



Cambridge Risk Framework

Profile of a Macro-Catastrophe Threat Type

Political Violence

Organised Crime: Piracy

Centre for
Risk Studies

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Threat Assessment Monograph

4 Political Violence

4.5 Organized Crime – Piracy

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Abstract

International trading networks, such as commercial supply chains or timely delivery of goods, and national security concerns, such as food and energy delivery, need to consider the threats to them to develop a risk management strategy for resilience. 90% of commerce is seaborne. This publication considers the threat to international shipping networks and commerce that depends on it, from organized crime in the form of piracy at sea.

The phenomenon of piracy is profiled, with a history and quantification of recent trends. The geography of threat is described and an index for global terrorism activity is proposed. The potential for step-changes in the level of pirate activity is considered, along with 'control process' constraints that limit the rate of change that might be possible. A scenario for extreme pirate activity is developed for use as a stress test in risk management, consistent with a '1 in 100' probability of occurrence.

Keywords: Piracy, risk, organized crime, marine, insurance, shipping,

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1 Summary

Organized crime adds a burden to modern business, increasing costs and adding operational danger to international operations. One of the worst operational hazards in international commerce is piracy. Modern day pirates are criminals who typically intercept ships at sea and steal cargo or hold the vessels, crews and cargo hostage for ransom. Pirates may also make attacks onshore. Piracy has become an industry in its own right in several parts of the world, usually operating from havens away from law and order, in places such as Somalia and Indonesia.

Modern piracy has been resurgent worldwide since the mid-1990s. In the period 1995 to 2010 there were over 5,000 recorded pirate incidents worldwide – attempted and successful attacks – an average rate of 320 a year. In a single year, 2009, pirates took 746 hostages, hijacked 56 ships, murdered 8 crew members and injured 59 others.

Piracy is seen worldwide, but activity varies in different regions. The late-1990s boom in piracy was chiefly in the South China Sea and Malacca Straits, but this has declined with concerted policing and military assistance. The recent escalation of piracy is from Somalia, attacking the busy shipping lanes around the Horn of Africa and East Africa. The Gulf of Aden has been classified as a piracy ‘war zone’ by Lloyd’s marine insurers since 2008.

Commercial shipping companies and their insurers have paid ransoms rather than lose ships and crews. In 2009-10 an estimated \$415 million was paid out in ransoms to pirates. The average ransom demand has escalated from an average of \$150,000 in 2005 to over \$4 million in 2010. In November 2010, *Samho Dream*, a South Korean oil tanker seized by Somali pirates, was ransomed for \$9.5 million.

The ransom revenues have also made pirate warlords rich, provided economic support for entire Somalian communities, and been reinvested in the equipment and weaponry for more piracy.

Piracy has added significantly to shipping cost overheads, in lengthening travel routes, increasing pay scales for crews, and escalating insurance rates: insurance premiums for ships traveling through the Gulf of Aden have increased from \$500 per voyage in 2008, to up to \$150,000 in 2010. The total costs of piracy including commercial cost escalation, re-routing and security measures are estimated to be in their billions: One estimate puts the cost as high as \$12 billion in 2010.

The rapid growth in piracy threatens to have even worse consequences. A step-change increase in the frequency of pirate incidence could have a severe impact on world trade: very significant reductions in traffic along the trade lanes between the Far East and Europe would result, according to some analysts, causing major structural shifts in global trading patterns.

For piracy activity to achieve a step-function increase, new conditions would have to arise, for example increases in the pirate populations through economic austerity and failed states; increased incentives with escalating ransom values; any reduction in naval deterrence; or new techniques and weaponry that could increase pirate success. The rate at which pirate activity can increase is however constrained by ‘control processes’: the rate at which new pirate action can occur is limited by logistical challenges of pirates gearing up their activity, manning and equipping larger numbers of pirate teams; by adaptive and defensive strategies adopted by the sailing vessel targets, and most importantly, by the naval and military response to counter increases in pirate activity.

A stress test scenario of pirate activity is proposed for risk management, representing a ‘1 in 100’ probability level of occurring in the short term. Analysis suggests that there is a 1% probability of pirate activity suddenly increasing to a level of 1,000 incidents in a single year, or 3 times the current annual average rate. For the stress test scenario 75% of these attacks are assumed to occur in the East Africa ocean region. The piracy stress test scenario can be used to assess supply chain vulnerabilities, food and energy security management, and other risk management activities.

2 Definition

No definition of piracy has been universally agreed. The United Nations Convention on the Law of the Sea includes ‘any illegal acts of violence or detention, or any act of depredation, committed for private ends by the crew or the passengers of a private ship or a private aircraft, and directed: (i) on the high seas, against another ship or aircraft, or against persons or property on board such ship or aircraft; (ii) against a ship, aircraft, persons or property in a place outside the jurisdiction of any State; any act of voluntary participation in the operation of a ship or of an aircraft with knowledge of facts making it a pirate ship or aircraft; any act inciting or of intentionally facilitating an act described [above].’

However, this definition captures only acts committed in international waters, which excludes, for example, piracy in the Strait of Malacca. To account for this, the International Maritime Bureau (IMB) has broadened the definition to include any ‘act of boarding (or attempted boarding) with the intent to commit theft or any other crime and with the intent or capability to use force in furtherance of that act’. Others have adapted the definition to exclude politically motivated crimes. Further, a distinction must be drawn between piracy and privateering. The latter is a state-sanctioned act of war by private agents against an enemy nation’s merchant shipping, but has the look and feel of piracy.

3 The Threat

Seaborne trade accounts for as much as 90% of international trade, and any vessel is a target. The immediate threat of piracy is obvious: danger to the property and safety, and to the lives of mariners. According to the International Maritime Organisation, pirates killed eight crew members, and fifty-nine were injured or assaulted in 2009. About seven hundred and forty-six were taken hostage or kidnapped; in total fifty-six ships were reportedly hijacked¹. Small private vessels may be attacked for the crews’ valuables; larger vessels sometimes have the additional lure of the ship’s safe, which often includes large sums of cash for port payrolls, and potentially items of cargo. At the other end of the scale, massive cargo and crude carriers have been hijacked and taken hostage by pirates, either for ransom or for the sale of their cargoes. The average length of a hijacking of vessel and her crew is over 7 months², removing the vessel from productive service and causing distress and management distraction for the shipping companies and their customers.

3.1 Consequences

Beyond the immediate threat to trade goods, vessels, and to the individuals facilitating their transport, piracy attacks can generate significant and far-reaching secondary outcomes.

