The Fractured Ocean

Current Challenges to Maritime Policy in the Wider Atlantic

John Richardson
Armando Marques Guedes
Xavier de la Gorce
Anne-François de Saint Salvy
Paul Holthus

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Executive Summary

This series of papers is dedicated to the hypothesis that analyzing the complex reality of international relations between the countries on opposite coasts of the Atlantic Ocean from the perspective of the Atlantic as a whole, rather than looking at two sets of transatlantic relations in the Northern and Southern hemispheres, can shed new light on old dilemmas and point the way toward new directions for government policy.

This particular paper examines the challenges posed by human activity on the Atlantic Ocean itself, and around its coasts, looking at it not so much as a vast expanse separating the Americas from Africa and Europe but rather as a shared resource and an important connector. All littoral states face a common challenge in maintaining its value as a foundation for sustained "blue growth" in the years to come.

The introduction to the paper sets the scene. It refers as well to the previous report in this series on "Energy and the Atlantic: Mapping the Shifting Energy Landscape of the Atlantic Basin," and in particular to its conclusion that a southward shift in the center of gravity of the Atlantic Basin energy map is taking place. Whether this true for other sectors of activity is a question that recurs throughout this paper.

Although taking care to examine policy challenges confronting all Atlantic states, the report also looks at their relative geographic importance, and as a result it relies to a considerable extent on their spatial representation in the form of maps. These show important differences for various parts of the ocean, affecting the acuteness of the challenges posed to states. Thus, shared policy dilemmas need to be analyzed in light of great heterogeneity among the coastal nations.

In Chapter 1, Armando Marques Guedes traces the evolution of the economic activities that have determined the geoeconomic

development of the Atlantic and of the complex web of international relations that have grown up as a result. He details the importance of the slave trade and the associated growth of plantation culture, the changes as a result of the political independence of former colonies, and the growth in the most recent century of trade patterns fueled by globalization and associated port development but also of illegal activities such as drug trafficking, new forms of trafficking in people, illegal fisheries, and piracy. He concludes that patterns are indeed changing fastest in the southern Atlantic, and he identifies deficiencies both in the area of cooperative governance structures and in the capacities of the littoral states to police activities on the ocean. He explains why the current policy positions of the main participants represent a serious obstacle to improving on this situation.

In Chapter 2, Xavier de la Gorce and Anne-François de Saint-Salvy examine the development of illegal activities on the Atlantic. They divide these into three classes: those such as piracy that impede legitimate maritime activities; those that lead to a degradation of the marine environment, for example, through the discharge of polluting substances; and those that abuse the freedom of the seas to engage in criminal activity such as arms smuggling or trafficking in people or drugs.

In each case, careful attention is given not only to the overall development of each activity but also to its geographical distribution and to the Atlantic routes used. Thus, the Gulf of Guinea is identified as of particular concern with respect to piracy and the Caribbean as an area in which terrorism is a potential problem. And in each case, the possibilities for the detection of illegal activities, for their interdiction, and for bringing to justice their perpetrators are considered. The authors conclude that the development of illegal activities is of particular concern in the southern Atlantic since that is where their growth is strongest; this is to a considerable extent a result of lack of effective surveillance, insufficient cooperation and exchange of information between governments, and weak coastguard capabilities.

Chapter 3 takes a look at fisheries in the Atlantic Basin. It paints a picture of the overexploitation of one of the planet's most valuable living resources and shows how this has led to the decline of

fish and shellfish stocks in the northern hemisphere and is now threatening to do the same in the South Atlantic. It shows how ineffective management of fishing resources by individual nations and by the regional fisheries management organizations set up to provide broader oversight is exacerbated by the activities of illegal fishermen. It describes how improved management and surveillance can help to remedy this situation before it is too late. It also examines the role of capacity-enhancing subsidies granted by governments to fishing fleets and calls for their elimination.

The chapter, a collaborative effort by Paul Holthus, Xavier de la Gorce, and Anne-François de Saint-Salvy, looks also at the impact of climate change on the distribution of fisheries stocks and activities. Finally, it assesses the prospects for the continued development of aquaculture.

Chapter 4, written by Paul Holthus, investigates the exploitation of the resources of the Atlantic, both living and mineral, including renewable energy. He notes the geographic distribution of each resource and the extent of its current exploitation. In the case of mineral resources, this encompasses the many deep ocean resources that are potentially exploitable in the future, such as the polymetallic sulfides found on ocean ridges, which are becoming commercially interesting, something that does not apply to many other mineral deposits. The exploitation of such resources, in areas beyond national jurisdiction, is regulated by the International Seabed Authority, which was set up under the United Nations Convention on the Law of the Sea. The chapter also looks at inshore mineral deposits, such as sand and gravel, which have been extracted for centuries. In this context, the environmental impact of the activities is examined.

Bioprospecting in the oceans is also covered, and the shortcoming of its UN-based regulation are discussed. The health of coral reefs and mangrove forests, both of which are of huge importance for the stability of the marine ecosystem, is analyzed.

Renewable energy on and from the oceans is looked at in considerable detail. This provides the one outstanding example in the report of a sector that is developing much faster in the northern part of the basin.

The report concludes that a forum needs to be created within which the southern countries can share their own ideas on ocean governance and maritime policy and profit from the experience of the North. Over time, the activities of this forum should lead to the southern states themselves setting up the kind of multilateral infrastructure that could yield a South Atlantic security agreement designed to deal with the multiple challenges arising in the context of increasing blue growth in the region, replacing the fragmented governance of today with an integrated framework for sustainable and safe shared development. The countries of the northern Atlantic should declare themselves ready, in the interest of a better husbandry of their common ocean, to assist in this process with their resources, their expertise, and their experience.

Preface

This study was undertaken in the context of a multi-year partnership for research and dialogue of the German Marshall Fund of the United States and Morocco's OCP Foundation, launched in 2010. Companion pieces have addressed Morocco's new geopolitics, energy and environment, and food security, all from an Atlantic Basin perspective.

(To be completed by Ian)

Introduction

The port of Venice recently adopted a new logo, which it wishes to be understood as signaling a "new Copernican revolution" by understanding the port as "Where the Earth revolves around the Sea."

This is symptomatic of an attempt on both sides of the North Atlantic to shape policies around the concept that the maritime sector should not be regarded as disparate, taking place somewhere beyond the coastal horizon, but rather as an integral component of the economy, whose "blue growth" can contribute to future prosperity. It calls for a rediscovery of the ancient maritime heritage that has been forgotten or neglected in many coastal states. In the European Union, it has led to the development of an Integrated Maritime Policy under the leadership of the president of the European Commission, Portugal's José Manuel Barroso (Commission of the European Communities 2007). In the United States, it has followed from a report released by the U.S. Commission on Ocean Policy on September 20, 2004, "An Ocean Blueprint for the 21st Century." The call is for a new paradigm in dealing with maritime activities, recognizing the truth of the comment attributed to Arthur C. Clarke, "How inappropriate to call this planet Earth when it is quite clearly Ocean."

The second Copernican revolution that underlies this report recognizes that for at least the past half century "the center of gravity in transatlantic relations has been firmly rooted in the Northern Hemisphere. This reality is unlikely to be overturned anytime soon. But the next decade is likely to bring a significant rebalancing of relations around and within the Atlantic space, with the South Atlantic playing a larger role in political, economic, and security terms" (Lesser 2010).

This report examines the extent to which this second revolution is coming about by conducting comprehensive scrutiny of the

elements of maritime activity that occupy this great ocean space, from the gates of the Arctic to the Southern Ocean.

Shipping flows in the Atlantic were once dominated by the triangular routes of the slave trade between the United Kingdom, West Africa, and the Americas. In the last century, trade between Europe and North America predominated, until the opening of the Panama Canal in 1914 added a totally new dimension, binding the Pacific Rim more tightly to the Atlantic.

In the 21st century, these patterns will change again, influenced by at least six developments:

- Volumes of trade are changing rapidly, as big emerging economies such as China, India, and Brazil increase their shares of world imports of raw materials and world exports of finished goods.
- Rising fuel costs and dynamic technologies are leading to large increases in ship size and to slower steaming speeds. The energy landscape of the Atlantic Basin has been shifting, as new deposits are identified, mostly in its southerly regions.
- The opening of an expanded Panama Canal in 2014 will once again provide new opportunities, particularly for ships larger than the Panamax standard of the past.
- The opening up of the Arctic Ocean to regular shipping will eventually provide much shorter routes from East Asia to Europe.
- Narco-trafficking, piracy, robbery, and incipient arms races, as well as various other symmetrical and asymmetrical security challenges, are on the rise on both sides of the southern Atlantic Rim — and these concerns are intensified by the growing engagement in the region of both traditional and new non-regional players.

The progression of these phenomena will have considerable implications for the demand for port capacity in many countries. Some ports will be geographically, technologically, and economically well placed to profit from this; others will not. Some are likely to develop much faster than others; some may even

decline. Chapter 1 explains how trends likely to affect the North/South balance of activity such as these interact with the geopolitics of the Atlantic, as it has evolved over the centuries, and analyzes the complex pattern of national and regional security policies. In it, the need for a security architecture focused on the southern reaches of the Atlantic is underlined in detail, sector by sector. Special attention is given to the growing perceptions of interconnectedness between the northern and the southern reaches of the wider Atlantic Basin, including its largely overlooked southernmost sub-Antarctic and Antarctic latitudes.

Traditionally, the oceans have been seen as areas unreached by the arm of the law, on which the master of a vessel was fully and solely responsible for the legality of its activities and those of its crew and passengers. The idea of the "freedom of the seas," a legal principle first propounded in the 17thcentury by the Dutch lawyer Hugo Grotius, long held sway. Over hundreds of years, the illegal activity most feared by seafarers was, of course, piracy, and government naval action has been the traditional response. This duel continues today, most prominently in the Atlantic off the coast of West Africa. In the 20th century, as globalization has proceeded, so too has the internationalization of crime. International traffic in narcotics and in people has increased, and the Atlantic provides a broad and tempting corridor for its expansion. In addition, concern for the sustainability of economic activities, which affect the environment, has led to the development of a considerable array of regulations designed to combat harmful discharges to the ocean and to minimize harmful impacts on often fragile ecosystems.

As we move into the second decade of the millennium, these activities on the Atlantic Ocean continue to proliferate and transform, and the capacity of governments to monitor them and to prevent unlawful uses of the maritime domain continues to leave much to be desired.

The ability of law enforcement agencies to operate is hampered by three problems:

- Illegal activities on the ocean are hard to detect, and evidence is difficult to obtain.

- The legal responsibility to combat crime is divided between flag state and port state authorities.
- Shared institutional and legal frameworks concerned with the security implications of these and other activities that threaten both regional and subregional stability are absent.

Chapter 2 of the report examines how quickly each of these forms of illegal activity is increasing in the Atlantic Basin, what law enforcement mechanisms in the form of land-, sea-, and satellite-based surveillance exist to deal with them, and how law enforcement authorities in different countries work together to enforce international law. It also identifies what forms of governmental or intergovernmental action would be required to sharpen their efficiency.

How important are the gaps in effective governance of the Atlantic, and how likely is it that they will be bridged? The answers depend on the propensity of the Atlantic partners to work with each other as well as the pace at which economic activity is increasing. These questions recur as a leitmotif throughout the report and are critical in framing its conclusions.

The most prominent resources extracted from the oceans are fish and shellfish, and an elaborate policy framework has been set up to deal with them. But statistics on fish stocks tell a dismal story. More and more of the global ocean's species are being overfished, and the Atlantic is no exception. The analysis shows that this is not a case of developed nations husbanding their stocks sustainably while anarchy reigns in the South. On the contrary, the record of most of the North Atlantic states is lamentable. What is clear, however, is that overfishing is spreading rapidly southward. Is it too late to introduce effective regimes to conserve the remaining South Atlantic stocks? Chapter 3 examines this most egregious example of biodiversity degradation.

More generally, though, the oceans are a reservoir of biological resources of many kinds, for example, providing new compounds for pharmaceutical products or new sources of renewable energy. In principle, extraction of such resources is subject to the restrictions imposed by the UN Convention on Biological Diversity (CBD). However, the 2010 report of its secretariat concluded that "unless

radical and creative action is taken quickly to conserve the variety of life on Earth, natural systems that support lives and livelihoods are at risk of collapsing."

Offshore extraction of fossil fuels is largely governed by national regulation within the 200-mile or continental shelf boundaries of the exclusive economic zones granted to coastal states under the United Nations Convention on the Law of the Sea (UNCLOS), although the environmental effects of oil spills are, of course, much more widely felt. Similar legal regimes apply to the extraction of other mineral resources, such as sand and aggregates or, in the future, methane hydrates. The installation of offshore wind farms or wave power installations would seem at first glance to be subject to the same sort of treatment. In that case, however, the "right of innocent passage" of ships flying foreign flags maybe impeded, and it is unclear to what extent national licensing procedures take this into account.

The extraction of mineral resources (such as manganese nodules) from the high seas outside of national economic zones is governed by the UNCLOS provisions declaring all such resources to be the "common heritage of mankind" and subjecting extraction to oversight by the International Seabed Authority established for this purpose.

All these economic activities risk disturbing the marine environment, and thus the obligations of states under the CBD come into play. But the program established through the CBD to create a network of representative ecosystems in order to conserve biodiversity has currently succeeded in approving areas covering only 0.7 percent of the ocean surface.

Chapter 4 of the report examines the evolution of these various forms of marine resource extraction, including any significant actual or potential developments in the Atlantic (except for oil and gas exploitation, which is covered in the GMF study by Paul Isbell on "Energy and the Atlantic: Mapping the Shifting Energy Landscape of the Atlantic Basin"), cites the legal frameworks to which they are subject, and identifies actions the Atlantic states need to take to ensure the exploitation of these resources in a sustainable manner.

It is worth recalling the findings of Isbell's report. It confirms the shifting focus of Atlantic analysis: "The Southern Cone and Southern Africa have recently emerged as new centers of gravity within the energy landscape of the Atlantic Basin. It is in the Southern Atlantic where most of the new energy trends are now emerging with the most force and the most potential for transformation." (Isbell 2012)

He identifies the need for better governance: "With increasing volume and heightened density of interaction we would expect more practical economic and security needs — and therefore more demand for tighter policy coordination and more intensive diplomacy within the Atlantic space." (Isbell 2010, Executive Summary 1.3) But he also points out the void in governing structures: "There are no formal or informal Atlantic energy organizations currently — with the exception of the relatively inactive Transatlantic Energy Council, a strictly northern Atlantic institution." (Isbell 2012)

He attributes this lacuna to a matter of collective mind-set: "Nothing even close to an Atlantic Basin consciousness yet exists. Global South identities and loyalties may even generate some initial resistance to the Atlantic Basin concept. However, it is also just as likely that the key emerging countries of the Southern Atlantic will identify the Atlantic Basin as a useful strategic hedging device for modifying current geopolitical identities or for moderating more traditional geopolitical dependencies and vulnerabilities." (Isbell 2012)

With respect to national policy frameworks, Isbell points out "the relatively underdeveloped state of energy policies and regulatory regimes (the EU being the clearest exception)." (Isbell 2012) His conclusions find many echoes in the much broader analysis to be presented here.

1. Geopolitical Shifts in the Wider Atlantic: Past, Present, and Future

Armando Marques Guedes

Introduction

Although taking the entire Atlantic Basin as a general framework, this chapter will focus on the geopolitics of the evolving security situation in the southern reaches of the basin. It will touch on what this means for the wider Atlantic and its interests regarding the maritime trade flows that cross it, due to changes currently happening fastest in the southern reaches, understood here as the huge expanses south of the Tropic of Cancer (henceforth called the South Atlantic). The "South Atlantic" referred to here is thus a larger entity than the one geographers talk about. It embraces the entire rim south of the Atlantic Alliance's area of jurisdiction.

To reiterate something that has been written about in early 2012 by the German Marshall Fund of the United States: a *tour d'horizon* of some of the leading flashpoints around the Atlantic reveals a number of active disputes and unresolved conflicts — as well as potential ones brewing. Perhaps none of them have the global geopolitical significance of points of contention in the Indian and Pacific Oceans — but some of them have the capacity to become more violent and polarizing. Collectively, they can have an inhibiting effect on the emergence of a more cohesive system in the wider Atlantic, with implications for the Atlantic Basin's aggregate interests and strategy in securing its place as a hub in a fast-globalizing world. Local and subregional political rhetoric and discourse play a central and fascinating role here. Indeed, as Ian Lesser and his co-authors have remarked, "many of the key trends affecting global economics and security are being played out to the south of the prevailing Washington-Brussels axis." (Lesser et al. 2012, 3)

In keeping with this outlook, the chapter's focus will be on the meridional, or austral, region. The analytical thrust throughout

is first historical and then geopolitical. It is concerned foremost with the risks of a rapid degradation that could result from the simultaneous and ever louder affirmation of sovereignty by regional or extra-regional players (state and non-state) amid the glaring absence of an overarching security architecture there. But geopolitics also recognizes the economic aspects of security, which entails constantly scanning the horizon for changing maritime trade patterns and their significance. What follows will take stock in particular of the fundamental linkages between the location of new ports, budding development policies, and underlying and emerging South Atlantic tensions — those facing regional powers and outside ones moving in or asserting their old presences there.

