international community must increase its efforts to understand this health and environmental problem. Many aspects have not been sufficiently studied, and some have not been investigated at all. Three of the most urgent issues are the many uncharted dump sites, the lack of knowledge about the presence of CW agents in fish and any resulting effects, and the potential for reclaiming sea-dumped CW materiel for nefarious purposes.

Increasing corrosion, cumulative man-made disturbances and natural disasters could speed containment failure or help sweep the more than 350,000 tons of mustard agent closer to shore.³⁸ Such an event may induce exposure to unsuspecting coastal dwellers or tourists, or seriously harm marine ecosystems. Whether any state is adequately prepared to respond to such an incident remains unclear. We hope that the CWMSD database will inspire the awareness necessary to help prevent such a calamity.

Notes

1. William R. Brankowitz, 1989, *Meeting Notes: Summary of Some Chemical Munitions Sea Dumps by the United States*, US Environmental Protection Agency, p. 51; Josh Schollmeyer, 2006, "Chemical Weapons under the Sea", *Bulletin of the Atomic Scientists*, vol. 62, September–October, p. 11; V.J. Linnenbom, 1971, *Final Report on First Post-Dump Survey of the CHASE X Disposal Site*, Naval Research Laboratory, Chemical and Biological Defense Information Analysis Center, Ocean Sciences Division; Federation of American Scientists, Military Analysis Network, "M55 Rocket", 15 June 2000, at <www.fas.org/man/dod-101/sys/land/m55.htm>.
2. In this report, CW materiel comprises chemical weapon munitions, associated fuzes, and canisters, vials or containers of bulk chemical weapon agents.
3. Figure based on sum of values noted in: US Department of Defense, Historical Research and Response Team, 2001, *Off-Shore Disposal of Chemical Agents and Weapons Conducted by the United States*, Aberdeen Proving Ground, MD; David M. Bearden, 2006 (updated 3 January 2007), *US Disposal of Chemical Weapons in the Ocean: Background and Issues for Congress*, Congressional Research Service; G.P. Glasby, 1997, "Disposal of Chemical Weapons in the Baltic Sea", *Science of the Total Environment*, vol. 206, nos 2–3, pp. 267–273; Danish Environmental Protection Agency, 1994, *Report on Chemical Munitions Dumped in the Baltic Sea*, Report to the 15th Meeting of Helsinki Commission, Ad Hoc Working Group on Dumped Chemical Munitions, 8–11 March 1994.
4. In mid-2006, Caroline Ong, a Davis United World College Scholars Program intern, decided to investigate chemical weapon agents dumped into the oceans and the possible problems they have and are causing. Under Raymond Zilinskas, Director of the Chemical and Biological Weapons Nonproliferation Program at MII, she plotted coordinates of many dump sites and, where possible, identified their contents. After Ong completed her internship, Tamara Chapman, and later Benjamin Brodsky, carried on the investigation. Joshua Newman finalized the project in 2008. After nearly six months of part-time effort on the part of Zilinskas, Newman and Andreas Sepp, the Chemical Weapon Munitions Dumped at Sea database was released in August 2009.
5. V.J. Linnenbom, op. cit.; Geoff Plunkett, 2003, *Chemical Warfare Agent Sea Dumping off Australia*, Department of Defence, Australia, pp. 18–19.
6. One short ton weights approximately 907kg.