3.1.1 Increased cost of shipping

One is additional cost. Marine insurance is routinely and almost always purchased for international cargoes and vessels, but a concentration of piracy attacks can drive insurance prices higher by multiples.

3.1.2 Rerouting

Repeated piracy attacks concentrated in time and space may make a waterway passable only at significant additional expense, or even functionally impassable, despite insurance, causing vessels to re-route. In recent years this has been the case in the waters off east Africa. Many major international vessel owners now choose the old route around the Cape of Good Hope to the much shorter Suez

¹ International Maritime Organisation, *Reports on acts of Piracy and Armed Robbery against Ships*, Annual Report 2009

² IMB BMP4, 2011

Canal option, which takes vessels through the pirate-infested Gulf of Aden, where 222 piratical incidents occurred in 2009³.

3.1.3 Delays and delivery interruptions

The interruption of the shipping of input materials for manufacturing may result in serious production delays or stoppages. Sustained, intensive, and concentrated incidence of piracy can even lead to a permanent dislocation of international trade.

Piracy in the Strait of Malacca in the 2000s led transportation planners to consider the relocation of south east Asia's key hub ports from Singapore and Malaysia.⁴ Thus, piracy has the potential to inflict serious and lasting impacts on individuals, corporations, trading systems, consumer markets, and nation-states.

3.1.4 Estimates of total costs of piracy

One estimate of the of maritime piracy in 2010 put the total between \$7 billion and \$12 billion, including ransoms, insurance premiums, rerouting ships, security equipment, naval forces, prosecutions, piracy deterrent organizations and the cost to regional economies.

At the end 2010, about 600 sailors from 18 countries were being held hostage by pirates⁵.

Far from the romantic image of buccaneers in the age of sail, or the children's version of pirates characterised by Captain Hook, piracy today is real, growing, costly, and very often fatal.

3.1.5 Seasonality

Pirate activity varies throughout the year, due to changing weather conditions and activity by Naval and Military forces. Pirate activity in the East Africa and Arabian Sea region generally reduces in areas affected by the South West monsoon, and increases in the period following the monsoon.⁶

3.2 History of Piracy

Piracy has been persistent since the outset of ocean-going commerce. Stories of piratical attacks on shipping by the 'Sea Peoples' of Lycia (in modern south-west Turkey) in the late Bronze Age are probably the earliest recorded incidents. Those stories are told in some of humanity's oldest texts and hieroglyphs, so the first occurrences were probably earlier, coincident with the arrival of shipping, not writing. Thus, the Mediterranean was perhaps never free of piracy. Greece in its Archaic period (c. 750-500 BC) occasionally turned its navy against the 'pirate islands' of Kithnos, Mykonos and the Sporadi; under Roman rule the distraction of the Carthaginian wars stretched Imperial naval resources, leaving pirate communities to flourish. Historian of piracy Maurice Holleaux argues that 'from the earliest times, piracy had free play in [Illyrian] waters, and this profitable career had been assiduously followed by the inhabitants of the eastern shore' of the Adriatic. The Roman conquest of Illyria in the second century BC was intended to halt its neighbour's piratical activities.⁷ In Asia, the collapse of the Han Dynasty of China led to a breakdown of maritime patrols, allowing piracy to resurge and menace shipping until the Ming Dynasty regained control of Chinese waters more than a millennium later.

³ Ibid.

⁴ Tongzon, J.L.: 'Wither the Malacca Straits? The rise of new hub ports in Asia', in Ong-Webb, G.W. (editor): *Piracy, maritime terrorism, and securing the Malacca Straits*. Singapore: International Institute for Asian Studies, 2006.

⁵ Bowden, Anna et al: 'The Economic Cost of Maritime Piracy'. *One Earth Future* Working Paper, December 2010, p. 2.

⁶ IMB BMP4 (2011)

⁷ Holleaux, M. 1928 'The Romans in Illyria'. *Cambridge Ancient History* VII, 824.

3.2.1 15th to 19th century

Piracy continued in the Mediterranean, although from about the fifteenth century traditional threats to European shipping (such as Catalan Christian pirates) were displaced by the rise of Muslim piracy by groups often called the 'Barbary Corsairs'. These attacks, which focussed on slaving, peaked in the seventeenth century. Meanwhile, Europeans began regularly to undertake oceanic trade outside the Mediterranean. The 'romantic age' of piracy perhaps began when the French captain Jean Fleury seized two vessels of the Spanish flota returning treasure from New Spain. Arguably this famous incident was a military act, but ultimately Fleury was captured by the Spanish and hanged as a pirate. While an era of piracy and privateering involving notorious characters such as William Kidd and Henry Morgan created a lasting image of adventure, brutality and violence remained characteristic. In Asian waters, for example, confederacies of sea robbers operated almost on the level of sea-states. A group led by Ching Yih in the early nineteenth century is said to have included hundreds of vessels and over 50,000 men, and to have defeated the Chinese navy in battle by sinking 63 of its vessels. Unfortunately, however, no comprehensive record or accounting of piracy attacks in either the South China Sea or the Mediterranean, or even the piratical Caribbean, has been kept until the 1980s. Its prevalence in earlier eras is thus a matter for conjecture only.

3.2.2 19th and early 20th century

Over the course of the nineteenth century organised, sustained piracy was largely eradicated, first in the Mediterranean where the last Barbary corsairs were mopped up, later in the Caribbean and finally in the Far East, as Britain's Royal Navy, in a time of European relative peace, focussed its attention on the protection of shipping. Combined with naval patrols of shipping lanes, the spread of modern administration of land gave pirates fewer havens in which to hide. In the period often called the Pax Britannia, piracy was at a low ebb.