At a geo-strategic level, this austral region can be conveniently divided into four subregions, each raising thorny issues of its own — and in most cases these have a clear economic dimension. If one is to unravel the regional political dynamics, both in this southern region and basin wide, special attention must be given to the interests and actions of a plethora of state and non-state actors. This means looking into the behaviors and evolving linkages between disparate entities and zones such as the United States, emerging nations (Colombia, Venezuela, Brazil, Argentina, South Africa, Angola, Nigeria), the Greater Caribbean, the Greater Gulf of Guinea, Cape Verde, the European Union, the African Union, radical political Islamist networks, irredentist movements, cartels devoted to drug trafficking, and so on. Comprehending the region's geopolitical tectonics requires paying heed as well to the roots of changes in influence — in economic, political, and military terms — of some old and new internal and external participants. Traditional European presences in the region like Great Britain, France, Spain, Portugal, and even Germany increasingly have to contend with growing U.S., Russian, and Chinese footholds. The roles of multilateral organizations and coalitions like NATO, the EU, or the Union of South American Nations (UNASUL or UNASUR), and the various degrees of formality of the objectives they put forward, has also of late become geopolitically significant, and so they too will be looked at, if briefly.

The absence of a security architecture is glaring. One built along lines similar to the one created for the North Atlantic might do the job, but it is an unlikely solution since it encounters the staunch

opposition of Brazil, South Africa, and a score of other Latin American and African states. Nevertheless, given the economic reawakening of the South Atlantic, the emergence of very real politico-military challenges there, and the new attention bestowed on it by external powers, hard security problems are probably not going away anytime soon. At the very minimum, what is needed is a "regional constabulary" type of entity, focusing on piracy and trafficking of various kinds, as well as on search and rescue.

Figure 1 **— The wider Atlantic, the Tropic of Cancer, and, below, the South Atlantic**

Historical Development in the Wider Rim: The First Steps

For thousands of years in its own world, only in the past 500 years or so has the South Atlantic Basin become more than strictly local interest. As a maritime domain, the South Atlantic gained significance when, at the end of the 15th century, Portuguese navigator Vasco da Gama for the first time traced a sea route from Europe to India. Although the all-maritime route increased the distance travelled for this important long distance trade, it drastically decreased the number of intermediaries. Combined with the expansion of tonnage capacity transported in each trip, the sea route thereby reduced the cost of freight. It also quickly gave the Portuguese crown a highly profitable spice business, which had previously been monopolized by Venetian and Middle Eastern merchants using land routes. With the "discovery" of the Americas

a few years later, Castile, Aragón, and other less hefty Spanish peninsular kingdoms soon followed suit.

Until the early 15thcentury, most maritime transport flows in the Atlantic remained confined to the northern tract of the big ocean. Wider Atlantic trade patterns began in the late 15th century and intensified throughout the 16th and 17th centuries, though they did so in a complex, nonlinear manner.

Portuguese and Spanish Spheres of Influence

South Atlantic-centered shipping lines of communication were once dominated by the triangular routes of general commercial and a more specialized slave trade between Africa, Latin America, and Europe, first carried out by Portuguese sailors and merchants, who were followed almost immediately after, and in a somewhat different fashion, by the Spaniards. This was the basis upon which the Treaty of Tordesillas was negotiated between Portugal and the Spanish kingdoms under the aegis of the Vatican. The treaty provided the first legal framework applicable to navigation in the South Atlantic. It stipulated that everything (and everyone) extending eastward from a meridian line 370 leagues (1,184 nautical miles) west of Cape Verde was allotted to Portuguese discovery, conquest, and Christianization by Pope Alexander VI and the lands westward of the line to Castile, thereby confining all European activity south of the Tropic of Cancer to Portuguese and Castilian endeavors for the best part of a century. The treaty was ratified by the Catholic monarchs of Castile and Aragón on July 2, 1494, by Portugal on the following September 5, and confirmed years later by Pope Julius II's bull *Ea quae* of 1506.[1] This meant Brazil fell on the Portuguese side of the Atlantic line and the remainder of Latin America on the Spanish side. This in turn accounts for the different linguistic regimes still found in the New World. With it, new processes of identity formation, more than simply linguistic, had begun throughout the Atlantic Basin, and beyond.

[1] The other side of the world was divided a few decades later by the Treaty of Zaragoza, signed on April 22, 1529, which added an antimeridian in the East Indies to the line of demarcation specified in Tordesillas.

***Figure 2* — After the Treaty of Tordesillas: the Atlantic and Portuguese and Spanish trade routes from the 15th to the 19th centuries. Portuguese routes are in blue, Spanish ones in white.**

As operational settings for such trade patterns and stepping-stones for interior exploration and trade, a few ports became important at the time. These included ever more important docking and harbor facilities in Lisbon and Seville, linked with a few Azores-based smaller conveniences (in the islands of Santa Maria, São Miguel, and, mostly, Terceira). The Portuguese also set up links with a string of West African trading posts, mostly located along the Gulf of Guinea (at São Jorge da Mina, for example, in modern-day Ghana) but sometimes offshore, in the archipelagos of Cape Verde and São Tomé e Príncipe. These extended down to facilities in what is now the Congo (around Ponta Negra and the Congo estuary), in São Paulo de Luanda (now Angola's capital of Luanda), and further down in what was called Angra Pequena (renamed Walvis Bay), in present-day Namibia.[2]

In the New World, important ports grew fast in Recife and São Salvador da Bahia, both in what is now Brazil, south of that in Santos (in the São Vicente captaincy), and, to the north, along the Caribbean, in Cartagena de Indias and Havana. The triangular network of exchanges hooked up with the remnants of the erstwhile Hanseatic League in the North Atlantic, mostly via the Low

[2] At the southern tip of Africa, Cape Town, founded by the Dutch in 1652, at Table Bay, was not really a trading outpost, as the indigenous Khoi had little interest for trade, but rather a superb strategic foothold.

Countries but reaching to Bergen, along the west coast of Norway, and with important inroads into the eastern Baltic. Thousands of persons migrated south, mostly (but by no means only) following the separation of the Low Countries from Spain after the 1568-1648 Eighty Years War, though some were prompted by the much earlier expulsion of Jews by the Spanish Catholic monarchs, Ferdinand and Isabella, in 1492.[3] Novel identities proliferated.

Early South Atlantic Trade Routes

This initial launch of basin-wide trade was followed by the entrance on the stage a couple of centuries afterward and in a quite different pattern of new actors, England, the Netherlands, West Africa, and the Americas. By then, Atlantic trade had become more specialized. The newer era was characterized by the predominance of the slave trade, which greatly intensified from 1650 onwards. Its geographical pattern had also changed: as far as the southern reaches of the basin were concerned, the trade carried out had been heavily south-south, if only unidirectional. Slowly, it began bifurcating from this austral main branch into a northern one going to what came to be the United States, and to Europe as well, to a lesser degree. Slaves were bought or seized mostly along the West African coast and taken to the New World along much of the Atlantic seaboard, both north and south, where they were put to work in plantations and other settlements, thus fueling the huge increase in commercial goods trade that was to follow and dotting the Atlantic seaboard with many more outposts.

As in earlier times, these were mostly a rather harsh set of enterprises, sometimes fraught with tensions between the increasing number of players involved, with regular occurrences of piracy; increasingly, state-sponsored corsairs were authorized to conduct raids on shipping of competing nations. Still, no formal security architecture was required to keep it all within relatively stable bounds. True, threats from French and Dutch corsairs led to a Portuguese-Spanish agreement to safeguard the West African coast with fortified "*praças*" and "*feitorias*" (outposts) — mostly in Morocco and along the West African bulge to its south — and, more important, the maintenance of a mid-ocean

[3] Many of these assembled first in Portugal, and, facing forced conversion from 1497 onward, went to areas such as northern Brazil, the Guyanas, and the Caribbean, where huge plantations were started

Canary Islands-Antilles "Atlantic corridor," with joint patrolling efforts, largely harbored at the port of Angra, on Terceira, in the Azores, which was intended to ensure the Iberian monarchies a continued supremacy. But these sorts of bilateral agreements were episodic. (Nogueira 2011, 209) Ships and small fleets mostly took care of themselves, mainly concerned with the traditional risks of sea voyages: diseases like scurvy, the consequences of poor maintenance and cargo overloads, breaks in the chains of command, which not rarely became full-fledged mutinies, and simply surviving the elements.

Other ports were to grow during this period, which lasted well into the 19th century, largely serving the plantation settlements all along the western shores of the Wider Atlantic, such as Richmond, Charleston, New Orleans, Veracruz, Paramaribo, Rio de Janeiro, and Buenos Aires. Others, like those earlier established in Havana, Cartagena de Indias, Recife, and Bahia, maintained their importance. Such ports received goods and slaves from those located on the Atlantic coast of Africa, which were of lesser importance, as they were mainly departure points, located mostly in what is now Senegal and a variety of footholds on the so-called Slave Coast (which included most of the Gulf of Guinea proper), as well as the Congo and Angola.

From the New World Atlantic ports and from the northernmost West African ones, mostly in Senegal, came heavy flows of goods — agricultural products together with mineral ores — on the routes to Europe. Again, these tied in to what was left of the great Hanseatic League system mentioned above.

From Feast to Fast: The South Atlantic's Short 19th Century

Up until the first two decades of the 19th century, almost four times as many Africans as Europeans settled in the Americas, mostly in the more southerly regions. The composition of incoming groups as well as Atlantic trade patterns changed radically in the early 19th century, with the British-led abolition of slavery and its slow and laborious imposition by the Royal Navy on Angolan settlers and (from 1822) nationals of independent Brazil. By then, the earlier Portuguese and Spanish hegemonic dominance of the Atlantic sea

lanes had faded, as the British and the Dutch, joined by the French along the northern and central reaches, progressively came to dominate Atlantic trade. The new transatlantic power dynamics, and the novel issues they gave rise to, turned the regional mesh of trade and security into a far more complex lattice.

Dutch activity was typically generated by private companies and was essentially commercial in nature. British interests were more political and wider in scope, as were the more northern French, including a specifically military component. In contrast, Portuguese and Spanish endeavors remained mostly state-centered and, at least notionally, tightly controlled, although the legal mechanism of "concessions" was widely used. While commercial competition became unforgiving, most islands in the South Atlantic — once occupied by Portugal and still bearing Portuguese names or their Anglicized or local derivatives (Ascensão-Ascension, Tristão da Cunha-Tristan da Cunha, and Santa Helena-Saint Helena are examples) — progressively fell into British hands. Portugal and Spain remained only residually present and in control of mid- and northern Atlantic Basin territories, normally archipelagos in Madeira, the Azores, Cape Verde, São Tomé e Príncipe, Fernando Pó, and the Canary Islands.[4]

Commercial paths and flows therefore diversified along national lines, as competing trade patterns settled down, with but small variations, mostly along those alternative routes. Embryonic forms of security were once more relegated to the actors themselves, but they now did so in a coordinated manner, necessitated by often harsh methods of commercial competition for trade routes.

But with the gradual elimination of the slave trade, the South Atlantic experienced a low point. A strong token of this relative obscurity was the fact that, for his second exile, Napoleon was sent not to a nearby Elba from which he could once again return to France but to St. Helena — a remote island beyond the mental horizon of most Europeans, sitting in the middle of what many contemporary Brazilian historians liked to call "the once most peaceful of oceans." In effect, the abbreviated 19th century between the post-Napoleon 1815 Vienna Congress and the historic

[4] A few remain to this day in the sphere of Brazil. Fernando de Noronha, Trindade, and Martim Vaz are the most important in this group.

"colonial" Berlin Conference of 1884-1885 was, in comparative terms, a period of slumber for the southern Atlantic Rim and the surrounding regions.

The Napoleonic Watershed

The competitive situation was soon to become unbalanced. Around the turn of the 19th century, Great Britain's hold on position and power became greatly enhanced by a double whammy, as it were.

On the one hand, Napoleonic France, in a series of well-coordinated strikes, all but devastated the navies of Britain's competitors and enemies; on the other, Britain's naval and commercial hegemony was consolidated for more than a century when Nelson beat the combined forces of France and Spain at Trafalgar. Coupled with the Industrial Revolution, which Britain pioneered and was able to embrace more fully than anyone else, and the economic and financial clout she gained through the devastation of Europe during Napoleon's reign and imperial adventures, the European power balance shifted heavily in Britain's favor. Along with that shift went supremacy in the North and South Atlantic, as well as in virtually all other seas.

It is fair to say that when the place of Portugal and Spain as the major maritime powers was taken up by Holland and England, the South Atlantic Basin remained as a part of global trade routes. Iberian-controlled routes dwindled to a trickle of what they had once been, even if scores of new plantations were created along the New World coasts — mostly in northern South America and the Caribbean — but overall trade flows increased fast. Commercial shipping engaged in the transport of ever larger cargoes of tea and cotton coming from Asia and Australia, in clippers taking advantage of the "roaring forties" winds, entering the Atlantic Basin via either the Cape of Good Hope or the Cape Horn routes on their way north.

This period of relatively fast expansion was, however, a mere interregnum. The Berlin Conference attempted to regulate the scramble for Africa, which had been taking place often through military deployments and installations. At that conference, it was agreed that territories had to be effectively occupied and administered for claims to be staked and recognized by the other

European powers. Atlantic Basin itineraries and paths were broken up into "national" sea pathways between colonies and their corresponding metropoles (Britain, France, and Portugal, together with Spain, Germany, and the Belgian king, as far as Africa was concerned.[5]

Wider Atlantic trade patterns had, slowly but steadily, become mostly a north-south collection of independent networks, as the once major south-south ones faded into obscurity, if not oblivion. The intricacy and national diversity of these patterns raised security problems of all sorts. The mainly Anglo-French Atlantic theater of the Seven Years' War, which raged between 1756 and 1763, and efforts in the first half of the 19th century to abolish the slave trade mostly in the southern portion of the oceanic basin are two examples. The opening of all Brazilian ports to international trade, which the British demanded of the Portuguese king in 1808, brought up new sorts of complex security issues.

Naval clout increasingly came to be perceived as necessary to regulate international commerce, which from the 17th century onwards was largely secured by a dominant British Navy, challenged with only limited success by the French. The change was significant and a forewarning of what was to come: the adoption of safety measures became paramount. Hard forms of security for the protection of maritime trade had become a core issue no one was prepared either to overlook or any longer devolve to commercial enterprises.

The 20th Century: The Re-Emergence of the South

By the beginning of the 20th century, the main hubs had shifted, and trade between Europe and North America clearly predominated. Naval power had shifted, too. It did so with a British Navy financially strained, if not greatly affected in sheer numbers, by World War I. The British were challenged by the rise of the U.S. Navy, which had gained prominence in the last quarter of the 19th century, together with the entrance onto the scene of a new German naval presence and a budding Brazilian

[5] The Congos were awarded to King Leopold II of Belgium as his "personal possession" when he vigorously complained of being left out of the supposedly pan-European partition deals struck in Berlin; he had, after all, sponsored Henry M. Stanley's journeys into "the heart of darkness."

one — in the 1880s, Brazil's *Riachuelo* was the largest warship in the South Atlantic, which led to the U.S. decision to build an ill-fated battleship, the *Maine*, to counter its supremacy there.[6] Along the lengthy Atlantic-facing shores of the Western Hemisphere, all the way to the tip of Patagonia, commercial shipping came to mean, by and large, U.S. and British trade, once the continental European powers were strong-armed out.

Colombia, Venezuela, Brazil, and Argentina each had a presence in the southern seas, but it was mostly regional in scope. The United States got involved in the maritime affairs of the South when it suited its interests, under the umbrella of the Monroe Doctrine and that of its corollary.[7] President Theodore Roosevelt sent troops and armor from what was to become the American Great White Fleet in calls to Cuba, Panama, Colombia, Haiti, the Dominican Republic, and Nicaragua. Some U.S. ships, famously, "visited" Morocco to safely bring out a U.S. businessman captured and held for ransom by a local warlord.

A new configuration had developed, one in which the southern ports of the Americas traded with themselves and with North America and Europe, while the European colonial metropoles traded with their African colonies. The harbors, used as pieds-à-terre and increasingly for storage, were largely the same as in the previous period — often enhanced and recast as trade grew and security issues and loomed. Remarkably, no new ports of any great import had been established in the prewar era.

The "Canal Effect"

Although this self-contained, bifurcated south-north configuration could not last, it was destined to remain mostly in place until the opening of the Panama Canal in 1914, which followed the advent of the Suez Canal by 45 years. Each of these added a totally new dimension to the extant patterns. Such feats of engineering allowed for much shorter, safer routes than the ones undertaken via either

[6] The *Maine* was to mysteriously explode in Havana harbor in 1898, apparently a boiler malfunction and became the rallying cry of the Spanish-American War.

[7] The Monroe Doctrine stated that the United States would use its power to guarantee the legitimate claims of European countries in their disputes with Latin American ones, in order to discourage direct European military involvement. The Doctrine was long in the making and formally announced in 1904 by President Theodore Roosevelt, who had previously been first undersecretary of the Navy.

the Cape of Good Hope or Cape Horn, directly connecting the Atlantic, Indian, and Pacific Oceans. This translated into cheaper, quicker, and safer Asian-American and Asian-European trade. It is easy to understand why the opening of the Suez Canal immediately became vital for Europe-Asia navigation, particularly for the British Empire. It provided, at least until the outbreak of World War II, a fast and secure path to India. Suez also guaranteed the U.K. easy access to the goods, notably oil, flowing out of the Middle East, and the opportunity for diversification, which led to a decline in the worldwide cost of freight. While the "Panama effect" has often been alluded to, it is important not to underestimate the centrality of the Suez Canal. From the perspective of the South Atlantic's strategic position, these developments further diminished the region's relevance in the calculus of international commerce and security. The opening of the two canals considerably reduced the flows moving around the two southern capes. Even the two major conflicts that so painfully afflicted the 20th century did not spell many changes to the stillness the 19th century had brought to the southern portion of the Atlantic Basin. As Brazilian analyst Eduardo Italo Pesce stressed, in spite of a few surface operations in World War I and the more stout U-boat campaign that struck the South Atlantic in World War II, nothing much happened to trouble what was mostly a *doux commerce*, starting in the mid- to late 19th century with the end of slavery there (only in 1888, in the case of Brazil) (Pesce 2010).[8]

This peaceful trade was substantially revived by a huge increase in shipping capacity — both in numbers and in dimensions — of the oil tankers that began crossing the southern basin again when tanker bulk started to exceed the size of canal locks. The construction of ever larger ships, the very large crude carriers (VLCC), and even larger ultra-large crude carriers, began to make sense economically, and the need only intensified with the 1973 oil crisis. These massive bulk tankers became essential to the austral maritime economic system. True, they had the disadvantage of not being able to use the Suez Canal or many of the shallower ports in Europe and the United States, thus requiring either off-loading in a handful of harbors — as, for instance, in Marseille or Rotterdam

[8] To a great extent, this was precipitated the declaration of war by Brazil against Germany in 1942.