7. To calculate this figure, we relied on cases where either the weight was known or where we had a precise number of containers and type as well as the ability to calculate the weight of the container. For railway wagons we used 50 short tons per wagon; we used 300 short tons per barge; 227kg per M78 bomb; and 52kg per M70 bomb. Due to the already existing restraints on precision, our estimate did not include cases where the amounts of a certain munition or container type would not equal hundreds of tons, or where quantities of agents were given in gallons.
8. Linnenbom, op. cit.; Thomas Stock and Karlheinz Lohs (eds), 1997, *The Challenge of Old Chemical Munitions and Toxic Armament Wastes*, Oxford, Oxford University Press.
9. The author has first-hand knowledge that conventional munitions are still sea-dumped, but does not believe the quantities are of the same scale as disposals occurring during the era of CW materiel dumping.
10. US Department of Defense, Historical Research and Response Team, op. cit.
11. Bearden, op. cit.
12. Plunkett, op. cit.
13. US Department of Defense, Historical Research and Response Team, op. cit.
14. Officially entitled the Marine Protection, Research and Sanctuaries Act, it regulates all dumping in waters within the jurisdiction of the United States.
15. Bearden, op. cit.
16. Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction, Articles III(1)(b) and IV(17), agreed 13 January 1993.
17. E. Amato et al., 2006, "An Integrated Ecotoxicological Approach to Assess the Effects of Pollutants Released by Unexploded Chemical Ordnance Dumped in the Southern Adriatic (Mediterranean Sea)", *Marine Biology*, vol. 149, no. 1, pp. 17–23; G. Garnaga and A. Stankevicius, 2005, "Arsenic and Other Environmental Parameters at the Chemical Munitions Dumpsite in the Lithuanian Economic Zone of the Baltic Sea", *Environmental Research, Engineering and Management*, vol. 3, no. 33, pp. 24–31; Linnenbom, op. cit.
18. Garnaga and Stankevicius, op. cit.
19. Amato et al., op. cit.
20. George O. Bizzigotti et al., 2009, "Parameters for Evaluation of the Fate, Transport, and Environmental Impacts of Chemical Agents in Marine Environments", *Chemical Reviews*, vol. 109, no. 1, pp. 236–256.
21. G.O. Bizzigotti et al., 2005, "Ocean Dumping of Chemical Weapons", *Noblis*, <www.noblis.org>.
22. Compiled from H. Kurata, 1980, "Lessons Learned from the Destruction of the Chemical Weapons of the Japanese Imperial Forces", in Jozef Goldblat et al. (eds), *Chemical Weapons: Destruction and Conversion*, London, Taylor & Francis, Stockholm International Peace Research Institute, pp. 77–93.
23. Xin Zhang et al., 2009, "Geochemistry of Chemical Weapon Breakdown Products on the Seafloor: 1,4-Thioxane in Seawater", *Environmental Science and Technology*, vol. 43, no. 3, pp. 610–615.
24. Bizzigotti et al., 2009, op. cit.; Zhang et al., op. cit.; Jonathan B. Tucker, 2001, "Chemical Weapons: Buried in the Backyard", *Bulletin of the Atomic Scientists*, vol. 57, no. 5, pp. 51–56.
25. Bizzigotti et al., 2009, op. cit.; Danish Environmental Protection Agency, op. cit.
26. Bizzigotti et al., 2009, op. cit.
27. Bizzigotti et al., 2009, op. cit.; Amato et al., op. cit.
28. This issue has been discussed for some time. One recent ecotoxicology study (Amato et al., op. cit.) found arsenic and CW agent breakdown products in sediment surrounding known leaking CW dumped materiel. The study also found arsenic levels higher than the US Food and Drug Administration limit for food (2.6 mg kg⁻¹) in the tissues of fish near the location of the materiel, and much higher than those found in fish from a reference area far removed from the CW dump site. Interestingly, the researchers also noted physical characteristics, such as histological lesions in fish species collected close to the dump site—a finding they presume may have resulted from exposure to blister agents. Another report focusing on the Baltic Sea showed less conclusive results regarding the arsenic levels within marine organisms, but

- did find higher arsenic concentrations in the sediments close to a CW materiel dump site (Garnaga and Stankevicius, op. cit.).
29. John Warner National Defense Authorization Act for Fiscal Year 2007, HR 5122, Title 3B, §314 became law on 17 October 2006. The act requires the US Secretary of Defense to conduct sampling at no less than six locations (two near the Atlantic coast, two near the Pacific coast and two near the Hawaiian Islands).
 30. For more information, see the web site of the University of Hawai'i and US Department of Defense's Hawai'i Undersea Military Munitions Assessment Project at <www.hummaproject.com>. See also William Cole, "Army Taking Closer Look at Ordnance Dumps Off Oahu", *Honolulu Advertiser*, 30 October 2008; Gregg K. Kakesako, "Army Analyzes Data from Offshore Dump", *Star Bulletin*, 5 April 2009.
 31. The lack of documentation stands as perhaps the largest issue facing those concerned about sea-dumped munitions. Possibly the most significant instance of poorly documented disposal is noted by Lev Alexandrovich Fedorov in his 1995 article, "The Undeclared Chemical War in Russia: Politics versus Ecology", Center for Russian Ecological Policy. Fedorov notes that approximately 150,000 tons of chemical weapon materiel was dumped by the Soviet Union in the Barents and Kara Seas.
 32. Emily E. Baine and Margaret P. Simmons, 2005, *Mitigating the Possible Damaging Effects of Twentieth-Century Ocean Dumping of Chemical Munitions*, Huntsville, AL, US Army Engineering & Support Center.
 33. Vic Rodrick, "Sea Shells: Deadly Harvest of Munitions is Washed up on Scotland's Beaches," *Red Orbit*, 1 October 2006; Rob Edwards, "Danger from the Deep", *New Scientist*, 18 November 1995, p. 1616; D. Hencke, "Details Released of 71,000 Bombs Dumped at Sea; Operation Sandcastle in the Fifties Disposed of Nerve Gas and Chemical Weapons", *The Guardian*, 28 March 1995, p. 2.
 34. For examples of this range in precision, see Brankowitz, op. cit.; Oslo–Paris Commission, 2005 (revised), *Overview of Past Dumping at Sea of Chemical Weapons and Munitions in the OSPAR Maritime Area*, Biodiversity Series, p. 11; Rob Edwards, op. cit., respectively.
 35. Kurata, op. cit.
 36. Thomas Stock, 1995, "Sea-dumped Chemical Weapons and the Chemical Weapons Convention", in Alexander V. Kaffka (ed.), *Sea-dumped Chemical Weapons: Aspects, Problems and Solutions*, Dordrecht, MA, Kluwer Academic, p. 59.
 37. Among many others, see Schollmeyer, op. cit; Brankowitz, op. cit., pp. 45–47.
 38. The 350,000 tons estimate was obtained by summing all instances of known values for mustard agent alone. However, it must be noted that many records mention that mustard was only one portion of the tons of agent disposed.