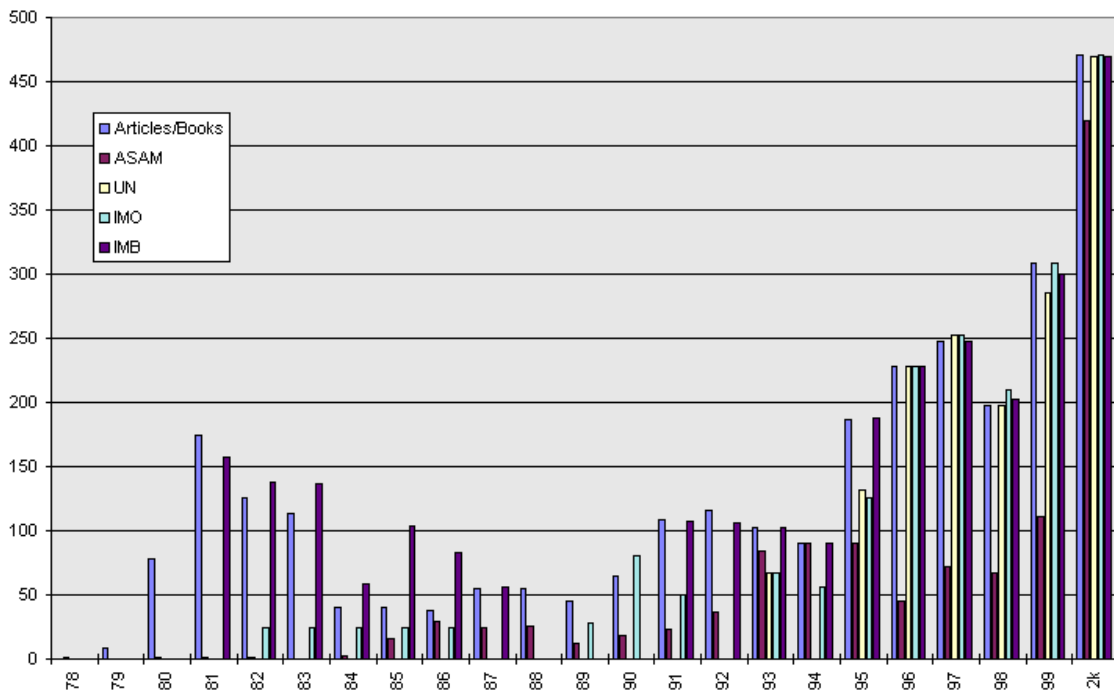
3.3 The Modern Piracy Resurgence

This began to change in the postwar era. By the late 1980s piracy had made a resurgence, first in southeast Asian waters, later in the seas off east Africa. It now constitutes a serious and costly danger to the world's business. In total, 5,227 incidents were reported between 1984 and the end of December 2008.⁸ David Marley has isolated seven causes of the resurgence:

- 1) the 'virtual disappearance' of western merchant fleets;
- 2) larger ships with smaller crews;
- 3) the expansion of national jurisdictions into adjacent territorial waters;
- 4) irresolution over pirate trials under international law;
- 5) the shift of large scale commercial traffic into Asian waters;
- 6) widespread use of 'flags of convenience'; and
- 7) the proliferation of light arms among civilians.⁹

⁸ International Maritime Organisation, *Reports on acts of Piracy and Armed Robbery against Ships*, Annual Report 2009.

⁹ David F. Marley: *Modern Piracy: A Reference Handbook*, ABC-CLIO, 2010, p. 9.

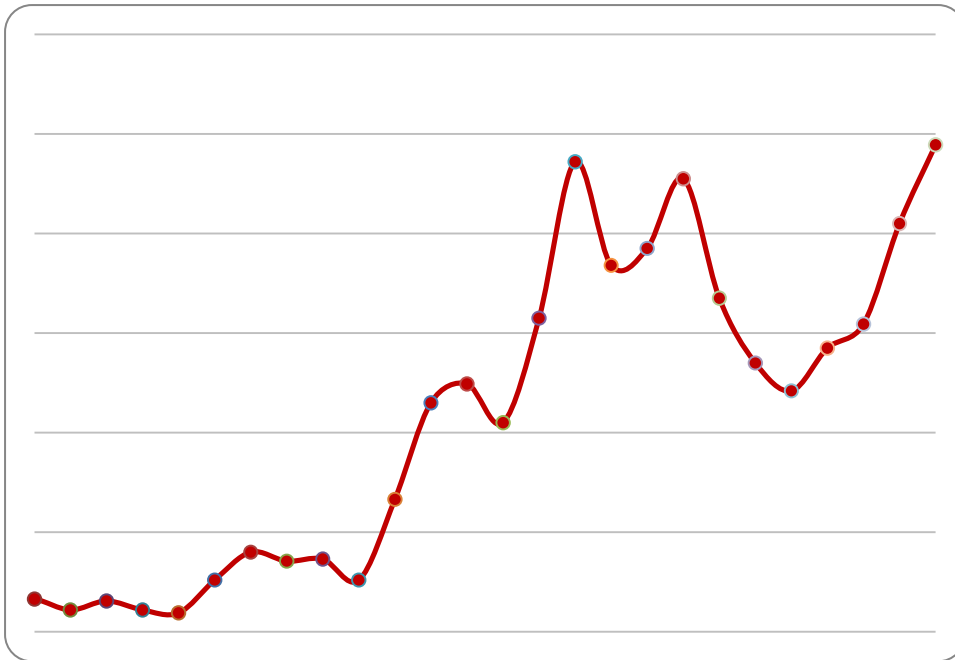
Figure 1 Reported Piracy Incidents: 1978-2000. Compiled by M. Bruyneel.

Research by Mark Bruyneel provides the following graphic illustration of the dramatic increase in piracy incidents since a dip occurred in the 1980s.¹⁰ Bruyneel identified a low level of attacks in the 1970s, but states that central recordkeeping was not undertaken prior to 1980. His statistics for 1984 to 1989 show a range of 30 to 55 attacks each year. For later years data from the International Maritime Organization are used; the IMO began to keep piracy statistics in 1984, and in 1992 established the Piracy Reporting Centre, which collects reported piracy data.

The International Maritime Bureau proffers a picture similar to Bruyneel's, extended to 2009, broken down by region. The figures show how the successful combating of piracy in the Malacca Strait and the South China Sea has been usurped by a dramatic increase in acts of piracy in east African waters, particularly the Gulf of Aden. They show a second dramatic rise in piracy incidents in recent years, from an average of less than fifty events per year in the 1980s, to a sustained level of 300 to 450 attacks per year from 1989-2004, and a return to those peaks, following the rise of Somali pirates, in 2008 and 2009.¹¹

¹⁰ <http://home.wanadoo.nl/m.bruyneel/archive/modern/index.htm>

¹¹ International Maritime Organisation, *Reports on acts of Piracy and Armed Robbery against Ships*, Annual Report 2009.