— or lightering (the offshore transfer of parts of their cargo). The southern routes of old returned to the international economic fore, recovering some of the importance they had held in the early modern era.

Emergence of a Growing Heterogeneity in the Southern Rim

To be sure, trade development in the Atlantic Basin was not homogeneous. Easily discernible asymmetries — different from the earlier ones — had radically reconfigured the basin: much denser trade flows persisted in the North than in the South Atlantic, coupled with smaller but steady "vertical" flows of merchandise connecting Europe and North America to South America and Africa. However, the predominance of trade in the North Atlantic remained, and indeed intensified through the use of the canal routes, to the detriment of the South Atlantic.

The two world wars had resulted in a diminution of the size and importance of the British Navy and its world-wide substitution by an ever stronger U.S. Navy. With Cold War bipolarity setting in, overall security dominance in an ever more vital Atlantic came to rest on the United States, just as it did in the Pacific. In spite of a handful of serious but largely inconsequential incidents, security was largely maintained in the ocean's southern basin in the 20th century, too, and that surely helped the rebirth of commercial fortunes in the South Atlantic seen in recent times. Stability was maintained in the face of largely unsuccessful Soviet attempts, from the 1950s and 1960s forward (peaking in the 1970s) to gain new footholds worldwide by turning the southern Atlantic Basin into a disputed area.

In the wider Atlantic Basin, new ports gained importance after the two World Wars. The period between the onset of World War II and the implosion of the Soviet Union spelled the heyday for commercial ports such as Bremerhaven, Brest, Glasgow, Hamburg, and New York/New Jersey, as well as military ones. These included the United Kingdom's Rosyth, near Edinburgh, and Faslane (where Britain's submarine fleet, including those equipped with ballistic nuclear missiles, were stationed), Murmansk, Halifax, Lajes (in Terceira, Azores), Havana, and the huge U.S. naval bases at Newport, New London, Norfolk, Jacksonville (Mayport), San Juan (Puerto Rico), Plymouth (England) and Rota (Spain). What

is perhaps most striking about these listings is their North Atlantic focus; to the south, no large ports appear to have played central economic or military roles during the Cold War period.

***Figure 3*–Some of the major North Atlantic commercial and military ports during the Cold War**

After the end of the Cold War, notwithstanding its comparative lack of critical infrastructure, it soon became clear that the South Atlantic was becoming more important once again. The end of a bipolar global confrontation did indeed bring the southern Atlantic reaches back onto the world stage, this time for structural and therefore more permanent reasons. Some were economic, some political-military, and some worked in tandem. Multiple Atlantic identity construction processes took shape. Such comparatively quick reorientation was only to be expected, given that the 1980s and 1990s saw new configurations of north-south trade and power emerging.

The Falklands War, the growth in importance of the Gulf of Guinea, and the rise of "Bolivarian" socialism in Central America and northern South America led to the creation of AFRICOM in 2008 and the reinstatement of a U.S. Fourth Fleet (with operational responsibilities in the Caribbean and Central and South America), which had been deactivated in 1950.

Huge hydrocarbon reserves were identified in the mid-to-late 20th century in Venezuela, offshore Brazil, under seas north of the Falklands, and near the South Georgia archipelago. On the ocean's

eastern rim, Angola, Nigeria, São Tomé e Príncipe, Equatorial Guinea, and Gabon also boasted real or expected oil deposits. Many of these are offshore and thus relatively easy to access and sometimes to secure, although also much harder to exploit. This is particularly true when they require deep sea drilling, which is strongly capital-intensive, demanding international investments and technological transfers, often at a high political price.

Oil and natural gas deposit findings were a game-changer, economically, politically, and security-wise. As could be expected, new ports have taken center stage since the end of the Cold War, and the underlying patterns of these changes are intrinsically interesting. While the harbors of earlier decades remained largely intact, commercial facilities grew in Antwerp and Rotterdam, and, in the south of the basin, in Buenos Aires, Santos, and Lagos largely because of the growing importance of the intensifying energy trade associated with them. Changes in military sea lanes have been less pronounced. Murmansk, on the Barents Sea close to the Norwegian border, has diminished in strategic significance, and Portsmouth in part replaced Faslane as home for the U.K. strategic submarine fleet, but no more considerable changes have as yet taken hold. Still, it is only reasonable and prudent to assume they will.

An incipient south-south axis, based on new trade and energy linkages, is altering the balance in the Atlantic Basin. When the Panama Canal doubles its capacity, something which is expected to happen around 2014, the connection between the Pacific and the Atlantic oceans will have undergone a second round of the re-engineering from which the northern part of the Atlantic Rim greatly benefited a century ago. The new twist is that the expanded canal will provide Brazil and other Southern players with a quicker route to China. China — and other countries — will gain from improved connections to South America. The effort may generate supplementary feats of engineering: witness China's 2011 proposal to build a "*canal seco*" (a dry canal), in a joint venture with Colombia, involving the building of a 791-kilometer (492-mile) railroad from the Pacific to the Atlantic, and a major upgrade of the Buenaventura port on the Pacific — all with state financing through the China Development Bank. We are thus in the midst of a major reconfiguration of the status quo.

It is worthwhile to dig further into the rationale for all these monumental infrastructure projects from the beginning, since the motives that guided the early efforts still apply. Renewed stirrings in the South Atlantic came early in the 20th century in the form of a typically Rooseveltian grand vision largely based on the writings of Alfred T. Mahan, the great theorist behind U.S. naval power: connecting the Atlantic to the Pacific in order to magnify the centrality of the New World. This same vision gave rise, in 1907, to President Theodore Roosevelt's startling decision to send the then newly built Great White Fleet around the globe.[9]

Later impulses for the strategic rebirth of the South Atlantic were more purely military in nature, arising first from naval activity in World War II and a generation later by the Falklands/Malvinas conflict in 1982. But in more recent times, the generative drive became fundamentally economic once again, mostly fueled by a South American development boom, by West African energy flows, and by cross-ocean narcotics trafficking. The second decade of the 21st century will likely witness yet more attempts to engage the South Atlantic regions to use its expanses in service of broader ambitions, mostly economic or political in character (sometimes both at once), few of whose consequences can easily be predicted.

With the benefit of hindsight, none of these newer developments should come as a surprise. In 1989–1991, as the bipolar world was fragmenting, 70 percent of global trade was carried by sea. This is now up to 90 percent and heading higher. The extent to which the growing importance of seaborne commerce boosted the South Atlantic Basin's stature amid a multipolar political order should not be minimized. It aids in understanding individual state and larger regional policies and their often contentious and always shifting postures. Moreover, in this part of the world, as in others, energy security considerations are never far from the surface.

[9] This was carried out both as a deterrent to rising Japanese naval power and as an early expression of the fast-growing US. force projection capabilities — a move as welcomed by Russia and China then as it was applauded by Germany, France, and an impressed, if cautious, Great Britain.

Wider Atlantic Maritime Transport Flow Changes and Their Structural Basis

How can one decipher and interpret all these changes? What lies behind them? It is surely to be expected that in the 21st century, wider Atlantic trade patterns will change yet again, influenced by at least six major, intertwined developments. So many systemic pressures are bound to produce geopolitical consequences of some weight in a region that is already a patchwork of metastasizing security uncertainties.

First, aggregate volumes of trade are changing rapidly, as fast-emerging economies such as China, India, and Brazil increase their shares of world imports of raw materials and world exports of finished goods, frequently choosing routes involving the South Atlantic. Moreover, the U.S. and European push for diversification of their sources of hydrocarbons has been making the Gulf of Guinea ever more critically significant.

Second, and closely connected to the first point, rising fuel costs and improving technologies are leading to large increases in ship size and to slower steaming speeds, which lowers commercial freight rates but may augment security risks. Larger ships are in one sense less vulnerable to pirate attacks because of the height of their freeboard, yet, because they tend to be slower, they are in another respect more vulnerable. However, all that may change soon, for both better and worse, with new propulsion technology or power sources, and as new tactics for effectively boarding commercial ships become mainstream. Larger tankers also make potentially more calamitous oil spills (against which sturdier double hulls offer some protection).

Third — and the implications of this are yet to be seen — the opening of an expanded Panama Canal in 2014 will provide opportunities for ships larger than the Panamax size of the past. But the enlargement of its shipping capacity will not allow warships to use it as a transit alternative.[10] Neither are the largest commercial ships able to use the canal: the new Maersk Triple-E container ships (the very largest tankers), the Valemax iron ore ships (namely, those using the ever more important Brazil-China route), and the

[10] Certainly not aircraft carriers, which will still be compelled to go via the Cape Horn, the Cape of Good Hope, or, perhaps eventually, one of the Arctic routes.

largest cruise ships. Most likely, as a result, a new Panamax size will develop, which will slow down, or even put a stop to, the growth in ship dimensions.

Fourth, drug trafficking, piracy, political instability, and regional arms races are on the rise to the south of NATO's traditional area of jurisdiction in the basin, as new opportunities become available within the framework of the South Atlantic's newfound geopolitical significance. The reopening of territorial claims in this southern section of the Atlantic is a case in point, spurred by the discovery of new commercially profitable resources. These are becoming a source of disputes further afield, as in and around the Falklands, South Georgia, and perhaps even the South Sandwich Islands. Several cases, actual or looming in the near future, augur trouble on both African and Caribbean/western Atlantic shores, as in the case of border conflict between Venezuela and Guyana, and among Central American states. This is surely of prime importance among the panoply of causes that are relentlessly leading to the de facto securitization of the Atlantic Basin's austral region. More states are looking at the region from the perspective of security policy and security-related challenges.

Fifth, it is increasingly clear that the opening up of the Arctic Ocean to regular shipping will eventually provide much shorter alternative routes from East Asia to and from Eastern North America and Europe. Until a couple of decades ago, the frozen waters above Alaska, Canada, and Greenland imprisoned ships in their icy bite, but soon the choppy waters of the Northern Sea Route around Russia and Norway and the Northwest Passage skirting Alaska and threading through Canada's northernmost islands may allow ever easier navigation in the summer months along routes much shorter than before between Pacific and Atlantic shores. Estimates are that shipping distances will be reduced, from 9,000 to 7,000 nautical miles for the American Northwestern Passage and from 11,200 to 6,500 nautical miles for the Eurasian Northern Passage. The potential gains are obvious. But so far, only icebreakers can really use these routes, and for short periods of the year at that. Furthermore, these routes are not immune to security problems. Such difficulties are compounded by the sorry fact that there are, at present, no national or international structures

designed to hedge the risks incurred in the opening of new navigable areas — not even at the basic level of search and rescue.

The same is true for the Northern Sea Route, connecting the Bering Straits and Alaska to northern Norway in the Barents Sea and from there the northern Atlantic. To travel by sea from Western Europe to East Asia today usually requires a trip through the Suez Canal. As the Northern Sea Route opens, the trip to the coast of China is on average cut by a third; what was once a 15-day journey is now reduced to a mere 10. The implications are huge. The U.S. government estimates that cargo transport via the Northern Sea Route will increase from 1.8 million tons in 2010 to 64 million tons by as soon as 2020, as ice cover declines. To put it another way, in 2008, about 200 ships transited the Bering Sea; in 2011, with increased accessibility and flimsier ice, numbers were much higher. An anticipated 660 vessels will traverse the Bering in 2012.

Finally, security machinations will likely influence Atlantic trade patterns. On that front, much is likely to change, particularly with the substantial transformations in NATO's northern Atlantic operational arrangements, which took place not too long after NATO's first joint military exercises in Africa, the 2006 Operation Steadfast Jaguar in Cape Verde, seen as the "choke point" archipelago, between the northern and southern reaches of the Atlantic. The exercise was notably far from a one-shot affair since NATO has been following it up with periodic joint exercises on the continent.

Strong signs that securitization is already taking place may be read in the 2008 creation of a U.S. command devoted to Africa, AFRICOM,[11] and, in the same year, the rebirth of the U.S. Fourth Fleet.[12] Announced with fanfare, the emergence of AFRICOM and the Fourth Fleet for military projection southward still resonates strongly in the region. Atypically for a U.S. central command charged with targeting security and developmental issues simultaneously, AFRICOM had a boom year in 2011, as it

[11] AFRICOM covers the entire continent with the sole exception of Egypt, which remained in CENTCOM.

[12] With an area of jurisdiction mirroring that of the Europe-centered U.S. Sixth Fleet, the Fourth Fleet, an on-call force, operates on and along the Central and South American coasts, including what the Brazilian call their "Blue Amazon." The Sixth Fleet runs all the way down the eastern Atlantic, from the Arctic to Antarctic shores.

helped orchestrate the logistics of the UN-mandated intervention in Libya. It is revealing, in the wake of the Libya intervention, to read the much-changed "Commander's Intent" document produced immediately after U.S. forces working through AFRICOM "led from behind" their allies in the Libyan campaign: the objectives and targets set are mostly now directly related to security and defense and so no longer really dissimilar from those of other U.S. commands (U.S. Africa Command 2011).[13]

Charting Current Developments in the "Other Atlantic"

With these constraints in mind, and within the context of a wider Atlantic envisaged as permanently interconnected with a much larger playing field, it is instructive to delve into how the South Atlantic became more of a geopolitical fulcrum in its own right. Many of the changes that took place are linked to the new regional and local identities that formed. If the stage setting was for a long time merely a "conjunctural" one, in the sense that it was dependent always on external forces and interests, it has become clear that more regional "structural" themes and issues have now come into play. Matters originating in the South Atlantic Basin per se, rather than simply resulting from the localized effects of global phenomena, now play a central role.

Apart from a sizable leap in intra-Asian maritime trade flows between the Greater Middle East, India, China, and the ASEAN countries — largely resulting from the newfound appetite of India, China, and Southeast Asia for energy and mineral resources — the most explosive growth in the post–Cold War world sea trade has occurred between the Atlantic and the Pacific basins. As a result, new port facilities boomed throughout the Atlantic Basin, mostly along the infrastructure-poor southern shores, with some benefiting from the U.S. policy, initiated in the 1990s, of energy diversification away from an increasingly restive and volatile Middle East.

The numbers speak for themselves: the U.S. imports around 60 percent of the oil it consumes, and the Gulf of Guinea hydrocarbon reserves are the second-biggest in the world — to which we should

[13] *U.S. Africa Command — Commander's Intent 2011* was publicly released on January 19, 2011. Contrary to what was earlier the case, "development" and "African ownership" are firmly relegated to the backseat.

add the as yet not entirely determined volume of the reserves further offshore, across the country's coastal maritime expanse. At the turn of the present decade, the Gulf of Guinea surpassed the Arabian/Persian Gulf as the biggest supplier of U.S. energy needs, representing 15 percent of U.S. imports. A common estimate is that by 2015, 25 percent will come from there. If trends are maintained — and there is much to suggest they will — it might well be the case that in six years or so, when one mentions "the Gulf," the listener presumes it is a reference to the Gulf of Guinea and not to the Arabian/Persian one.

How will Brazil, which recently discovered its own offshore oil deposits under a thick layer of salt, help the trade-induced renaissance of the South Atlantic? On January 2, 2012, Brazilian Development, Industry, and Trade Vice-Minister Alessandro Teixeira held a press conference in which he announced that in 2011, Brazil exported goods — mostly iron ore, soybeans, and crude oil — worth a grand total of US$77.1 billion to China, making the Asian giant Brazil's main trading partner. In 2011, bilateral trade between Brazil and the United States, its number two trading partner, reached $60.1 billion, while trade with Argentina, its number three partner, rose to $39.6 billion. Echoing most analysts, Teixeira used the opportunity of the press conference to announce that, in 2012, Brazil's trade volume is expected to hit new highs — though he also warned that "continued turmoil in Europe" may have an adverse impact on China, undermining its demands for Brazilian commodities. Although this is an ongoing concern, Brazil actually has numerous alternative paths to development — and the rate of its trade growth has been impressive in the past few years. In 2010, for example, Brazil's total trade volume was $387.4 billion.

Prospects are good: Brazil is a member of numerous economic organizations, including the Union of South American Nations (UNASUL, or, in Spanish, UNASUR), the WTO, Mercosul (Mercosur in Spanish-speaking South America), the G20, and the Cairns Group (an association of agricultural commodity-exporting nations), giving the country many natural trading partners. Some 60 percent of its total exports is composed of manufactured and semi-manufactured goods. Given that trade volumes create transport needs, if Brazilian trade continues to

expand steadily for the next decade or two, shipping volumes will boom and port capacities will have to shoot up accordingly — which, as shall be seen below, is precisely what Brasília is gearing up for. The continued growth of northern transatlantic trade flows, in value terms, may actually mask declining trade volumes, as the components of trade change — so it is not unthinkable that Brazilian shipping volumes rapidly approach those of its North Atlantic peers.