New publication

Searching for Aid Effectiveness in Small Arms Assistance

Kerry Maze (UNIDIR, 2010, 84 pages, sales number G.V.E.10.0.2, ISBN 978-92-9045-198-3, English, \$15 plus shipping and handling)

The international community has made several concerted efforts to address the issue of small arms and light weapons (SALW) proliferation at the international and regional level. These have included the development of policy instruments, the creation of best practice guidelines and online tools, and the provision of financial and technical assistance.

However, there is no framework or system in place for measuring the impact of these efforts and for determining whether or not donors are getting the most value out of the assistance they provide and, likewise, whether or not recipient states are measurably benefiting from such assistance. States have, through the UN Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects and its biennial meetings, expressed a willingness to advance the issue of assistance and cooperation.

This report highlights several general and practical challenges to SALW assistance, ranging from a lack of clarity or precision on how to measure and evaluate SALW assistance to a lack of coordination in organizing and managing SALW assistance at the national, regional and international level.

In order to overcome these challenges, this report explores the concept of aid effectiveness as contained in the Paris Declaration on Aid Effectiveness and the Accra Agenda for Action, the most widely recognized set of international principles on aid effectiveness. Many of the commitments contained in these documents—notably ownership, alignment, harmonization, managing for results and mutual accountability—can apply to SALW assistance. The report demonstrates the structures, measures and tools that already exist and how they make SALW assistance more effective. It concludes with a series of recommendations for action by states and organizations at the international, regional and country level.

New project

Discourse on Explosive Weapons

Contemporary events suggest it is reasonable to assume that twenty-first century conflicts will be fought predominantly in places where civilians are present. In conflict, civilians should be protected from the effects of weapons. This includes explosive weapons, the effects of which represent a distinct humanitarian problem—one recognized by the UN Secretary-General in his 2009 report on the protection of civilians in armed conflict (UN document S/2009/277).

The blast wave created by the detonation of an explosive weapon, the projection of fragments, and sometimes the collapse of structures in the surrounding area is a major cause of civilian harm. Explosive weapons also cause damage to vital infrastructure and leave behind unexploded explosive ordnance.

A report by Landmine Action, *Explosive Violence* (2009), has shown that states already tacitly recognize explosive weapons as a category from a technological and ethical standpoint. However, state representatives seem to find it difficult to engage in substantive dialogue on how to address the concerns raised by the use of explosive weapons in populated areas. Practitioners lack a common vocabulary and conceptual tools to enable them to productively frame these issues.

Greater focus on the humanitarian effects of explosive weapons could enhance civilian protection, support the effectiveness of legal norms applicable in armed conflict and contribute to reducing the global burden of armed violence.

UNIDIR's Discourse on Explosive Weapons (DEW) project aims to contribute to a shared understanding among multilateral practitioners in the field of arms control/disarmament and humanitarian action about what "explosive weapons" and "populated areas" are in order to enhance the protection of civilians and further stigmatize explosive weapon use in certain contexts.

The project has already begun work: the web site <ExplosiveWeapons.info> contains news, background information, and has documents and podcasts available for download, including presentations from DEW's first symposium, "Explosive Weapons: Framing the Problem", held in Geneva on 29 April 2010. Further project-related events will be held in the course of 2010.

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