Figure 2 Increasing Frequency of Piracy Incidents Worldwide

The piracy problem has continued to grow. The IMO has reported that, in 2010, some 489 actual or attempted acts of piracy and armed robbery occurred, up 20.4% over 2009, and the fourth successive year of increasing numbers. Many vessels have avoided pirate-infested waters in the Gulf of Aden and off the Somali coast by travelling instead around the Cape of Good Hope. The UN Conference for Trade and Development reports that: 'if piracy attacks increased [by] ten times, it would lead to a reduction of 30% in total traffic along the Far East–Europe trade lane, [but] only 18% of the total traffic would sail through the Cape of Good Hope'.¹² The cost of these events has been significant. As stated above, in 2010 the estimated total cost of maritime piracy was between \$7 billion and \$12 billion.¹³

Costs of piracy are rising. One Earth Future states that ransoms demanded by pirates averaged \$150,000 in 2005; estimates of the equivalent for 2010 have shot up to \$4 million and \$5.4 million. In November that year, *Samho Dream*, a South Korean oil tanker seized by Somali pirates, was ransomed for \$9.5 million. The researchers have put the total cost of ransoms for 2009-10 at \$415 million, including related expenses such as negotiation expenses and the cost of idle vessels. The cost of insurance has also skyrocketed. Areas where piracy is most rampant are declared War Risk zones by insurers, requiring the payment of an additional premium. The Malacca Strait was so designated between 2005 and 2006; the Gulf of Aden, which lies between Somalia and Yemen and is the ultimate exit from the Suez Canal, was designated a war zone by Lloyd's in May 2008. According to One Earth Future the cost of war risk premiums have risen since then from \$500 per ship, per voyage, to up to \$150,000 in 2010. Outside of war zones, piracy risk, including ransoms, is included in standard policies covering vessels and cargoes. The cost of such insurances has also risen dramatically. Costs of re-routing and security measures have also been enormous, reaching billions of dollars annually.¹⁴

4 Geography of Hazard

¹² *Review of Maritime Transport 2011*, U.N. Conference for Trade and Development, 2012.

¹³ Bowden, Anna *et al*: 'The Economic Cost of Maritime Piracy'. *One Earth Future* Working Paper, December 2010, p. 2.

¹⁴ *Ibid.*, pp. 9-18.

Any area of the seas can be subject to individual, disconnected acts of piracy, at almost any time. However, the acts of piracy which are of greatest concern are those which are organised and repeated.

The International Maritime Bureau currently classifies piracy incidents by the following regions:

- 1 Malacca Strait
- 2 Indian Ocean
- 3 East Africa
- 4 West Africa
- 5 Latin America and the Caribbean
- 6 Mediterranean
- 7 North Atlantic
- 8 South China Sea
- 9 Arabian Sea
- 10 Others

Figure 3 International Maritime Bureau Piracy Map 2011

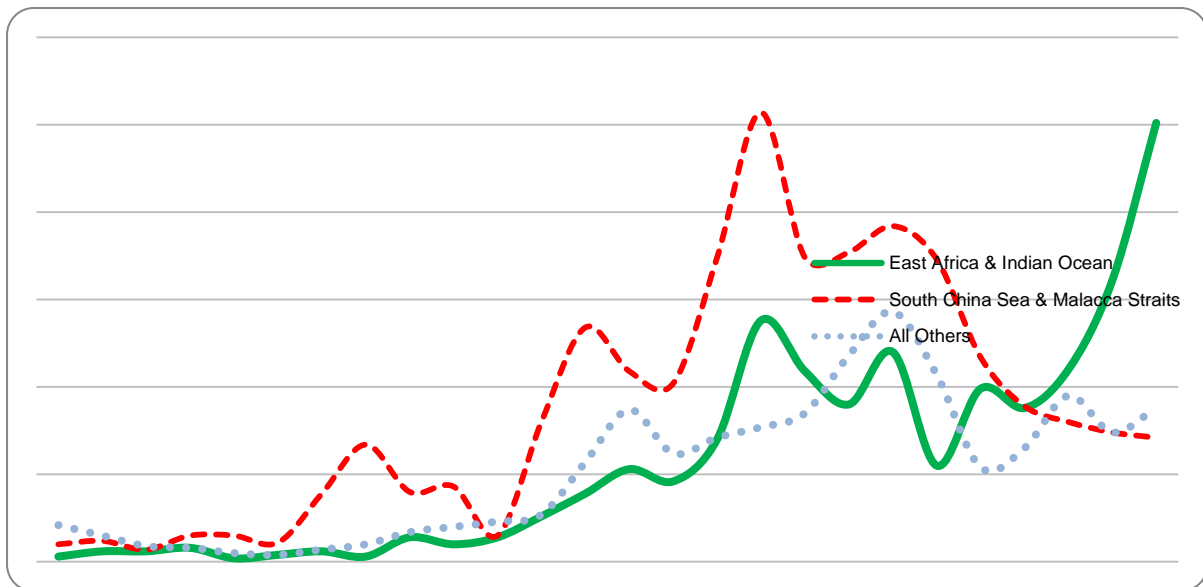


The combination of two factors determines the location of contemporary piracy: the proximity of a busy shipping lane to an area of weak state control or high levels of insurgent activity, or both. Because of this, the Mediterranean Sea, where piracy began, is now almost entirely free of piracy incidents, while poor governance and civil war in the east African nation of Somalia have, notoriously, made the Gulf of Aden into a piratical playground where vessels are extremely vulnerable to kidnap. In recent years concentrated piratical activity has occurred in the Malacca Strait, which divides the Malaysian Peninsula from the Indonesian island of Sumatra. The South China Sea is another area where piracy has reached serious levels, accounting for half or more of reported incidents until the rise of piracy elsewhere from about 2000. The Sea is bordered roughly by Vietnam, China, Taiwan, Philippines, Malaysian Borneo, and Indonesia, is claimed almost entirely by China, but this claim is hotly disputed by other countries. The sheer volume of shipping in the Sea is seen as a key reason for the rise of piracy there.¹⁵

¹⁵ Rosenberg, David: 'The political economy of piracy in the South China Sea'. *Naval War College Review*, Summer 2009, Vol. 62, No. 3, p. 44.

Regional division of the oceans and seas into piracy zones is therefore reactive: while large seas such as the South China and the Mediterranean are usual divisions, smaller bodies of water such as the Gulf of Aden tend to be singled out only when piracy there is organised, extensive, and persistent. For example, the true limits of the Indian Ocean include the Gulf of Aden, but West African piracy has seen the smaller region identified as a specific zone, and presumably excluded from the 'Indian Ocean' zone specified in the IMO data displayed in Figure 3.