A New Chinese Presence?

Structural changes normally provoke discomfort. Upon entering the Atlantic Basin from the east in November 2010, so as to celebrate ten years of friendly relations with post-apartheid South Africa, the crews of two incoming Chinese vessels — the missile carrier *Shenzhen* and its companion warship — must surely have felt the sudden turbulence that always marks conflicting ocean currents. As both ships passed the Cape of Good Hope and advanced to Cape Town before turning back, their visit publicly announced that, a decade into the 21st century, the South Atlantic had encountered its largest infusion of foreign battleships since the end of World War II.

China, to be sure, does a great deal more on both shores of the South Atlantic than simply send in token warships. It sends people and invests ever more in the region, all the while buying land, extracting mineral and other resources, and, in general terms, trying energetically to establish footholds on both sides of the rim. As a rule, it does all of this with far fewer conditionalities attached (except for the acceptance of work carried out by companies heavily subsidized by the Chinese government) than the Europeans, particularly the EU. Elites and the public in Africa and Latin America are well aware that this is the case. Coming as it did on the back of marked new Chinese economic interest in Africa and Latin America, the 2010 South Africa visit rang bells, and added to a complexity that, if not unrecognized, is at least not fully understood or taken into account politically. That is most certainly the view taken by quite a few of the regional and local officials, businesspeople, and institutions, as well as by global firms. The growth of certain transnational trends — such as the discovery of a huge economic potential (mostly in the form of oil and natural gas

and other valuable and strategic mineral deposits) and with it a new and often unexpected bargaining capacity and associated security problems are easy to understand for local players — or so they are predisposed to think.

New Non-State Actors in West Africa

Local and global concerns related to the newly enhanced interconnectedness are also linked to fears arising from the emergence of powerful, if often brittle, coastal states. Concerns also relate to the appearance of increasingly active and heavily armed sociopolitical movements, even revolutionary outfits intent on exporting their political models as far and wide as they can, and groups devoted to activities like drug trafficking, terrorism, piracy. This is a recipe for disaster, as competition for the bounties associated with mineral extraction and other forms of economic exploitation pushes many countries with only fledgling state structures and capacities into an abyss of economic monoculture (overdependence on a single product), patrimonial temptations, internal strife, and dangerous exposure to external manipulations of all sorts, squandering resources rather than using them to build up productive assets for their people's future.

The Gulf of Guinea is a case in point. High among the examples of how strife can hamstring resource-rich countries is Boko Haram — often referred to as "Nigeria's Taliban." The Islamist movement first appeared in northern Nigeria in 2002, inspired by a radical Muslim cleric, Mohammad Yusuf, who was killed in due course in 2009. The loosely structured Boko Haram (which roughly translates as "Western learning is a sin") network came onto international radar screens in 2008, when it orchestrated a series of attacks on hundreds of Christians in Jos. On June 16, 2011, a small cell attacked a police station in Abuja, the Nigerian capital. The following August 26, technically skilled Boko Haram militants killed 20 civilians in an attack on a UN building. In November, a swelling wave of attacks spread over northeastern Nigeria, slaughtering some 100 people. Pointedly symbolic, on Christmas Day 2011, about 40 were killed in a Catholic church. Almost every week since, churches have been targets of Boko Haram throughout the country. In 2012, the violent attacks have reached fresh peaks,

with relentless hits on prisons, marketplaces, and mobile phone towers in rapid sequence.

As is often the case with such movement Boko Haram has been changing operationally in spurts: it went from machetes to roadside improvised explosive devices, a leap that suggests some of its operatives have been linking up with al-Qaeda in the Islamic Maghreb (AQIM) and Somalia's al-Shabab Muslim militants. Indeed, Abdelmalek Droukdel, one of the AQIM's leaders in 2010 promised Boko Haram support in "weapons, equipment, men, and training." These links do not bode well for the future, to say the least. In these and many other cases, targets are chosen carefully so as to inflict maximum damage to state or Western interests. By and large, Boko Haram has not reached the oil-rich coast yet, though perhaps this is only a matter of time.

Other threats, though, have been unleashed on coastal areas. Armed attacks at sea, and banditry in the Niger Delta, piracy on the Togolese and Beninese coasts, and still-smoldering civil war in the Ivory Coast turn the Gulf of Guinea regional portrait into fuzzy instability, with poor prospects for a restoration to even a modicum of orderliness. So it seems as if action-reaction patterns are to be expected, in spirals of violence that are increasingly difficult to contain. It should be noted, in this context, that São Tomé e Príncipe is ideally positioned to observe and eventually help control events in the greater Gulf.

Violence-prone dynamics can become even more difficult to both predict and control when they directly or indirectly involve states. Even when states limit themselves to harsh words and (at least overtly) mostly symbolic forms of political action, they often roil the waters in unforeseeable manners. In Central and northern South America, a large number of states have been veering towards a virulent form of anti-Western rhetoric — and in particular an anti-U.S. one, something the Obama administration has not really managed to change. The rise of "Bolivarian" socialism — a transnational movement that Peruvian politician and Nobel Prize winner Mario Vargas Llosa famously classed as "a regressive Utopia" — provides a good illustration of the direct and indirect destabilizing effects of state-generated agitation.

U.S./Cuba Relations and Bolivarian Socialism

Friction between the United States and Cuba has been a feature of the Western Hemisphere strategic environment since 1959, and has been at times a mainstay of Cold War disquiet close to the U.S. homeland. Fidel Castro's militant foreign policy and his party's alliance with the Soviet Union led to Cuban involvement in military operations on both sides of the Atlantic Basin, most notably in West Africa in the 1970s and early 1980s. In the mid-1980s Cuba had 50,000 troops in Angola alone, side by side (although not always seeing eye-to-eye) with Moscow's 5,000 "military counselors" and scores of other Warsaw Pact military and political specialists. The breakup of the Soviet Union, helped along by what Paul Kennedy called "imperial overstretch," meant the end of Soviet annual subsidies to Cuba, and of Cuba's role as a Soviet proxy in regional Atlantic conflicts.

The implosion of the USSR did ease U.S.-Cuban frictions. But it did not prevent them entirely. The confrontation with Washington (and sometimes with the European Union, although at a much greater remove) over competing models for socio-political and economic order and human rights has persisted. President Raúl Castro of Cuba has shown the world he is still ready at least to tease the West with his unshakable alliance with Venezuelan President Hugo Chávez and Russia's Vladimir Putin. In this, he is following the tradition of his brother Fidel, who, as the formidable U.S. Fourth Fleet entered the South Atlantic in mid-2008 for the first time since 1950, left his hospital room for a nationally broadcast interview about the horrors of what he saw as a renewed "Yankee threat." He was not alone in seeing it this way.

In December 2008, President Chávez had his revamped "Armada Bolivariana de Venezuela" engage in not particularly credible joint military exercises with a fleet Moscow sent in for the purpose — barely four months after Russia's invasion of Georgia. Earlier, when the Fourth Fleet was reactivated, he loudly warned that his brand new Russian-bought Sukhoi SU-30 fighter planes would "promptly sink" U.S. ships should they enter Venezuelan territorial waters or attempt any other acts of aggression against Caracas' sovereignty. At stake was little more than posturing. But that, in itself, was new.

In fact, the Fourth Fleet has no standing forces; the ships the naval command requires are mobilized on demand. A few such vessels routinely deploy to the fleet's area of responsibility, during which time they are under the operational control of the Fourth Fleet commander. Significantly, many of the ships are assault craft. And the fact that its first commander, Rear Admiral Joseph Kernan, previously head of the Naval Special Warfare Command and a SEAL, was put in charge of fleet operations did cause a stir and outcries in Central and South America, as it was seen as a sign of aggressive intentions. Combined with the fact that two large assault craft, the *USS Kearsarge* and the *USS Boxer*, figured prominently in the Fourth Fleet's 2008 tour of duty in southern waters, speculation arose, predictably, as to Washington's real intentions. With such fears, curiously, came language of "resistance" that many felt to be an anachronism. It appeared to come straight from the Cold War era, during which the leaders who used that language were raised.

Darkening Horizons

There is undoubtedly a strong tendency for Latin American leaders to express wariness of a U.S.-led "securitization" of relations in the South Atlantic, (Lesser et al. 2012, 27) often including Great Britain as a preferential partner of the United States. However, time and again, certain Latin American states engage in similar behavior. Sub regional arms races rage, for instance, between Venezuela and Colombia, as each country strives for competing ends. This is worth following carefully, not only because Colombia and Venezuela today are so sharply divided by political outlook but also because the militarization of their conflicts inevitably generates insecurity for their neighbors.

The portentous diatribes that loudly resonated throughout the Caribbean and Latin America in 2008 can be viewed as part of a succession that began during the episodic sea clashes in 1942 and 1943, as German and a few Italian Axis submarines came to blows with Allied British and Brazilian mostly surface navies, and intensified with the Malvinas/Falklands conflict of 1982. The new, contentious realities had apparently come to stay, effectively eclipsing an older image, one that had lasted for the best part of two centuries — that of relatively tranquil and uncomplicated austral Atlantic sea lanes. The new paradigm has come to be felt more and

more as the inexorable dawn of an upcoming perpetual *Sturm und Drang* of ever more darkened horizons along the rim of the South Atlantic.

Interestingly, the South Atlantic's relationships with Europe have a different cast than those with the United States. Although the European Union has for decades ranked highly among donors to Africa, the EU does not have a specific policy for the continent (contrary to what is the case for the Arctic or the Caucasus); nothing substantive came out of the EU-Africa Summit of December 7-9, 2007. Some of its member states do have Africa policies — France, Portugal, Spain, the United Kingdom — but these are naturally designed as bilateral. The same applies to Central and South America. Certainly, EU policemen and military regularly get sent to both sides of the South Atlantic, from Congo to the Ivory Coast, Angola, Haiti, or Honduras, but this is done in case-by-case fashion. Many see the region as asymmetrical, with resources streaming south to north and security, including peacekeeping and peace-enforcement missions and weapons sales, going in the opposite direction. The implication is that the EU acts with duplicity when it professes the use of "soft power" in the "political south."

Mapping Systemic Pressures and Future Prospects: The Four Main Security Sub-Regions of the South Atlantic

Can one usefully break the South Atlantic up into distinct, if interacting, sub regions, with differing (though intermingled and frequently complementary) security properties? It appears that this is possible, keeping in mind that it is done only for the analytical utility of the exercise, since security affairs are far too intertwined for neat divisions across issues to reflect reality's complexities.

The Northern Horizon

In the northern stretches of the South Atlantic, non-state groups and individuals — ranging from radical political movements bent on asymmetrical clashes to others more concerned with profiteering and tapping an international demand for narcotics — can create regional havoc. On the opposing Caribbean/Central American and African shores, the picture is not greatly different.

Indeed, as in times past, there have been attempts to export in either direction, eastward or westward, forms of political or religious defiance and instability, on top of mounting challenges to peace and governance related to broadening markets for illegal drugs and weapons. All the tumult has cohabited with cyclical political turmoil, which has been for some decades the area of main concern for successive U.S. administrations.

The Western Rim

South of this horizontal belt of insecurity, two vertical bands can readily be identified, western and eastern. The properties they exhibit are very dissimilar, as the eastern New World shore consists mainly of a very large and fairly stable state, Brazil, a peaceful Uruguay, and a relatively placid Argentina.

Larger and stronger than all surrounding countries put together, Brazil clearly wants to lead. It has, in July 2005 and December 2008, produced legally binding "constitutional" strategic documents (the "Política de Defesa Nacional,"and the "Estratégia Nacional de Defesa") to stress precisely that. Interestingly, for Brasília, this does not mean only the rapid advancement of regional forms of integration (UNASUL, by and large modeled according to a mix of the EU and the UN templates, although not an easy marriage, is the latest and most ambitious), but also the exclusion of any foreign military presence, namely the United States and NATO, from the region. Brazilian analysts often project the entire South Atlantic, arguably up to and including the African shores, as its intended exclusionary zone. After all, in trumpeting the claim that by 2050, Brazil will have domestically produced 47 nuclear-powered submarines, the country's security policymakers are explicit that these are intended for purposes of "denial of navigation" to potential adversaries wanting to penetrate what Brazil considers to be its maritime domain.

One should, however, be aware that much of this stern rhetoric is — perhaps like the more radical (and apparently less forgiving) "Bolivarian" proclamations further north — little more than political oratory designed for domestic and regional consumption.

Let us take one example. Former Brazilian Defense Minister Nelson Jobim was sharply critical during a conference on

September 10, 2010 at the official National Institute of Defense in Portugal of any U.S. military presence in the South Atlantic as "inopportune" and "inadequate." He reiterated this point a week or so later in Washington to U.S. Homeland Security Secretary Janet Napolitano and in public talks he gave at Johns Hopkins and George Washington Universities. That very week, Jobim addressed unusually harsh and unsympathetic words about what he termed "the NATO question" in talks with Arturo Valenzuela, the U.S. assistant secretary of state for Western Hemisphere affairs. Not much later, on November 3, 2010, at the Tenth Conferência do Forte de Copacabana organized by Konrad Adenauer Stiftung (Foundation)on his home turf in Rio de Janeiro, he flatly refused "any form of shared sovereignty of the Atlantic by Brazil," either "by the U.S. or by NATO." Nevertheless, a mere week earlier in Natal, as he prepared to host the "largest military exercises in the history of the southern hemisphere" — CRUZEX V, which lasted from October 28 to November 20, 2010 — he warmly welcomed the large group of F-16 "Fighting Falcon" pilots of the 140th Fighter Wing, arriving from Colorado in response to the Brazilian government's invitation for the United States to participate, along with Chile, Uruguay, Argentina, and France. The contradiction could not be more stark.

The various air forces present at CRUZEX V used NATO's modus operandi for the almost month-long series of war games, and semi-official Brazilian Air Force blogs raved that "since no South American country is a NATO member, this constitutes an excellent opportunity for us." For the first time, Venezuela, which had keenly participated in the four earlier CRUZEX exercises, opted out in protest. The response, in dozens of YouTube videos about the historic exercises posted by Brazilian Air Force officers, was the taunt, "Hombre, porque no te callas?" (Man, why don't you shut up?)[14] — a dig by King Juan Carlos of Spain at President Chávez a couple of years earlier. Against this background, one would be hard put to take entirely at face value the Brazilian minister's comments. If the reality of the security relationship is at variance with the political rhetoric, that is because their ends differ.

[14] Juan Carlos's explosion took place at a formal meeting during which Chávez persisted in garrulous criticisms of the United States and the West in general. The occasion was the 17th Ibero-American Summit at Santiago de Chile on November 10, 2007.

The Eastern Rim

The counterpart eastern vertical security band extends down the African shoreline. In contrast to the western rim, West Africa does not hold any states sufficiently large and stable that they might credibly aspire to regional, much less continental, leadership. Nigeria is certainly larger (richer as well as more populous) than all of its neighbors, but it is severely fractious and dysfunctional. It is surrounded by countries it dwarfs but over whom it cannot expect to have any control.

Further south along the African coastline lie other sizable states, namely the Democratic Republic of the Congo, Angola, Namibia, and South Africa. Of these, only South Africa and Angola, both with substantial militarily might and mineral wealth and both potential economic powerhouses, can project substantial force. Angola has airlifted armored personnel carriers into rough Central African theaters of war in the past decade. As for South Africa, the *SAS Drakensberg*, a large support and refueling navy vessel, was sent to the distant Ivory Coast in mid-January 2011, as electoral troubles brewed there. But, unlike Nigeria and many of the small surrounding states (like Guinea-Bissau or Senegal), neither Angola nor South Africa seems to aim for programmatic exclusion of external armed powers[15] — much less do they harbor any ambitions toward implementing forms of regional integration that they would hope to control with the intention of shutting non-African powers out of the neighborhood.

On the contrary, they seem more inclined to invite in a variety of external powers, tacitly hoping that their clustering will lead them to balance each other. The two have established preferential ties with China, the United States, Brazil, the United Kingdom, Germany, and, to a lesser extent, France. This propensity means a heightening of complexity, which makes the identification and implementation of security solutions harder since it exponentially ups the ante.

[15] The South African Navy joined its first-ever joint exercises with the Atlantic Alliance, when in 2007 NATO's SNMG1 (Standing NATO Response Force Maritime Group 1), then circumnavigating Africa counterclockwise, visited numerous countries and held joint deployments and exercises with their navies. By 2009, South Africa's reactions to SNMG1 were notably cooler.

The Southern Fringe

The fourth and final identifiable security region is again a horizontal band, lying in the southernmost reaches of the Atlantic Basin. It runs from Patagonia and the Falklands/Malvinas through South Georgia (where the British have maintained a standing military force since the 1982 Falklands War) and further east to the tip of Africa and south to Antarctica. The main British military facilities in the region are stationed at the Royal Air Force Mount Pleasant base, in East Falkland, and at the adjacent Mare Harbour Naval Base. This is a far cry from the situation during the war in 1982, when, until the Royal Navy arrived, the British were forced to use Vulcan bombers stationed 7,500 kilometers (4,660 miles) away, at Ascension Island, near the Equator, to try to dislodge Argentine positions after that country's occupation of the archipelago.