Figure 4 Threat Dynamics by Geography – Regional Activity over Time



4.1 Recend Trends in Regional Activity

Two broad geographical regions dominate pirate activity: Southeast Asia, consisting of the South China Sea and the Malacca Straits, and the Horn of Africa, a large zone that extends from East Africa to the Indian Ocean. The period from the middle of the 1980s through to the early 21st century saw a surge in activity in Southeast Asia. Almost half of all pirate attacks worldwide in the period 1995 to 2005 were in the South China Sea or the Malacca Straits. The phenomenon of piracy in the Malacca Straits is described in the case study below. Coordinated marine patrols, combined with destruction of the social and support infrastructure of the pirate communities in Indonesia, are credited with this reduction in activity after 2004.

This however has been replaced by a major upsurge in pirate activity in East Africa in the period since 2006. Attack frequencies doubled within three years and continue to increase. In the period since 2006, almost half of the pirate attacks worldwide have been located in East Africa, the Indian Ocean or the Arabian Sea. The current dynamic is shown in Figure 4, with the new surge in the Horn of Africa exceeding the peak levels of activity in Southeast Asia in 200.

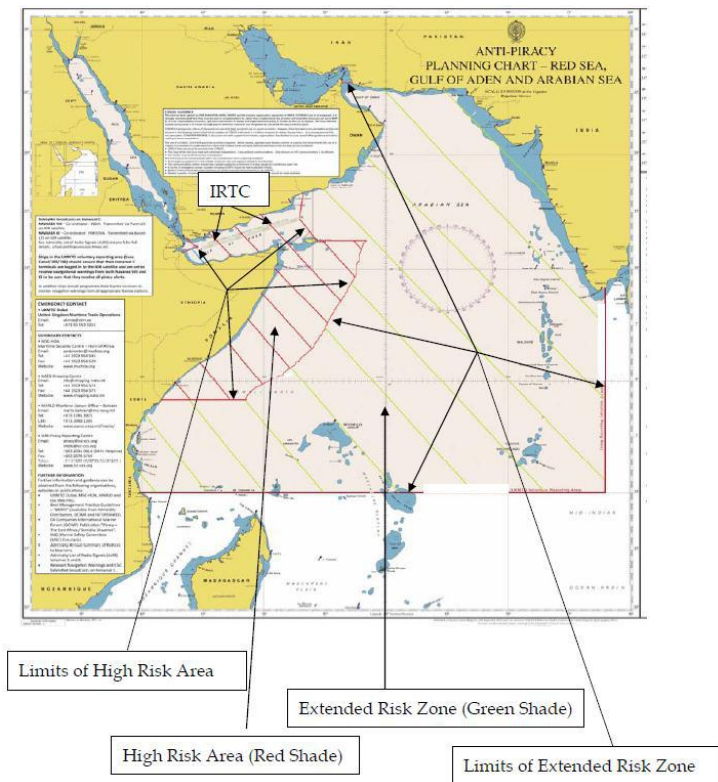
4.2 East Africa High Risk Zone

The High Risk Area for piracy attacks from Somalia is defined by the International Maritime Bureau as an area bounded by Suez and the Strait of Hormuz to the North, 10°S and 78°E¹⁶. The UKMTO Voluntary Reporting Area is slightly larger as it includes the Arabian Gulf. Attacks have taken place at most extremities of the High Risk Area. Attacks to the South have extended into the Mozambique

¹⁶ IMB BMP4 (2011)

Channel. Within this area, there is an Internationally Recommended Transit Corridor (IRTC), where the Naval/Military forces in the Gulf of Aden concentrate their patrols.

Figure 5 East Africa High Risk Zone



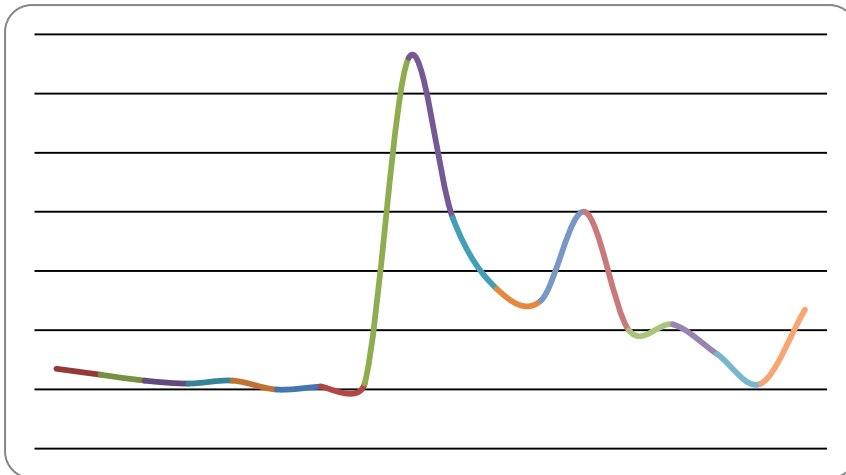
5 Case Study: Strait of Malacca

For centuries, the Strait of Malacca has been the primary commercial route between the Indian Ocean and the South China Sea. The sea lane, which divides the Malaysian Peninsula from the Indonesian island of Sumatra, is roughly 900 kilometres long, but at its narrowest is just 2.7 kilometres wide.



Today it is the critical route between Europe, via the Suez Canal and the Middle East, and the ports of East Asia and the Pacific. Between a quarter and a third of all of the world’s seaborne trade passes through the Strait of Malacca – carried upon some 90,000 vessels per year. According to the United States Energy Information Agency, an estimated fifteen million barrels of oil flow through each day.

Piracy has been a persistent presence in southeast Asian waters for at least 2000 years. For the first time in over a century, it became a serious concern in the Malacca Strait in the 2000s.

Figure 6 Malacca Strait Piracy Incidents, 1992-2009, based on IMO data.¹⁷

The reasons for the rise are not clear, although it has been suggested that the Asian financial crisis of 1997 may have forced hard-hit littoral residents to piracy, which may have been easier in an atmosphere of decreased political stability brought about by the crisis. According to data collected by the International Maritime Bureau, actual and attempted acts of piracy in the Strait increased from two in 1999 to seventy-five in 2000. The International Maritime Organisation, which uses a wider definition of piracy, put the number for 2000 at 112. Attacks included simple robbery, hijacking, and kidnap-for-ransom. According to the Bureau, the first kidnappings for ransom in the Strait occurred in 2001, when a vessel docked for repairs was looted. The master and second officer were held, and ransomed for \$30,000.

Some Malacca Strait piracy appeared to be political. When the *Ocean Silver* was boarded and six crew taken ashore for ransom in 2001, a spokesman for Gerakan Aceh Merdeka, the Free Aceh Movement, which seeks independence for Aceh from Indonesia, said that in future shippers should seek safety of passage from the organisation.

In September 2005, in response to the rising number of piracy incidents in the Strait, Lloyd's of London, one of the world's largest centres for the insurance of marine vessels, removed piracy from those perils included in standard marine insurance coverage. It reclassified piracy as a peril of war, which carries an additional premium for vessels active in areas deemed to be active war zones.¹⁸ Other insurers had excluded piracy for standard insurance cover for decades, and offered it as a separate endorsement. Rates for such cover were raised, or cover was withdrawn. Many new insurance facilities were established to offer piracy protection¹⁹, bringing an associated cost. Most dramatically, piratical activity in the Straits of Malacca led some analysts to predict the decline of the littoral ports of Singapore and Malaysia, in favour of new and emerging facilities which were more distant from the Malaccan piracy threat.²⁰

According to Mak, a clash of interests prevented an early resolution of the Malacca Strait piracy problem. This clash was manifest on well level between the national interests of Malaysia and Indonesia, coastal states with coastal interests, and the interests of major users of the waterway, characterised by Mak as 'maritime states'. The littoral states saw the Strait as one of many coastlines

¹⁷ <http://www.icc-ccs.org/home/piracy-reporting-centre/imb-live-piracy-map-2010>

¹⁸ 'Owners set for battle over piracy cover', *Lloyd's List*, 15.11.2005.

¹⁹ See, for example, 'Sumitomo Marine To Offer Piracy Insurance To Shipping Cos', *Dow Jones International News*, 22.07.1999; 'U.K. firm launches piracy insurance - ransom cash, negotiators provided - rise in open-seas hostage taking cited', *Toronto Star*, 19.01.2006.

²⁰ Tongzou, J.L.: 'Wither the Malacca Straits? The rise of new hub ports in Asia', in Ong-Webb, G.W. (editor): *Piracy, maritime terrorism, and securing the Malacca Straits*. Singapore: International Institute for Asian Studies, 2006.

and maritime issues to deal with; the others as a critical link in the global transportation, its utility lying only in its role as a highway.²¹ In short, the coastal states had little interest in seeing military vessels from maritime powers in their territorial waters, but had insufficient resources to clean up the problem themselves. In July 2004 Malaysia, Indonesia, and Singapore began coordinated marine patrols, but they could not pursue suspect vessels over each other's territorial boundaries, and had little effect. Ironically, it was another shock – the tsunami later the same year, which devastated the region of Aceh, where pirate communities were thought to reside, led to a large reduction in incidents, from 38 in 2004 to 12 the following year. The sustained decrease in incidents is attributed in part to the end of a 26-year battle between the Free Aceh Movement and the Indonesian government, which was itself a direct result of the natural catastrophe.²²

6 Defining a Stress Test Scenario

6.1 Magnitude Scale: Piracy Threat Index

The Cambridge System Shock framework represents piracy threat with the IMO-reported total number of reported acts of piracy in a single year. This represents the magnitude scale of piracy activity. i.e. the piracy 'event' of concern is a year of increased activity in a given region of high marine traffic.

The data records piracy incidents as either 'attempted' or 'successful'. Whether an event comprises the petty robbery of a fishing vessel or the highly coordinated, well-financed hijacking of a Very Large Crude Carrier, organisations investigating and reporting on piracy make no distinction of severity. However, when events are concentrated in time and space, they constitute a shock to world trade. When the Lloyd's Market association, a body representing insurance underwriters at Lloyd's of London, declares a body of water a war zone for insurance purposes, the magnitude of the shock can be considered as significant.

6.2 The '1 in 100' Likelihood Level for Pirate Activity

The Cambridge System Shock framework standardizes scenarios proposed for stress tests by assessing the magnitude of extreme event that is likely to occur with a 1% probability (1 in 100 chance) in the next year.

For piracy, we define the stress test scenario in terms of the piracy threat index (the total number of IMO-reported piracy incidents across the world).

The past 15 years has seen high levels of piracy activity, running at an annual average of around 320 events worldwide. The trend suggests that piracy in southeast Asia is declining or stable, but that piracy levels in East Africa are rising. The number of piracy events fluctuates considerably year on year. In an extreme year, the incidence of pirate activity would be surprisingly high relative to the trend. This could be the result of various coincidences or unexpected causal drivers.

6.2.1 Alternative methods for assessment

One method of assessing the likelihood of extremes is to do statistical analysis of the volatility of past fluctuations. An alternative method is 'event tree' derivation, where the various causal mechanisms are defined that might give rise to extreme variations. The current trends could potentially undergo a 'jump discontinuity' from an expected progression of the current situation to a new state of affairs

²¹ Mak, J.N.: 'Unilateralism and Regionalism: Working together and alone in the Malacca Strait', in Ong-Webb, G.W. (editor): *Piracy, maritime terrorism, and securing the Malacca Straits*. Singapore: International Institute for Asian Studies, 2006, pp. 135-6.

²² Raymond, C. Z.: 'Piracy and armed robbery in the Malacca Strait: A problem solved?', *Naval War College Review*, Summer 2009, Vol. 2, No. 3, pp. 36-7.

that gives rise to a radically different level of activity. For example in the East Africa region, pirate activity has been increasing at an average of about 40% each year since 2004 – but what would it take for this level of increase to suddenly go through a step change to a very much larger increment in the near future?

Statistical analysis of the past 25 years of IMO data suggests that the 1% probability of exceedance (1 in 100 chance per year) is around 3 times the average – i.e. about 1,000 events in a single year. There are different analytical techniques that give a range of potential values from 750 to 1,300, depending on the type of distribution that might be assumed.

6.2.2 Piracy step changes

Piracy can be seen as a ‘control process’ – the number of incidents is a function of the capabilities, desire and resources of the adversary, controlled by the counter-measures in place to prevent or suppress the activities. Pirate communities are spawned when populations can operate in a lawless home base environment, with little alternative legitimate economic potential, and with high rewards incentivising pirate operations. The control systems that suppress pirate activity are the armed marine patrols that prevent and deter attacks on ships, the establishment of law enforcement in the home base territory of the pirates, and the removal of the approval and support of their home community.