President Cristina Fernández de Kirchner's February 2012 reiteration of Argentina's historical claims to the Falklands/Malvinas is perhaps part and parcel of the political rhetoric churned out for domestic consumption. Brazil's president, Dilma Rousseff, was immediately supportive of Buenos Aires's stance, although, on this matter and others, the alignment of the two Southern Cone giants is less than clear-cut. What appears plainer is that Argentina is endangering the support it has garnered in recent years by appearing more and more politically statist, both in its protests regarding the Falklands and in its renationalization in April 2012 of the large oil company Yacimientos Petrolíferos Fiscales (YPF). Despite overwhelming domestic support, the YPF takeover was roundly criticized by Brazil and by Spain, whose oil firm Repsol had purchased a majority stake in YPF during Carlos Menem's tenure as Argentine president. It is difficult to imagine that Argentina can continue to depend on the vocal support of the Iberian-American countries, in part given Spain's open annoyance over the YPF renationalization. This level of pressure cannot be sustained — either internally or externally. Too many other pressing regional and local matters are on the table for the opening of an old wound.

Strategically, during the Cold War, there was continuing concern about keeping the Cape Horn route available for free passage. This remains the case, since, among other considerations, U.S. aircraft carriers cannot pass through the Panama Canal. The Falkland

Islands command the eastern approaches to the Drake Passage, the expanse of water separating South America from the Antarctic, another of Admiral Mahan's "choke points." The Falklands are thus a privileged position from which to patrol and observe the waters and skies around the passage. Nevertheless, the Drake Passage is wide, and the Falklands are approximately 700 miles away. So, in purely geographical terms, the islands are not better placed than Punta Arenas (Chile) or Ushuaia (Argentina), both located on Tierra del Fuego and ice-free year round, for the purpose of controlling the passage. It would be possible to station large air forces at the tip of the Southern Cone, although this would involve an enormous effort in infrastructure and materiel by any military power, regional or not. The major operational advantage of the Falklands, from a strictly North Atlantic military point of view, is that it is the United Kingdom, a modern, well-equipped power, that holds them. As such, it ensures that the connection between South Pacific and South Atlantic is, in security terms, risk-free, and it is still in a position to check other powers, regional or extra-regional, should they adopt unsettling postures. Of course, one must be careful here. Should Argentina or Chile reach a degree of military competence and proficiency comparable to that of the United Kingdom (by means, say, of a "Chinese-styledefeat-through-exclusion-via-threat-of-swarms-of-ship-killer-missiles"), the Drake Passage would not be easily defensible from the Falklands. Whatever the strength of these arguments, influential military analysts like John Keegan regularly list this region as one ripe for potential future conflicts. So, although Argentine and Brazilian motives may be primarily rhetorical, other aims can hardly be excluded.

This southernmost horizontal security region runs all the way east to the Indian Ocean and southward to Antarctica, where there is a sizable U.S. military facility, the largest of such polar continent installations, McMurdo Station. While the 1961 Antarctic Treaty limits military activity in Antarctica, military personnel and equipment may be used for scientific research or any other peaceful purposes such as for delivering supplies. Apart from scientific pursuits, countries' interests in Antarctica rest on two pillars, economic and strategic. Antarctica has huge potential value, in terms of mineral and oil and gas resources, as well as in its krill and other seafood stocks, which need to be harvested sustainably.

It is estimated that the biomass of the krill population is between 100 million and 500 million metric tons. North Korea and Japan reportedly violate the mandatory 4 million-ton annual allowance for national fisheries, and, if the situation persists, it could aggravate of an already difficult debate in the region, raising the question of how and by whom fisheries regulation can be enforced.

It seems clear, though, that geo-strategic considerations that are as much positional as economic in nature should not be discounted. From this perspective, a few examples may be raised, even if they are not to be as hotly contested in sovereignty terms as the Falklands/Malvinas, the South Georgia Islands, or the South Sandwich archipelago.

France is recognized as having full sovereignty over the widely spread Indian Ocean territory of the French Southern and Antarctic Lands, consisting of the Kerguelen Islands, St. Paul and Amsterdam Islands, and the Crozet Islands.[16] Since February 1930, Norway has held Bouvet Island, a small, uninhabited island 2,525 kilometers (1,569 miles) south-southwest of South Africa, as a "dependent territory." And the United Kingdom holds a recognized claim, as a dependency of Tristan da Cunha and part of the British overseas territory of Saint Helena, Ascension and Tristan da Cunha, to the remote Gough Island, where the South African National Antarctic Programme has maintained a manned weather station since 1956. Gough Island lies midway across our horizontal southern band, about 400 kilometers (249 miles) southeast of the other islands in the Tristan da Cunha group, 2,700 kilometers (1,678 miles) from Cape Town, and more than 3,200 kilometers (1,988 miles) from the nearest point on South America. Critically, these clusters of strategically located islands are not subject to the Antarctic Treaty.

Whoever holds these small but strategically situated archipelagos, sprinkled as they are along the southernmost Atlantic rim, holds a measure of control of sea circulation, as well as a grasp on any economic activities undertaken in their surrounding expanses.

[16] This list does not include Adélie Land (*Terre Adélie*), the French claim on a wedge of eastern Antarctica (due south of Australia), where French sovereignty is not recognized internationally but where France is effectively present. The large U.S. -held McMurdo Station, on the Ross Ice Shelf, was established in 1956. In most if not all of these locations, there are small populations of military personnel, civilian officials, scientific researchers, and their support staff.

Large states with a political or economic strategic stake in these southern seas have begun to take note. Here, as in the other sectors of the South Atlantic, the race for resources and geo-strategic claims are generating diplomatic arm wrestling and arms races of varying intensity. This points to the need for new collective security frameworks.

In 2008, Brazil bought in Germany — and then had heavily refitted in the United States — the large *Almirante Maximiano*, as a new dual-use "support vessel for polar research," devoted to "defending Brazilian interests in Antarctica." In late November 2010, as earlier noted, the antimissile war vessel *Shenzhen*, together with a companion Chinese warship, visited Durban, in South Africa, then passed the Cape of Good Hope, so as to join in the celebrations of "a decade of goodwill and close relationships" that the end of apartheid had rendered possible, the first time Chinese warships had ever entered the Atlantic Basin. Sales of French and German nuclear-powered (most often hybrid) submarines and last-generation fighter aircraft, mostly to South Africa and Brazil but also to many other regional players, are easily beating all historical records. Political-diplomatic gambits connected to the ongoing crises in the Middle East and UN Security Council voting on new rounds of sanctions to Iran have given rise to detailed and apparently credible German reports, supposedly emanating from Berlin's Ministry of Defense, that the South Atlantic may not remain nuclear-free for much longer[17] (See, for instance, Rühle, 2010). If any country were to make such a move, it would be in contravention of what is stipulated in the 1967 Treaty of Tlatelolco, signed by virtually all states and territories in the region, which proscribes nuclear weapons "in Latin America and the Caribbean."

Ports and Maritime Security in the South

So what is likely to unfold against such a churning background? To speak with certainty is well-nigh impossible when examining the likely changes in security and the hierarchy of Atlantic ports over the next several years. But some educated guesswork on the

[17] Hans Rühle, who wrote the report cited here, was director-general for national defense policy at the German Ministry of Defense until a few years ago. On June 9, 2010, Brazil and Turkey voted against the fourth round of sanctions imposed on Iran, as non-permanent members of the Security Council, while 12 UN member states voted for the round, including Russia and China. Lebanon abstained.

implications of these developments for countries, as well as the regional political and economic associations and the military coalitions to which they belong (and any new "conglomerates" of this sort) is feasible, in view of existing trends and taking into account the likelihood of galloping transformations affecting the South Atlantic in the near future.

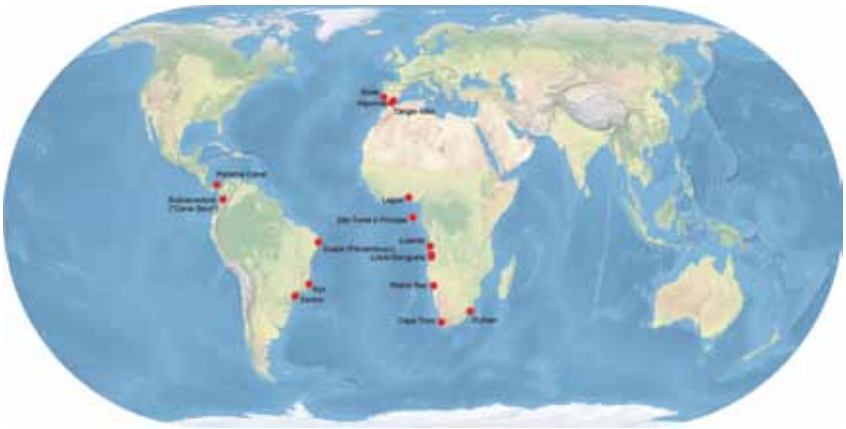
Western Behemoths...

Ports such as the new ones that emerged to service Atlantic Basin trade patterns in the past couple of decades will almost surely retain their centrality, perhaps even enhancing it. But other, still newer ones are coming to the fore. These may well include Algeciras, in Spain, the largely underused Sines (whose economic justification seems to many debatable) in Portugal, the gigantic Tanger-Med project, in Morocco, a much-needed alternative to Lagos in Nigeria, the growth of the extant facilities — severely underused and widely overlooked — of Luanda or Lobito in Angola, the small but strategically essential deep-sea harbor at Walvis Bay in Namibia, and Santos (the port for São Paulo), the Suape Industrial Port Complex near Recife (the fastest-growing port in Brazil), and the massive Açu industrial and port complex in the northern part of Rio de Janeiro state, all in Brazil.

Açu merits some detailed description. Construction of the90 square kilometer (35 square mile) complex at São João da Barra began in 2007 and it is likely to be completed in 2013. Eike Batista and his conglomerate Grupo EBX are the major investors. It will be the largest shipyard in the Americas, truly pharaonic in range. In mid-March 2012, OSX Brasil, the offshore shipbuilding and maritime equipment/services arm of Grupo EBX, won a $732 million order from Kingfish do Brasil Navegação to build 11 medium-range tanker ships at Açu. Fifty thousand jobs will be created there. Açu will include large oil, minerals, and container terminals, a refinery, ironworks, enormous metallo-mechanical facilities, and yards for supporting offshore industries, as well as a large fishing harbor, a complex of thermoelectric generators, and a plethora of other industrial installations. It will be able to receive the most massive ultra-large crude carriers, as it has a depth of 21 meters (69 feet), soon to be amplified to 25 meters (82 feet). The complex is being built so as to be capable of moving 350 million

metric tons of goods per year when it opens. Enterprises that want to be present at Açu can move in and out via two major railroad connections, the Nova Linha Mineira, connecting it to the state of Minas Gerais, and the Linha Litorânea, which follows the coastline; the railroads already exist, but they are being upgraded so as to accommodate the increase in freight capacity. Two highway routes are also available, linking Açu to the entire network (which is not first-class but is serviceable for the main destinations), and a novel logistical corridor 400 meters (1,312 feet) wide and 43 kilometers (27 miles) long is being built to tie Açu into these networks. The corridor has been planned for the transportation of 200 million metric tons per year, at a potential rate of circulation of 100,000 vehicles per day. Three high-tension electricity networks are also under construction. The scale is akin to that of Tanger-Med along the Moroccan coast. Massive and state-of-the-art, Açu will surely benefit from the Panama Canal enlargement, as Tanger-Med could also from a reorientation of trade flows passing through the Suez.

***Figure 4* — Some of the projected up-and-coming deepwater Atlantic ports**



With trade in the South Atlantic surging, guaranteeing security will become imperative for all involved. The most cursory of overviews shows where this will likely be felt most quickly and acutely. The political energy of West African non-state forces — such as Nigeria's Boko Haram or the Cabinda separatist fighters in Angola's northern exclave — are implosive rather than propulsive when compared with their equivalents in Central America, northern South America, or the Caribbean (drug cartels, revolutionary

movements). Partly for lack of political cohesiveness or even of a clear policy strategy (sometimes by design), African movements, which can be proxies for other, larger forces, seem prone to creating localized havoc instead of generating proselytizing waves of contagion. They are thus both more and less effective than their western counterparts, as they could cause states to break down and become havens for marginal organizations seeking to stir up trouble but are otherwise unlikely to spread across borders.

In a narrow sense, parallels can be drawn between the characteristics of state and non-state agents on each shore of the South Atlantic, relative to the other. West Africa has no state that begins to approach the weight Brazil exerts in the Western Hemisphere. Nigeria is almost in the same league in sheer demographic terms but is not comparable on any other plane. South Africa is too small for the kind of regional clout that Brazil has in its own sphere, although in world affairs it can often be said to "punch above its weight." Angola is full of vitality but has yet to use it meaningfully, and the Democratic Republic of the Congo, wracked by ethnic and regional divisions and civil war, cannot measure up in any sense to its South American counterpart and would-be partner in any renewed south-south cooperation.

...and Eastern Dwarfs

The greater Gulf of Guinea, for all its importance as a global supplier of hydrocarbons has but one sizable port, Lagos. It would be difficult to underestimate the risks raised by this dependence on just one set of port facilities. Lagos is hence the Gulf of Guinea's own geo-strategic Strait of Hormuz; its closure or even partial or temporary incapacitation would be disastrous. The lack of alternatives turns Lagos into a liability, which networks such as Boko Haram will likely seek to exploit for explosive advantage. So far, that radical Islamist movement has only hit soft or medium-soft targets, but surely that is only because larger ones are still beyond its operational capabilities.

What could be the alternatives? South of Lagos, Luanda's port is small and hard to enlarge since it is embedded in the heart of the capital city. Lobito/Benguela to the south, also in Angola, is connected to the rich mineral production areas of Congo's Katanga (Shaba) province by a lengthy railway. Both the port of Lobito and

the Benguela Railway are being rebuilt and modernized by Chinese contractors under an oil-for-infrastructure agreement negotiated between Angola and China. In the north of the country, Soyo already has huge oil depots. As noted, a deepwater harbor at Walvis Bay, on the Namibian coast, could be developed, as could Durban or Cape Town, in South Africa. Well to the north, there is Tanger-Med, in Morocco. But each of these is too far away to replace the Lagos hub in any sense.

Is an Explosion Imminent?

More security worries could be put forward with ease — such as the unfortunate fact that the long coastal stretches running down from the Congo River estuary to Namibia are protected merely by an incipient Angolan Navy outfitted with a few small North Korean vessels and a scant force of some 200 government-trained paramilitary "ninjas" — a special group of police rapid intervention forces. This situation persists in spite of the huge quantities of often rare and valuable minerals, diamonds, oil, and gas that converge onto commercial routes linking this lengthy seaboard to the wider Atlantic and beyond. Security risks such as these are unacceptable, as they are bound to be exploited in the short or medium term.

In the Americas, the expanded Panama Canal and the booming China trade for Brazil, Mexico, and the United States will surely give the Guyanas and the Pacific coast of Central America renewed relevance. As activity grows in Caribbean waters, shipping will move along shores feebly policed or only loosely controlled by states such as Jamaica, Nicaragua, or Haiti. Piracy, environmental concerns, and a surge in illegal immigration immediately come to mind as hazards. True, since the *Achille Lauro* affair in the Mediterranean, no cruise ships have been taken hostage, and powerful navies from the United States, Canada, France, and the Netherlands are coordinating attempts to contain drug trafficking and could thwart other threats in the region. But the situation, both politically (in terms of wobblier stability and the appearance of new potential troublemakers in the region) and economically (in terms of growing poverty and heftier flows of people and goods along busy sea lanes) has been changing fast. This calls for planning ahead rather than waiting for serious events to take place.

Looking Ahead, Informed by the Past

The interactions of economic, political, military, and other related phenomena have considerable implications for the security environment in the Atlantic Basin and for port capacity in many countries. Some ports will be geographically, technologically, and demographically well placed to profit from this, while others will not. A few hub ports are likely to develop much faster; some may even decline.

Maritime security challenges originating further afield may affect Mediterranean and North Atlantic as well as South Atlantic interests. For example, to the extent that piracy in the Indian Ocean and the Red Sea drives commercial shipping away from the Suez route, the development of Mediterranean trans-shipment via the Tanger-Med port will be affected. A crisis-driven closure of the Suez Canal, even if short-lived, would have similar effects, with a corresponding increase in traffic via the Cape of Good Hope route. Such closures have happened in the 1967 Six-Day War and in the 1973 Yom Kippur War, and in each case, the Cape route became the temporary alternative. As has been pointed out (Lesser 2010), both scenarios, alongside the physical limitations of Suezmax ship size, reinforce the logic of growing Atlantic transit routes. The evolution of the maritime security environment far beyond the Mediterranean and Atlantic coasts can encourage — or limit — the potential for ports and maritime commerce as a component of regional economic development throughout the Atlantic rim.

The extension of a credible, in the double sense of effective and well-sustained, security architecture is a prerequisite for the growth and fruition of the southern sectors of the Atlantic. The need for a stronger security framework is becoming clear for everyone. On one hand are the temptations of mammoth hydrocarbon deposits discovered at an ever-faster rate in both the North and the South Atlantic and in many flanking regions, the riches of polymetallic nodules scattered in oceanic depths throughout the basin, and the exploitation of a biodiversity whose economic and ecological value has mushroomed. On the other are the rise in violent instability in the Gulf of Guinea, and the ratcheting up of political and legal tensions in the Caribbean and adjacent Central and South American flashpoints, including the unresolved Malvinas/Falklands claims. During the Cold War, maritime security was largely ensured

by the U.S. Navy; now it is not so clear that this is the case, any more than that it would be acceptable to many countries of the region. But energy security dilemmas will push toward a wider Atlantic framework for a NATO-type security umbrella.[18]

It is no longer a simple question of gaps in the fragile regional security scaffolding, since, as mentioned above, something a little more robust is already being put into place by the United States and a few other concerned countries. The problem concerns the ad hoc nature of the security arrangements in practice; they are to a great extent reactive and executed without much planning. Finding a more durable solution brings into play issues that flow from the realities of interdependence and the requirements of participation.