A step increase in the rate of piracy could occur from a number of changes in these conditions, either in the regions where piracy is already common, or potentially in new regions, for example:

1. A new population of pirates can be created by the collapse of law-enforcement in a newly-failed state – other countries along the east African coastline could potentially spawn additional populations of pirates. Other parts of the world could suddenly see new pirate populations if states within them fail.
2. Economic alternatives could suddenly dry up, driving much larger populations to participate in piracy. This could be the case if there is a lengthy economic downturn, widespread austerity measures, or collapses in agricultural economies from drought or market failures.
3. The incentives for piracy could increase – the reward for a successful pirate action has reportedly already risen from \$150,000 in 2005 to over \$4 million in 2010. If either the reward levels or the success rates were to improve further in the pirates’ favour, this could drive a step change in pirate activity.
4. The suppression of pirate activity through patrols of navy ships could be reduced, for example by a major geo-political conflict elsewhere that pulls naval power away from policing commercial sea-lanes.
5. Pirates may develop new techniques or improved equipment or weaponry that changes the calculus of their risk in mounting attacks. As pirates generate economic rewards from successful ransom payments they can afford better weaponry, manpower and equipment, and as terrorist groups have shown, well-motivated individuals can be adept at innovating to overcome the asymmetry of state security apparatus.

A number of these step-change drivers of increases in pirate activity would apply to multiple regions where piracy is practiced. A period of worldwide economic austerity could affect marginal income communities in every part of the least-developed world. A major geo-political conflict could distract naval powers worldwide, enabling piracy to bloom wherever warships have been withdrawn from. A clever new piracy technique developed in East Africa is likely to be rapidly copied by pirates in the South China Sea and elsewhere.

6.2.3 Limitations on pirate activity increases

Running counter to these drivers of step-change increases of pirate activity are practical considerations that limit the rate of step-change in pirate activity. Expansion of pirate activity is limited by the speed at which change can be effected. Constraints that limit just how much increase could occur in one or two years include:

- a. Rapidly increasing the number of participants in pirate activity requires time for people to move to the area, pass knowledge to each other, or to learn techniques
- b. Equipment availability needs time and logistics to acquire a greatly increased capability in weaponry and boats
- c. Sailing vessels' routes, practices and defensive measures also adapt to counter rising levels of pirate activity. Ultimately if attack rates become too high, vessels will stop exposing themselves to the threat and the increase will become self-limiting.

6.2.4 The 10X Threshold

The UN Conference for Trade and Development report sets out a cautionary vision of what the consequences would be if piracy attacks [in Eastern Africa region] were to increase to a level ten times greater than they are today. East Africa attacks in 2010 numbered just below 300, so this means a level of 3,000 attacks in a single year.

An important analysis is whether the '1 in 100' probability of step change increase in piracy activity could reach this order-of-magnitude escalation. The 'control process' of piracy outlined above, with limitations and self-limiting response by the vessels operators themselves suggests that it would be extremely difficult to achieve a 10 times increase, and that this would be well beyond the 1 in 100 level that could be justified. Statistical analysis suggests that even the 1 in 1000 chance per year would not get East Africa piracy rates to that 3000 event threshold.

6.2.5 The '1 in 100' Stress Test Scenario

The '1 in 100' probability of exceedance stress test scenario that is proposed for the piracy threat category is for piracy rates to increase from the recent (2005 to 2010) global annual average of around 320 to a value of 1,000, i.e. around three times.

To achieve these levels, piracy would need to increase in all areas around the globe, but it will be assumed that the large majority of the increased incidents are located in the region where growth is fastest and most volatile – i.e. in the oceans around the Horn of Africa. It will be assumed that a series of events trigger a step-change in piracy, as outlined above.

6.2.6 The '1 in 1000' Stress Test Scenario

If a '1 in 1000' probability event is required, this could be taken to be an increase of five times the recent global annual average, to a value of 1,600 events worldwide in a single year.

7 Piracy Stress Test Scenario

A series of events causes a step change in piracy activity worldwide, but driven by an escalation of pirate attacks in the wider Horn of Africa region of East Africa, Indian Ocean, and the Arabian Sea. In a single year, 1,000 pirate incidents are logged. 750 of these are in the Horn of Africa region. The following events unfold to create the scenario.

The population of people prepared to engage in pirate activity in the coastal communities in Somalia and neighboring low-income states is increased by migration to the coast from inland, bringing ex-war lords from African conflicts. Economic hardship drives increasing numbers of previously law-abiding people into the semi-organized militia of the pirates.

A well-publicized pirate hijacking of a large oil tanker is ransomed for an unprecedented \$20 million. The promise of this scale of rewards drives an increase in pirate activity, and more coordinated and more ambitious attacks by the pirate organizations.

At the same time, a major conflict occurs in the Pacific ocean, drawing most of the navy vessels to that theatre of operation, and reducing their abilities to police the commercial sea lanes and deter pirate attacks.

Pirate attacks escalate. The Lloyds Market Association extends its designated 'war zone' to the whole of the East African ocean area. Marine insurance rates increase five-fold.

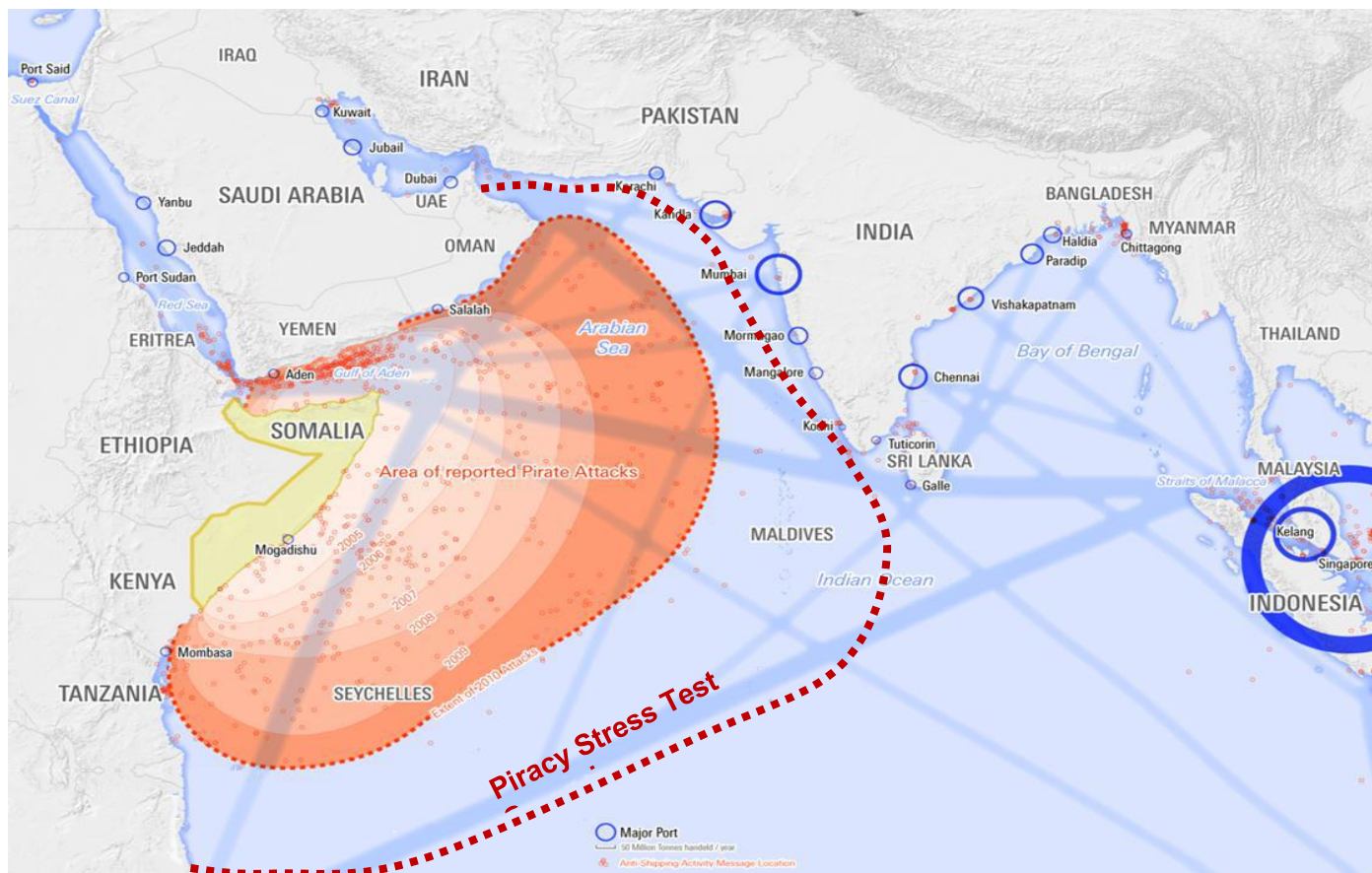
Commercial ship owners respond by re-routing away from the area and into deep ocean routes much further from shore, traveling in convoys, and by employing private security protection.

The pirates develop techniques for carrying out attacks much further from land than previously expected, and intercept commercial shipping in areas far out to sea. They employ heavy weaponry and escalate the levels of violence. The geographical footprint of the areas of potential pirate attack is much larger than previously observed.

Piracy revenues are used to fund militant Islamic terrorism and anti-Western activity in Africa, the Middle East, and Western Europe.

The period of high piracy activity is sustained until military intervention by a NATO coalition establishes a new government in Somalia, coupled with economic regeneration for East Africa.

Figure 7 Piracy Stress Test Scenario: Attack Zone Extent



8 Further reading

Works on piracy abound, and range from fantasy fiction to serious analysis of the economic, social, and political aspects of the phenomenon. The following represents a selection of recent analytical work about current piracy.

Bendall, H.B.: 'Cost of Piracy: a Comparative Voyage Approach', IAME. Copenhagen, 2009.

Bowden, Anna *et al*: 'The Economic Cost of Maritime Piracy'. One Earth Future, Working Paper, December 2010.

Chalk, Peter & Smallman, Laurence (editors): *Countering piracy in the modern era: notes from a RAND workshop to discuss the best approaches for dealing with piracy in the 21st century*. Conference proceedings, Volume 269, Rand Corporation, 2009.

Eklöf, Stefan: 'The return of piracy: decolonization and international relations in a maritime border region (the Sulu Sea), 1959-63', Issue 15, Working papers in contemporary Asian studies, Centre for East and South-East Asian Studies, Lund University, 2005.

IMB Piracy Reporting Centre BMP4, *Best Management Practices for Protection against Somalia Based Piracy: Suggested Planning and Operational Practices for Ship Operators, and Masters of Ships Transiting the High Risk Area*; Version 4 – August 2011, ICC International Maritime Bureau. <http://www.icc-ccs.org/images/stories/pdfs/bmp4.pdf>

Johnson, Derek & Valencia, Mark (editors): *Piracy in Southeast Asia: status, issues, and responses*. Institute of Southeast Asian Studies, 2005.

Kraska, James & Wilson, Brian: *Contemporary Maritime Piracy: International Law, Strategy, and Diplomacy at Sea*. ABC-CLIO, 2011.

Lehr, Peter: *Violence at sea: piracy in the age of global terrorism*. Psychology Press, 2007.

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Murphy, Martin N.: 'Contemporary piracy and maritime terrorism: the threat to international security', Adelphi Papers, Volume 388, International Institute for Strategic Studies, 2007.

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Ong-Webb, Graham: *Gerard Piracy, maritime terrorism and securing the Malacca Straits*. Institute of Southeast Asian Studies, 2006.

Parritt, B.A.H.: 'Violence at sea: a review of terrorism, acts of war and piracy, and countermeasures to prevent terrorism', Volume 439, International Chamber of Commerce, 1986.

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Rosenberg, David: 'The political economy of piracy in the South China Sea'. *Naval War College Review*, Summer 2009, Vol. 62, No. 3.

Villar, Roger: *Piracy today: robbery and violence at sea since 1980*. Conway Maritime Press, 1985.

Wu, Shicun & Zou, Keyuan (editors): *Maritime Security in the South China Sea: Regional Implications and International Cooperation*. Ashgate, 2009.

Young, Adam: *Contemporary maritime piracy in SE Asia: history, causes and remedies*. Singapore: International Institute for Asian Studies, 2007.

9 Resource Index

The major sources of information on piracy include:

- The International Maritime Bureau's (www.icc-ccs.org/home/imb)
- Piracy Reporting Centre (www.icc-ccs.org/piracy-reporting-centre)
- The International Maritime Organization (www.imo.org),
- UNCTAD, the UN Conference for Trade and Development (www.unctad.org).
- RAND Corporation (www.rand.org) has worked occasionally for the U.S. government on piracy issues.
- Singapore's Institute of Southeast Asian Studies (www.iseas.edu.sg) has worked extensively on regional piracy issues
- One Earth Future (<http://oneearthfuture.org>) has recently contributed to the growing body of contemporary research on current international piracy issues.