In Europe, Portugal, Spain, France, the United Kingdom, and perhaps Bulgaria, a small but growing host of Atlanticist executive and legislative state and non-state entities have in recent years embarked on ever more important task of awakening Brazilian, South African, Angolan, and even Nigerian skeptics to an awareness of the risks of the absence of a robust set of collective security arrangements for the South Atlantic and, further, of making them conscious that it must be tied into a wider framework that takes North Atlantic preoccupations far more seriously than is now the case. So far, by and large, discomfort and distrust have effectively trumped a sober realism. But as aggressive rhetoric reverberates and dramatic or unexpected events shake the foundations of public confidence, sooner rather than later this stalemate is bound to change. It is thus imperative that, as soon as possible, a more comprehensive security architecture is erected for the region. The question is whether this will be consensual and regional or imposed and external.

Indeed, as threats grow, many smaller South American and African polities (like Chile, Argentina, Colombia, Namibia, Cameroon, and Morocco, to give but a few examples) become conscious of the need for firmer security and enhanced interdependence. Recognition is dawning that the adoption of a broader framework would be a good way to counter the rise of hegemonic regional ambitions on

[18] For two not very different positions, see Gvosdev 2009; Lesser 2010; the latter for a more cautious and nuanced take.

the part of some increasingly powerful and assertive southern states and transnational organizations.

Worryingly, many of the southern nations that are plainly beginning to develop their own ambitions have done so by aligning themselves with the external powers they are tolerating in the basin in a risqué attempt to check the challenges they perceive as mostly coming from powerful northern Atlantic great powers — about which they hold historical misgivings, some colonial or neocolonial, and others stemming from the bipolar interregnum. Some are trying out linkages to non-Atlantic countries. The budding coalitions engendered by smaller states in the region follow a parallel pattern, relying on newly forged links with powerful outsiders to try to ensure equilibrium.

A New Security Architecture

It does not seem likely that a "SATO" will be created anytime soon, or even less that an "ATO" might be in the works. Military alliances rarely materialize in the absence of major wars or the anticipation thereof. Not that the setting up of such forums — some following external models, some more endogenous to the region — has been neglected.

For many years, the Cape Verde archipelago has been cast as holding the key to movements between the North and South Atlantic. This was recognized by Solomon Passy, who, in 2006, as minister of foreign affairs of Bulgaria, formally proposed the entry of Cape Verde as a full-fledged member of the Atlantic Alliance.[19] A few NATO member states responded positively; others, like Greece, opposed it. Following that failed initiative, on June 13, 2009, Spain and Portugal, together with ten South Atlantic states, signed a "Lanzarote Declaration," a semiformal legal instrument aimed at jump-starting a soft security framework for the region, focusing on organized crime, illegal migration, weather monitoring, and the safeguarding of biodiversity.

Going further back, at the North Atlantic Assembly ministerial meeting that convened in Paris in December 1952, a resolution was signed, at France's request, that stated that "resistance to direct or indirect aggression in any part of the world is an essential

[19] Three years later he ran unsuccessfully for the position of secretary general of NATO.

contribution to the common security of the free world" and thus expressed its support for French military action in Indochina. Ten years later, the North Atlantic Council was still making noises of support — although actually doing nothing — as concerned Algeria in revolt against France. It was not the only case in which a colonial member state actually requested help from the Alliance. According to John Chipman, then deputy director for regional security of the International Institute for Strategic Studies in London,

> "In October 1968 at a NATO meeting in Lisbon, the Portuguese Foreign Minister argued that 'the NATO Alliance should not be indifferent to the preservation for the West of vital strategic positions. We have never understood, for example, how one can separate the north Atlantic from the south Atlantic or how one can ensure the security of one without taking into account the security of the other.' The Portuguese government even offered NATO use of its bases in Africa in order to assist in the protection of the Cape route, but this offer was not taken up by other member states, who were more concerned that Portuguese policy in Africa lead to a smooth transition to independence for her African possessions." (For these two cases, see Chipman 1987.)

Despite protestations, nothing was to come of it. In that case, the Alliance refused even nominal support.

More was in store. As Chipman wrote, "In the mid-1970s, concern centered for some time on problems in South Africa. Fears of the putative Soviet campaign of 'total onslaught' in southern Africa led to worries that strategic materials located there would be lost to the West or that the Cape route might be effectively controlled by the Soviet Union. Inevitably there were a few who felt that NATO should act to prevent this from happening or should at least be prepared to protect its interests." Pretoria's ambition was building "a sort of SATO," which should include Africa and adjacent seas, from the Cape of Good Hope "on to Cape Horn and Latin America," (Holst 1982, 6) so as to avoid the Soviet transformation of the South Atlantic into a "Communist lake." Matters did not stop there. In the early months of the Reagan administration, there were some fleeting references by U.S. officials visiting South American countries to "the desirability of greater military collaboration

among South Atlantic powers, but the difficulty in bringing the relevant parties together meant that the idea was never carried very far." Although speculation raged that NATO had developed extensive plans with South Africa, again the special pleading did not work: "While some studies were done in the 1970s by Allied Command Atlantic on the defense of South Atlantic shipping and other contingencies south of the Tropic of Cancer, it never received a license to plan operations."[20] (Chipman 1987)

Given the region's latent tensions in the current day, it should come as no surprise that President Chávez's proposal to Brazilian President Lula da Silva in 2009 that a "SATO" be built between Brazil and Venezuela fell on deaf ears. With a little nudging, nonetheless, some sort of cooperative formula will emerge and be embraced, however hesitantly. But desirable as that may seem, the signs are that this is not going to be an easy task. A good indication of the hurdles ahead is the often uneasy relationship between the United States and Brazil, which more and more casts itself as "the United States of the South Atlantic."

The United States has been formally active in African affairs since 1961, inviting participation in its International Military Education and Training Program (IMET), a special military training endeavor administered by the Department of Defense, which offers scholarships to officers from all countries with which the United States maintains "friendly relations." Forty-four African states participate in IMET. It is one of the oldest tools of security assistance available to the U.S. Defense and Security Cooperation Agency, and demonstrates a global reach that Brazil cannot hope to match in the near future. Certainly, Brazil, Uruguay, and Argentina have cooperated in ATLASUR (Atlantic South) to organize joint naval exercises, some of them, notably, in South African waters. But

[20] As Chipman pointedly commented in 1987, "South Africa's attempts to develop a South Atlantic Treaty Organisation must be seen in this light. Leaders in South Africa have consistently argued that Soviet naval activities in the South Atlantic might turn the area into a 'Communist lake' and have sought to enlist other governments into a loose military organization in order to protect 'Western interests' in the area. In the late 1970s and early 1980s, various Argentinian officials seemed openly to support the idea of a South Atlantic defense pact. Other countries in the region have been less enthusiastic." The statement by António Francisco Azeredo da Silveira, the foreign minister of Brazil, in September 1976 to the effect that "there is not the slightest possibility of establishing a collective security system in the South Atlantic, especially with the awkward and unwanted presence of South Africa," was a good case in point.

militarily, such south-south Atlantic Basin operations have little significance.

The ongoing north-south security effort led by the United States is illustrated by the unusual naval military exercises that took place in the Gulf of Guinea from March 18-23, 2011. What made the exercises, called Obangame Express, stand apart was their atypical scale and breadth — they were the largest-ever operations of the sort in the West African region. (For information on the joint exercises, see U.S. Embassy, Cameroon 2011) Nine states participated: the United States, France, Belgium, Spain, Nigeria, Gabon, São Tomé e Príncipe, the Republic of the Congo, and Cameroon, which hosted the command and control at the naval base in Douala and at the Center for Multinational Coordination of the Economic Community of Central African States. Seven of these states (all but São Tomé e Príncipe and the Republic of the Congo, with few or no war craft), as well as the Economic Community of Central African States, included warships of their own in Obangame Express. The joint exercises are evidence that the U.S. military presence and activity has been growing in the region.

While the United States has of late tried to restrict its southern security perimeter to its "near abroad," that is the Caribbean, Central America, and northern South America, this in no way means that other regions are being overlooked. War games such as Obangame Express easily dwarf others that have taken place along the West African shores. When seen in the broader context of Washington's creation of AFRICOM and the rebirth of the Fourth Fleet, they contribute to the progressive buildup of elements of a regional security framework that the South Atlantic Basin so sorely lacks.

The problem is that these are precisely the sort of efforts that Brazil resists so strongly. In the view of Brazilian authorities, they raise troubling economic, legal, and security issues. It is easy to understand why, looking at Brasília's new Estratégia Nacional de Defesa. Central to that strategy is the South American giant's drive to assert its newfound clout in what it considers its "near abroad" region. The "proactive defense of oil platforms" (Presidency of the Brazilian Republic 2008, 20) is one of the main missions of the Brazilian Navy, which casts a wary eye on persistent U.S.

challenges to its freedom of maneuver on the high seas. In any serious conversation with Brazilian civilian or military officials, it is virtually impossible to avoid invoking the dreaded specter of the Monroe Doctrine — and the protracted threat that Brazil perceives as looming over its sovereignty in its own immense Amazon forests or over its continental shelf claims.

It is of particular note in this context that Darc Costa, the head of postgraduate studies at the influential Brazilian Superior War College, has in the past few years been spreading the notion that Brazil's *Destino Manifesto* turns the country into the "only possible artisan of true globalization."[21] (For an instance of this call, see Costa 2008.) This leads Brazil to envisage "external incursions," particularly those from its northern "far abroad neighbor," as events it needs to prepare for in the upcoming years (Passos 2011).

This cannot but be unsettling, and its logic is sometimes hard to fathom. As Portuguese academic analyst Pedro Seabra pointedly stressed (Seabra 2010),

> "at the end of the day, growing security concerns for certain parts of the [African] continent — the Gulf of Guinea, for instance — only help fuel the notion that some kind of international cooperation is required in order to properly tackle every regional threat. What would Brazil do, far from its own shores, when confronted with a hypothetical NATO support mission in these Atlantic waters or even a follow-up of the organization's Steadfast Jaguar military exercises in Cape Verde in 2006? Its local economic interests would have to be taken into account but it is reasonable to question if they can actually be translated into effective influence in the area. In other words, would Africa also be under Brazil's guard? Unlikely or far-fetched as it may sound, the question arises if one follows through with Brazil's 'South Atlantic turf' reasoning, thus exposing its main conceptual flaw."

[21] In the article cited, Darc Costa wrote that "if there is a principle that synthesizes the entire conception of Brazil's national strategy, it is the idea that, today, Brazil is the only possible artisan of true globalization, a result of our colonization and of Portuguese immigration."Darc Costa's voice should by no means be discounted, as he is widely respected and influential in administration as well as military circles — and also the president of FEDERASUL, the increasingly powerful Federation of South American Chambers of Commerce. I am grateful to Costa for both the "Rooseveltian" and the "Russian" expressions I make use of here.

What Lies Ahead?

The need for cooperative goodwill and trust building is patent. If historical comparisons matter, there is an urgent need for alternatives to aggressive forms of regional exclusivism confronting forcefully applied comprehensive Atlanticism, a situation likely to engender none too palatable "solutions" to the conundrums of keeping order in this part of the world. Neither the establishment of a security grid imposed from above, with no concessions to southern regional "ownership," nor an unregulated vacuum will do. This is where mediation by exogenous but historically concerned parties, be they national or intergovernmental ones, could be useful. Portugal, Spain, the EU, NATO, France, or Great Britain — any of these might serve the purpose.

Not all is bad in the birthing traumas of a more balanced wider Atlantic. After many centuries of unquestionable supremacy, the North Atlantic is no longer the center of gravity it was. The South Atlantic is rising from its long period of lethargy and "peaceful tranquility." Moreover, the entire Atlantic Basin now has competition for centrality with other ocean basins, the Pacific and the Indian.

At this moment of opportunity, with some nudging, both North and South Atlantic states can modify their regional and international foreign policy strategies — a slight adjustment, as policy swings go, from the classic routine of maintaining an often difficult balance of power in their own neighborhood to mediating between these strategic continental orientations of old and new Atlanticist ones. Such is as true for Great Britain, the Netherlands, Portugal, and Spain in the North Atlantic, as it is for Brazil, Argentina, Colombia, Venezuela, Cuba, South Africa, Angola, Nigeria, and Morocco.

Scenario-drawing may help flesh out this idea. If, say, the European Union weakens, and a few European nation-states reemerge as the undisputed primary Old World forces, many of the Atlantic states will be in an enviable position to exploit this fragmentation to their own economic and political advantage, while keeping their standard continental rooting and their favored alliance ties to support their new external policy strategies. Should instead (although this seems less likely) the New World stagger or stumble

and the Old World resurface as more prominent, Atlanticist emerging states will be able to modulate their own traditional continental orientations at will, as well as, in some cases, those with their erstwhile metropoles. In this alternative scenario, the more powerful ones (Brazil, South Africa, Angola, perhaps Nigeria, Colombia, and Venezuela) could try to serve as interfaces with a weakened United States. If both Europe and the United States weaken, the Atlanticist states will be in the enviable position of having the means to chart whatever independent course they choose. Emerging southern Atlantic states (including the likes of Mexico and Morocco) would face new circumstances in which it is likely they would seek new orientations for their foreign relations, so as to boost their geopolitical weight by means of a diversification of their economic and strategic ties.

In scenarios more favorable for multilateralism, as Ian Lesser wrote a couple of years ago, "Atlantic orientations will be rediscovered, reasserted, and reshaped. The result may be the rise of multiple Atlantic identities, some compatible and mutually reinforcing, some operating in isolation or in competition" (Lesser 2010). Let us hope that, in reality, Atlanticism is a movable feast. A comprehensive Atlanticism that can engender a twinning of "Atlantic regionalisms," north and south, that serve as default settings, could well be plausible, if such feats of security engineering can overcome an array of odds. Hedging of this sort does appear to be one of the best strategies to maintain tranquility and confidence as the world adjusts to new patterns of maritime commercial transport flows in a wider Atlantic whose rebirth we are witnessing.

2. Evolution of Illegal Activities at Sea and Governments' Responses to Them

Xavier de la Gorce and Anne-François de Saint Salvy

Introduction

The sea has always been a zone of freedom. Being part of the common heritage of humanity and the property of nobody, it has for centuries favored trade and provided humanity with much wealth. This idea of freedom of the seas has been part of customary international maritime law at least since *Mare Liberum*, published by Hugo Grotius in 1609. The United Nations Convention on the Law of the Sea (UNCLOS) codified this immemorial law in 1982 and included a limited designation of specific marine areas with a view to development and protection. Oceans are therefore not a space without law. But illegal activities benefit from the immensity of oceanic areas with often little opposition from official law enforcement services. Many flag states are unable to deploy security forces, and those states that are able to do so, see their action limited by flag states' rights. UNCLOS has established a balance between coastal- and flag-state rights that limits their respective ability to act against illegal activities on the high seas.

As 90 percent of commercial exchanges in the world are carried by maritime transport, it is easy to hide in this enormous flow the smaller if not less profitable flow of illegal cargoes. These illegal activities may be divided into three categories:

- those with a direct impact on maritime economic activities;
- those that affect the maritime environment and resources; and
- those that use freedom of the seas to conduct illegal activities that damage the security of states and societies ashore.

Of course, such a classification can be challenged since terrorism may use the first as well as the third, and illegal fishing involves

both the first and the second, but it provides a good scheme of analysis and may help to evaluate more precisely the drivers of illegal activity and countermeasures.

For each of these categories, this chapter will analyze briefly what the activities are, where they are conducted in the Atlantic, and what their implications are for security. It will then analyze their evolution in order to bring to light the main trends impelling them. It will also present the governmental responses of several countries (including Brazil, Canada, the European Union, the United States) or organizations trying to deal with these activities and the lack of response from some others. Finally, it will propose some ways to improve the situation.

The chapter will also analyze the ramifications of the difficulty in detecting these activities and gathering evidence of them in order to be able to efficiently prosecute their perpetrators. The tricky subject of ensuring an adequate and coordinated legal framework will also be analyzed, together with the question of the split responsibility between port state and flag state, which may in many cases hamper the efficiency of actions.

Some economic activities may have harmful consequences for the maritime environment and resources without themselves being illegal. These activities are usually subject to evolving regulations trying to mitigate their negative impact. This is, for example, the case with maritime transport, through its carbon dioxide emissions or pollution hazards, or with certain fisheries, when the amount of fishing, though not itself illegally reached, exceeds the level fixed for reasons of sustainability. These activities may not be included in "illegal activities" as such, but they may be subject to similar control or enforcement operations. It is thus relevant to look at them here.

Illegal Activities Threatening Maritime Security

Piracy and Robbery

According to article 101 of UNCLOS, piracy is defined as any illegal acts of violence committed for private ends against a ship or against persons or property on board a ship in a place outside the jurisdiction of any state. Thus, according to this definition, recognized and accepted by nearly everybody as international law,

any illegal acts of violence committed within a state's territorial waters are not defined as piracy but armed robbery against ships.

The International Maritime Bureau (IMB), which is part of the International Chamber of Commerce, has merged the two definitions in order to give a comprehensive picture of these acts of violence, despite their differing legal definitions. However, it is estimated by the International Maritime Organization (IMO), the UN agency governing shipping, that these incidents are undercounted by a factor of two because of the lack of reporting of many incidents. This mainly stems from the risk of increasing insurance premiums, which often outweighs the value of the claim for smaller attacks, and the fact that reporting a piracy attack can lead to a costly delay for the ship. If piracy has sharply decreased in Southeast Asia since the turn of the new century (from 54 percent of total number of reported events in 2000 to 25 percent in 2011), it has widely increased in Indian Ocean (from 29 percent of the total number of events in 2000 up to 66 percent in 2011) and also in the Gulf of Guinea, from 7 percent in 2000 to 11 percent in 2011.[22] Piracy has the distinction of being one of the few illegal activities at sea that is internationally recognized as permitting counteractions without any interference by a flag state, if any is involved.

In the Atlantic, the record of piracy and acts of robbery of the IMB shows a clear picture with two hotspots, the major one in the Gulf of Guinea, the secondary one along the north coast of South America and in Caribbean waters. It seems that events reported off the shores of Venezuela and Brazil or around offshore oilfields in South America are more small thefts than real piracy or serious robbery.[23] In the Caribbean waters, the most common acts are also mostly thefts and common crimes than real piracy. On the other side of the Atlantic, in the Gulf of Guinea, the phenomenon is characterized by a relatively stable number of events, but the area concerned extends beyond the gulf, partway around the bulge of West Africa, to Guinea.

The main impact in this area is on oil companies, which see their support boats and tankers attacked. One may speculate by analogy that developing exploitation of hydrocarbon resources off the

[22] These figures are taken from IMO annual reports.

[23] We intend then not to deal with this aspect in this paper.

coast of Brazil and more widely along the northern coast of South America may trigger an intensification of piracy. This is unlikely, though, because the economic incentive for piracy, which springs largely from poverty, is relatively low in this area. Moreover, the capacity of the region's authorities to counter such operations, offshore as well as onshore, is considerable. The circumstances of attacks in Africa have up to now been somewhat different from those in the Indian Ocean. What is worrying is that things are rapidly evolving to include attacks on the high seas and the taking of hostages. International concern over the problem is increasing.

A Focus on the Situation in the Gulf of Guinea

In the Gulf of Guinea, the main area of piracy is the waters off Nigeria and Benin, where 67 pirate attacks on ships were registered in 2011 alone. This area is among the top six in the world in the incidence of piracy according to the International Maritime Bureau. Pirates from Nigeria usually act in small groups. Nigeria's government has little capacity to constrain the problem because it has too many other issues to contend with, involving radical Islamic groups and other internal social unrest. The situation in Nigeria is different from that of Somalia, the most infamous pirate haunt, because Nigeria, for all its problems, remains a functioning state.

Piracy occurs all along the coast of the Gulf of Guinea and especially off Togo, Ghana, and Benin. The total 2011 figure for piracy and robbery together in the area is about 130 events, one-third of them qualifying as true piracy. Ten people have been killed and about 60 kidnapped.

Attacks on the oil sector have cost billions of dollars in lost revenue, destabilized global energy prices, and led to many environmental disasters along the West and Central coast of Africa.[24] According to the report of the UN assessment mission on piracy in the Gulf of Guinea in 2011, these crimes are causing economic losses of up to $2 billion annually, mainly hitting local economies.[25] The report indicates, for instance, that the number of ships entering Cotonou harbor in Benin declined by 70 percent between 2010 and

[24] Energy Information Administration, January 2011 edition.

[25] Mission led in Benin, Nigeria, and Cameroon by B. Lynn Pascoe, under-secretary-general for political affairs, from November 7-21, 2011, at the request of the president of Benin.

2011, after the port was put on a list of countries at risk of war by a British board of insurance.[26]

Benin, Nigeria, and their respective economic centers are classified similarly in the most recent list of at-risk countries by the insurance board. The rise in insurance premiums in such "war-risk" areas could be as much as ten times the ordinary level of maritime insurance premiums, with some insurance companies refusing to insure ships and shipments in certain areas without specific protection measures.

Detection and Surveillance

The surveillance and detection of acts of piracy or of the pirates' home bases presents different challenges in the Atlantic than in the Indian Ocean, for most of the incidents take place close to the coasts, if not inside ports or along coastal rivers, as is often the case in Nigeria. Even though some piracy acts have been more recently reported up to 80 miles from the coast, the area of concern that needs to be scrutinized is less extensive than in the Indian Ocean. It is therefore possible to use mainly shore-based long-range surveillance radars; a satellite surveillance system dedicated solely to this purpose clearly would not be cost-effective. Moreover, the highly localized means and practices used by Gulf of Guinea pirates do not pose the problem of escape to a different maritime jurisdiction to evade capture. The only known exception thus far is the Bakassi peninsula area, where it is easy to go from Nigerian to Cameroonian waters and vice versa. But this situation is not of real concern, and in any case the cooperation between these two states is increasing, despite their being members of two different regional organizations.

The surveillance vacuum notwithstanding, the most critical need is for coastguard units (ships and aircraft) in order to patrol coastal areas, in particular the zones outside ports where ships wait to dock, which is where most of the piracy/robbery acts are committed, and also in order to take countermeasures as soon as pirates are detected. The situation is slowly improving in several regional countries with the help of Western partners. The United States is installing shore-based radars in São Tomé e Príncipe and

[26] The London-based marine insurers' group, the Joint War Committee.

Ghana; France is doing the same for Benin with radars and patrol craft. As an example, the first radar unit installed at Cotonou, Benin's largest city, allows coverage of all the maritime area between the Nigerian border and Grand-Popo, near the Togolese border.[27] A comprehensive surveillance network, linking together shore-based long-range radars and patrol vessels, would deliver added value.

Many West African and Central African countries are concerned about the phenomenon of piracy/robbery and are trying to act against it. One of the difficulties is that a large percentage of these crimes are committed inside the territorial waters of coastal states, even though, as mentioned above, this actually makes detection easier than elsewhere. In these cases, only the navy and coastguard of the state in question have the right to counter these activities. Besides a number of regional initiatives, described in more detail below, there is little cooperation between these states and others that can offer greater capabilities. France and the United States, the two countries whose navies are usually present in this area, provide maritime information and training but are not allowed to operate against pirates. Western assistance is gradually helping to improve the coastal states' skills and capacities, which are deficient. But local initiatives are beginning to develop as well, such as the specialized battalion created by Cameroon to secure the Bakassi area or the planned upgrades to the Nigerian Navy.

In some cases, as in Nigerian waters, private companies are in charge of the security of offshore oil installations. These forces work directly for the oil companies or under the supervision of the local navy.

Two sets of initiatives are in place to combat piracy. The first one marks the beginning of an organized African response, mainly through regional entities such as the Economic Community of West African States (ECOWAS) or the Economic Community of Central African States (ECCAS). The second is UN-driven.

ECCAS notably established a common security strategy in 2008 aiming to protect the vital interests at sea of the concerned nations. This strategy puts forward six principles:

[27] This radar has a theoretical range of 90 nautical miles and is equipped with an AIS receiver.

- common management and sharing of information;
- development of common surveillance in the area, using patrol units as well as coastal radars;
- the harmonization of the legal framework in order to enhance the efficacy of the actions taken by patrols of one country or another;
- the institution of a community-wide tax to finance means and actions;
- the procurement and maintenance of necessary equipment to implement the defined strategy; and
- the institution of a Central Africa maritime conference.

Construction began on a new coordination center situated at Pointe Noire, Republic of the Congo at the beginning of 2012.[28] Its financing is shared between the ECCAS states, the United States, and the European Union. The first common operation among the participating states took place in September 2009. When it is present in the area, the French combat ship permanently assigned to a mission in the Gulf of Guinea participates in this surveillance and sends its information to the coordination center.[29]

In 2011, at an international seminar in Cotonou, ECOWAS presented a similar strategy for the West Africa states.[30] Coordination of these two initiatives may result in a significant improvement of security along the western littoral of Africa. Such coordination, which is underway through the Maritime Organization for Western and Central Africa (MOWCA, uniting 20 African states), is critical because many incidents occurring in the area take place at the boundary between the ECOWAS and ECCAS maritime surveillance areas. In close coordination with IMO, MOWCA has implemented a regional coast guard network in order to boost the efficacy of maritime security.

[28] CRESMAC: Central Africa Regional Maritime Security Center.

[29] Since the 1980s, France has deployed a combat unit with a permanent mission in the Gulf of Guinea that includes cooperation and training objectives with West African navies.

[30] The first common patrols between Nigeria and Benin were put in place in the second half of 2011, following an increase of piracy off the Beninese coast.

After a first resolution in October 2011 (UN Security Council Resolution 2018), the UN Security Council backed the proposal of Secretary-General Ban Ki-moon on February 28, 2012, to hold a regional summit on combating piracy in the Gulf of Guinea. The United Nations Office on Drugs and Crime has already developed a program of cooperation in the Indian Ocean with Somalia, and some parts of this program could be applicable in West Africa. It aims to develop a sound legal and judicial framework so that pirates are well treated when captured and judged fairly. It is important to stress that this program should be accompanied by the adaptation and training of military and police forces in order to have them implement these measures. If the legal framework is put in place before police and security forces are well trained and equipped, it is likely to lead to abuses and distrust among the general population, sapping confidence in the new legal/judicial regime.

A Way Forward

One of the main problems for these countries is their ability to acquire, maintain, and use the necessary means to implement such a strategy. Increased cooperation from more developed countries is an important catalyst for action and may also boost efficiency. Initial and continuous training provided by undertakings such as those of the French permanent naval mission in the area or the African Partnership Station (APS) program of the United States are good examples. Further coordination between the French and U.S. endeavors helps leverage improvements.[31] In the same way, the regional maritime school created with the support of France in Bata, Equatorial Guinea, which is a member state of ECCAS and involved in the strategy), is vital to teach and train sailors. This school receives students from Angola, Cameroon, Cape Verde, the Republic of the Congo, Djibouti, Gabon, Guinea, and Senegal.

In addition, global satellite surveillance could contribute to a comprehensive overview of the maritime situation in the waters of these nations, helping them to fight against piracy and armed robbery. If not strictly necessary for piracy surveillance in this region, satellite imagery whose primary purpose is, say, monitoring oil spills would be useful in that regard.

[31] A French Navy officer is inserted among the APS staff, and there are many contacts between the two operations.

As for security measures aboard ships, that subject is currently under discussion by the IMO's Maritime Safety Committee.

Terrorism

It is difficult to find a universal definition of terrorism; the one given in UN Security Council Resolution 1566 is often invoked: "… criminal acts, including against civilians, committed with the intent to cause death or serious bodily injury, or taking of hostages, with the purpose to provoke a state of terror in the general public or in a group of persons or particular persons, intimidate a population or compel a government or an international organization to do or to abstain from doing any act, which constitute offences within the scope of and as defined in the international conventions and protocols relating to terrorism…."

As for the maritime domain in particular, the Council for Security Cooperation in the Asia Pacific Working Group has offered a working definition for maritime terrorism:

> "…the undertaking of terrorist acts and activities within the maritime environment, using or against vessels or fixed platforms at sea or in port, or against any one of their passengers or personnel, against coastal facilities or settlements, including tourist resorts, port areas, and port towns or cities."[32]

These definitions, however, do not specify what really constitutes terrorism and whether it would only include attacks against merchant vessels or also attacks against military craft.[33] Maritime terrorism is therefore defined here as the use or threat of violence against a ship (civilian or military), its passengers or sailors, cargo, or a port facility if the purpose is solely to create a platform for political ends. The other type of terrorist activity, using the maritime transportation system to smuggle terrorists or terrorist materials into a target country, is considered in Section 2 below since it is a different activity requiring different responses.

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[32] All acts defined in additional protocol were added in 2005 to the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation (1988); this protocol came into effect on July 28, 2010.

[33] The difficulty of distinguishing terrorism from freedom fighting may be the crux of the uncertainty over definitions. In fact, in many cases, yesterday's terrorist is today's legitimate leader of a new regime.

The terrorist act with the greatest potential for human lives lost and the most profound impact on public opinion, a principal goal of groups resorting to terror, is the targeting of cruise ships. One of the main risks from a terrorist gang for cruise ships is that of a waterside attack using a light boat full of explosives, which is highly difficult to detect and to counter. These large vessels are vulnerable to fire, and the evacuation at sea of thousands of people is one of the nightmares most dreaded by maritime security authorities in all countries. Boarding a cruise ship may also be considered by terrorists, but it is more difficult to pull off than in the case of a cargo ship owing to these ships' high freeboard. Another conceivable terrorist action would be to seize a merchant ship and use it as a weapon by sending it into a port with explosives on board.

After the September 11, 2001, attacks, this threat has been widely discussed within the IMO and led to a major change in the International Convention for the Safety of Life at Sea (SOLAS), adding specific provisions to prevent such attacks against ships. Following the first recommendations issued by IMO in 1986 after the terrorist attack against the Italian cruise ship *Achille Lauro,* these provisions are included in the International Ship and Port Facility Security Code published by IMO in 2002 and effective as of 2004. Mainly through itslegal committee, IMO is still working on these questions in order to improve maritime security.

The Region of Most Concern: The Caribbean

If every Atlantic port could be the target of a bombing, the part of the Atlantic where cruise ships are most numerous and active is the Caribbean Sea, and so it is probably in this region that the risks are highest. Nonetheless, since the *Achille Lauro* attack, not a single cruise ship has been taken hostage by terrorists. More than 9 million people departed on cruises in 2008 from 30 U.S. ports. Most were heading for the Caribbean, even if the fastest-growing market for cruising and cruise destinations in the Americas is now Brazil.

In the Caribbean, several powerful navies operate continuously against drug trafficking. They provide a solid surveillance and response capability in case of a terrorist act. France, the United Kingdom, the Netherlands, Canada, and the United States

participate in these coordinated operations, and the close link between these countries' navies enables them to work effectively together if such an attack occurs.

Detection and Surveillance

As far as terrorism is concerned, detection and surveillance measures are mainly intelligence gathering, and these are not very different than those used by security and intelligence agencies to counter other forms of terrorism. Measures that can be considered in this case are similar to those used to detect piracy, in order to help ships' crews to keep control if a terrorist team is trying to board the ship en route or in port, given that security measures when embarking passengers and vehicles are assumed sufficient by themselves to prevent such actions.

The cruise industry launched an Operational Safety Review in January 2012 that has proposed new measures to enhance the safety of cruise ships. Mainly designed for safety of navigation, some of these measures (better planning of routes, restrictions of access to the bridge) may also contribute to protecting the ship against terrorist acts. A number of these recommendations have been endorsed by IMO in the most recent meeting of its Maritime Safety Committee.

Nevertheless, all systems tracking the normal routes and situations of merchant ships, such as Automatic Identification System (AIS) or Long-Range Identification and Tracking (LRIT), could be used as alert or detection systems to allow quicker reactions by concerned authorities. If the equipment and procedures in the region and the proximity of various security assets (French, U.S., British, and Dutch, for example) allow for rapid action against terrorists, as compared with the Indian Ocean, one can assume that the delays inherent in decision-making will remain the major problem in such cases.

The alarm design made compulsory by the 2002 change to SOLAS convention allows the ship's crew to warn flag-state authorities and the ship's owner of a hostile act against the vessel. Satellite-based surveillance can be used in this case to help track a non-cooperating target, as when a cruise ship hijacked by terrorists tries to escape by cutting off its AIS transponder.

Measures against terrorist acts at sea are thus mainly directed toward prevention. This chapter will not deal with the specifics of procedures in case of such an event occurring.[34] It is essential only to stress that these operations are among the most difficult, especially at high sea, and that they require highly specialized teams to get rid of the terrorists while preserving the lives and safety of hostages or passengers. These situations also raise the question of the merits of providing armed security guards on board, as is done in some countries to protect ships against pirates.

A Way Forward

Two questions need further thought and debate with respect to countering specifically maritime terrorist acts:

- Do nations have the capacities necessary for taking back a ship hijacked by terrorists?
- Is it possible to create regional security organizations providing protection for ships when they sail in dangerous areas? Should these protection teams be private, under flag-state authority, or under a coordinating authority in the areas of concern?

The specific answers offered to these questions need to be assessed against a cost/risk analysis.

The fight against terrorism is a global intelligence challenge that calls for extensive cooperation from all concerned security services. However, even if a certain level of security can be achieved through coordinated protection measures, taking back a ship by force is a very difficult operation for two main reasons:

- the necessary operational assets are rare and possessed by only a handful of states; and
- the risks of such operations are very high and, in the case of a cruise ship, they concern multiple parties and states, leading to a difficult and complex decision process and chain of command.

Common reflection on these points by all parties is of high interest, naturally, but one should not forget as well how different it is to

[34] Tactics, operational means, and procedures are confidential data that should not be published.

deal with such problems in a real-life situation compared with theoretical scenarios.

Illegal Discharges at Sea

Oil slicks on the ocean are one of the major causes of marine pollution. Besides accidents, which are not within the scope of this chapter, there are two main categories of oil slicks that need to be considered: intentional tank washing and discharge in the sea by ships en route and pollution resulting from illegal activity centered on coastal oil installations as can be seen in the Gulf of Guinea.

Pollution from Ships

In the case of pollution from ships, although the northeastern Atlantic is covered by an effective agreement to prevent and counter oil pollution from maritime transport (the Bonn agreement), the same is not true of other quadrants of the Atlantic, where few states have the capacity to detect and track those ships. Such a comprehensive structure as the European Maritime Safety Agency (EMSA) does not exist in the southern Atlantic beyond national organizations.

Assuming that maritime transport will increase in the future in tandem with trade, it will cause growing damage to the ocean environment if negligent practices continue, especially in southern areas where controls are lacking.

The trend in the North Atlantic, especially on its eastern shores where the Bonn agreement is in place and where countries such as France and Spain have put in place severe countermeasures, is that negative environmental impacts are steadily dwindling. Two main efforts led to this improvement:

- surveillance of these areas and the strong actions taken against offending ships led to a decrease in adverse incidents; and
- the rules implemented by the EU in order to prevent these actions for ships going into an European port are slowly improving conditions.

The situation is not the same in the southern half of Atlantic, where there is much less satellite imagery available and very few

surveillance flights and operations, and where means of action against offenders are much less effectual.

Along the western approaches to Europe, satellite and aerial surveillance have proved their efficiency in detecting and tracking illegal discharges by ships. Through its CleanSeaNet service, EMSA provides every European member state with satellite radar pictures, covering all European seas, which are analyzed in order to detect possible oil spills on the surface. It also delivers alerts to the relevant country when a possible oil spill is detected by the satellite. Images analyzed are available to national contact personnel within 30 minutes of the satellite passing overhead, which often triggers air surveillance flights.

This CleanSeaNet service is a great help to coastal states, which are able to focus their means on satellite information. It is nevertheless not entirely sufficient: because there is a lack of continuous satellite coverage, comprehensive surveillance by ships and aircraft is necessary.

Sweeping surveillance of French waters linked with vigorous action by navy and customs units and the judiciary have led to significant decrease of incidents in which the seas are fouled in the past ten years. Spain has acted in the same way more recently.

For the North Atlantic, two reforms remain important: the first is to develop and harmonize penal sanctions against negligent captains and ship owners; the second is to pursue development of port installations that allow ships to clean their tanks when in port efficiently and with decreasing costs and delays.

Technically speaking, the "color code" elaborated by the Bonn agreement constitutes a reference that goes well beyond the strict framework of the agreement's member states. At the judicial level, it provides magistrates with a common reference table.

Category	Appearance	Thickness of slick (µm)	Liters/km2
1	Sheen (silvery grey)	0. 04 to 0. 30	40 – 300
2	Rainbow	0. 30 to 5. 0	300 – 5000
3	Metallic	5. 0 to 50	5000 – 50,000
4	Discontinuous true oil color	50 to 200	50,000 – 200,000
5	Continuous true oil color	More than 200	More than 200,000

While the response to oil slicks in the North Atlantic is ever more vigilant, a lot remains to be done along African coasts to help states to counter pollution. There, coastguard units are not able to go far enough, owing to their limited size and training, to effectively survey the necessary areas. Moreover, there is no real legal framework to counter these activities. But it is important to mention that some states, such as Senegal, have begun to restructure their capabilities to protect their maritime areas, a necessary first step.

One measure that Western nations that could offer to help African states curb marine pollution is to provide these countries with satellite photos along the main maritime routes off their coasts in order to bring them the more full picture of the situation. This will lead to better responses to problems that occur. Beyond the pooling of surveillance systems or the exchange of best practices at assemblies such as the North Atlantic Coast Guard Forum, it is indispensable that the magistrates of coastal states are able to share their investigating methods. The detection and the identification of an illicit discharge can be carried out by State A, which, considering the constraints on the means of intervention or meteorological conditions, cannot intercept the suspected ship or steer it toward one of its ports. In such case, it is then essential that State A can rely on State B, which is home to the ship's port of destination, to proceed with inquiries and appropriate judicial action. To achieve this result, states must collaborate even more closely and encourage the development of prosecutors' networks. By means of regional or bilateral agreements, they should establish the mutual juridical admissibility of the reports drawn up by their authorized agents.

Pollution from Onshore and Offshore Installations

Oil pollution resulting from illegal or incompetent exploitation of coastal installations as in Nigeria is more a shore police problem than a maritime one, but its consequences are important in the Gulf of Guinea, where wide coastal areas are befouled. In Nigeria, people use leaks and deliberate diversions from oil pipelines to steal fuel and sell it on the black market. Detection is not a real concern when it comes to oil pollution created by illegal exploitation of coastal or river installations. The question is then how to counter such activities and their consequences.

At the same time, offshore oil exploitation is intensifying. Offshore oil installations are highly secured because of the risks they involve, but there are no international safety standards other than those defined by each company. In the absence of enhanced government controls, the development of oil extraction along the Western African coast may lead to a pickup in illegal exploitation around these installations. Only after the Deepwater Horizon accident in the Gulf of Mexico in 2010 has the EU begun consultations to introduce rules for the safe development of offshore installations.

Activities Abusing Maritime Freedom for Illegal Goals

Drug Trafficking

The general prohibition on drugs and narcotics (for purposes other than pharmaceutical, therapeutic, and scientific ones) rests on a relatively homogeneous and binding set of three international conventions elaborated under the aegis of the United Nations:

- The Single Convention on Narcotic Drugs of 1961 and the 1971 Convention on Psychotropic Substances, which established in particular the scope of prohibited substances; and
- The United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances signed in Vienna in 1988 and applicable since 1990. It contains in its Article 17 all necessary provisions allowing security forces to counter drug trafficking operations at sea.

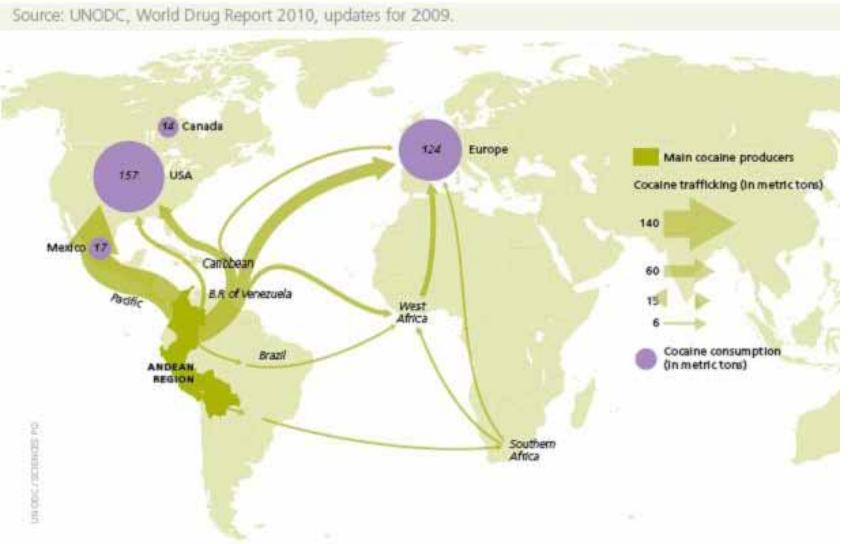
These three legally binding instruments concern the control of the manufacturing and the trade of classified substances and their chemical precursors and the penalization of breaches.

The international follow-up for these conventions is ensured by the Committee on Narcotic Drugs within the UN Economic and Social Committee, which monitors their application and analyzes the situation worldwide. The permanent organ of this committee, the International Narcotics Control Board (INCB), controls the execution of the conventions and formulates, where necessary, recommendations addressed to states. This framework was complemented in 1997 by a specialized agency, the United Nations Office on Drugs and Crime (UNODC), in charge of unifying

international control and coordination of the actions taken to fighting against illegal drugs.

The 2011 *World Drug Report* from UNODC gives a comprehensive picture of drug trafficking in the Atlantic and clearly shows that cocaine is the primary substance being transported, from the Andes north to United States and east toward Africa and Europe. In recent years, the U.S. flow has decreased slowly, and the flow to Europe has gone up. The amount of cocaine transiting the Atlantic toward North America and Europe is estimated between 300 and 600 metric tons, depending on the data used to make these calculations.[35] Half of it is going north through the Caribbean to North America; the other half is going to Europe, either directly or through Africa.

***Figure 5*—Global cocaine flows (2009)**



The Atlantic Ocean is thus one of the main routes for drug trafficking from South America to North America and Europe. For a long time, maritime transport has been the main vehicle used by smugglers because it allows for large shipments of drugs and because of the low level of control on the high seas compared with

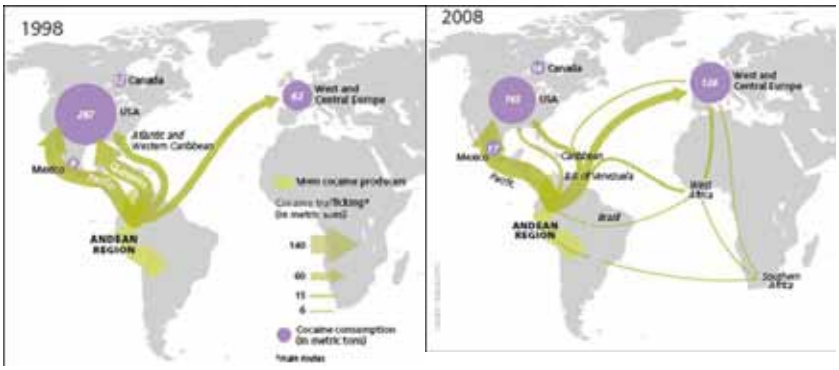
[35] These estimates vary with the different agencies. Some use databases on demand and seizures; others use extrapolation of cultivated surfaces devoted to coca and evaluation of processing efficiency.

the airways. There has, however, been an evolution over time. The boosting of surveillance and the actions of concerned countries, mainly the United States and some in Europe, has led to changes in the habits of smugglers.

It is therefore necessary to analyze more precisely these two flows, the one through the Caribbean to various islands and to United States, the other one toward Europe, directly and through African countries. Based on a UNODC estimate, the flow of cocaine to Europe is calculated to be 150 million metric tons, with only a minuscule part of it being consumed in African countries.

The twin panels of Map 8 show the evolution of these flows between 1998 and 2008, clearly indicating the shift from North America to Europe.

Figure 6 **— Global cocaine flows, 2008 and 1998**
Source: UNODC World Drug Report 2009



A further important change is the diversification of routes, opening up several new ones through the Mediterranean toward Eastern Europe countries and through West Africa. This is confirmed by the evolution of the record of seizures in European countries in the past five years. The traditional point of entry in Europe for cocaine, the Iberian Peninsula, saw seizures fall by 50 percent between 2006 and 2009; the decrease has been even more significant in the Netherlands. In contrast, a sharp increase has been observed in eastern European countries such as Romania, Russia, Turkey, Poland, Greece, and Ukraine, countries that were not, in the past, strongly associated with cocaine trafficking. As an example,

Romania reported 1.2 tons in a single seizure in 2009 in the port of Constanta, from containers arriving on board a ship from Brazil.

These reports also indicate a real change in the trafficking routes via air or ground transportation from Africa. Although air transport is outside the scope of this chapter, bulk shipments of cocaine are suspected to depart from remote or jungle airports in South America bound for vulnerable states in West Africa. As for maritime transport, large shipments have been tracked in recent years to various states along the Gulf of Guinea, before switching to air or ground transport to Europe.

Detection and Surveillance: An Intelligence Challenge

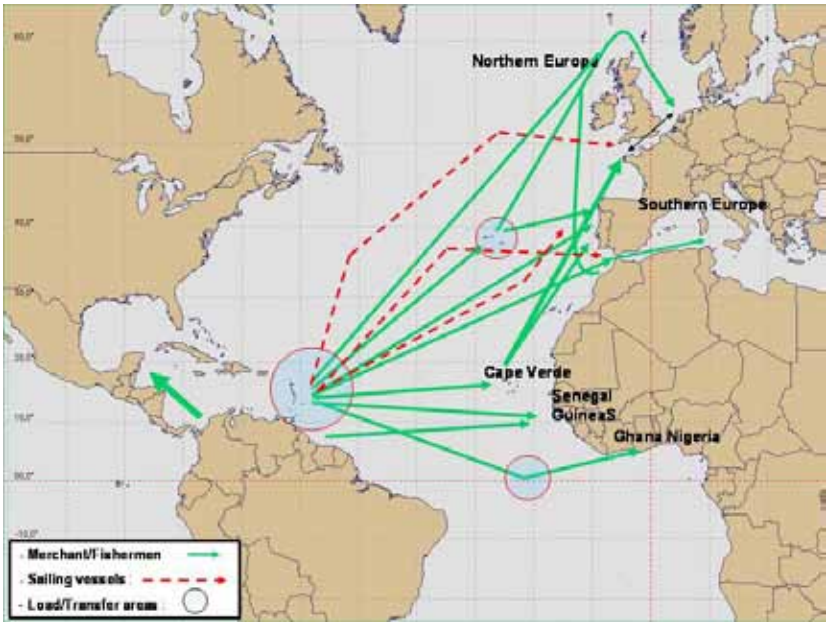
The means of transport used by the drug smugglers are varied and adapt themselves to whatever routes work best in connecting the areas of production with the areas of consumption. Therefore, the interception of the flows of cocaine, to be effective, has to be based on precise knowledge of these various modes of routing, triggering specific national countermeasures, in cooperation with all partners.

Smugglers resort to all sorts of ships, from merchant ships to rubber boats to semisubmersible craft. If medium-size ships were often used for nefarious activities in the years immediately after the millennium, the present tendency is the use of sailing vessels going directly to Europe,[36] along with an increase of seizures in containers being transported through regular commercial lines. There is also unconfirmed information about semisubmersible vessels or even fully submersible vessels being used by smugglers. Map 9 gives a comprehensive view of these routes.

Since the ships being used for the transport of drugs do not in any obvious way infringe on maritime regulations, they have (with the important exception of fast boats) the ability to hide amid the customary traffic. The problem confronting law enforcement ultimately is less to multiply sensors and other systems of collecting data on the positioning of ships and more to look for and exploit the maritime information and intelligence of all kinds, both upstream on the networks of drug exporting and downstream on the networks of narcotics distribution.

[36] Pleasure yachts loaded with relatively small quantities of drug.

Figure 7 — Various means used by smugglers to bring drugs from South America to Europe



In this respect, cooperation between states and between their respective law enforcement units has improved in the past ten years, and agencies like the Joint Interagency Task Force (JIATF) on the U.S. side or the Maritime Analysis and Operations Centre–Narcotics (MAOC-N) in Europe have led to real progress in information exchange and coordination. MAOC-N is an intelligence-sharing platform between various agencies of different European states and also contributes through its analysis of operations to a better knowledge of the smugglers' procedures and techniques. Through experience, Western law enforcement experts have discovered this kind of intelligence exchange is the most efficient way to tackle the problem of smuggling. Even so, interagency rivalries and turf battles impede full-spectrum coordination. It is easier to have two custom officers of two different nations working together than to have a French police officer and a French customs officer do the same. One might well dream of the day when information is able to go directly and confidentially from one country to another without consideration for the service using it, but for now, the MAOC (or JIATF) help bring together agencies from different areas of law enforcement. The immediate improvements to seek are to convince more

European states to join the MAOC-N and to develop tighter relations with reliable African states.

The UNODC report on the *Globalization of Crime: A Transnational Organized Crime Threat Assessment* released in June 2010 found that "drugs remain the highest value illicit commodity trafficked internationally, by quite a margin, with the illicit drug market generating approximately 85 percent of the estimated US$125 billion per year total revenue flow generated by transnational organized crime." (United Nations Office on Drugs and Crime 2010, 275) The report concluded that, "in the end, it appears that drugs remain the backbone of TOC [transnational organized crime], commanding the largest share of revenues, and fuelling violence, corruption, conflict and addiction." (United Nations Office on Drugs and Crime 2010, 276)

As stated by the leaders of the G8 during their 2010 summit in Muskoka, Canada, drug trafficking is one of the serious threats that international organized crime poses to global peace and security.

In view of the extent of drug trafficking being carried out at sea, it is critical that states be able to engage effectively in interdiction activity on the high seas. In particular, the ability to board, search, detain suspects, and transport them to shore to face justice is imperative. Engaging in law enforcement activity on the high seas requires states to operate within the prevailing international legal framework, complemented by the necessary domestic authority. Furthermore, cooperation is paramount since the responsibility of tackling the problem of transnational crime lies with all states.

To prevent the high seas from becoming a "safe haven" for offenders, Article 108 of UNCLOS provides that "all States shall cooperate in the suppression of illicit traffic in narcotic drugs... engaged in by ships on the high seas contrary to international conventions." Article 110 also provides justification for boarding a ship under certain circumstances.

Because the rule of the exclusive jurisdiction of the flag state applies in this matter, the provisions of Article 17 of the Vienna Convention further promote international cooperation in the interdiction of vessels engaged in the illicit traffic of drugs by sea, with a particular focus on cooperation between the authorities of

the flag state and those of a state that has reasonable grounds to suspect that a vessel exercising freedom of navigation is engaged in illicit traffic. However, far from planning an exceptional regime, the Vienna Convention, in Article 17, paragraph 9, organizes the international cooperation stressed by UNCLOS in suggesting the conclusion of bilateral or regional agreements while reserving to the flag state the right to accept or refuse the visit to one of its ships. It is by this logic that the agreement of Strasbourg promoted by the Council of Europe and the Agreement Concerning Co-Operation in Suppressing Illicit Maritime and Air Trafficking in Narcotic Drugs and Psychotropic Substances in the Caribbean Area (Caribbean Regional Maritime Agreement) of 2003 were adopted.

In this respect, some examples of functioning cooperation deserve mention, for example, that between the United Kingdom and Cape Verde or that between European countries, which in each case allow for the prosecution and interception of trafficking ships in due time to prevent the unloading of drugs. But it remains true that there is no comprehensive network of bilateral agreements, so it remains possible for perpetrators, by a judicious choice of flag and route, to avoid the possibility of apprehension.

A Way Forward

The main challenges for drug trafficking countermeasures are

- intelligence gathering and sharing between all countries and agencies involved in these operations; and
- identification of the jurisdictional complexities resulting from the various applicable laws, including regional agreements.

On the first point, it is clear that detection of drug-trafficking activities in the Atlantic and its ports is primarily a challenge of intelligence gathering and processing, in which cooperation is critical to boosting the efficiency of law enforcement. Good intelligence data from satellite, air, or maritime surveillance is often necessary to intercept smugglers. Interdiction capability is of course necessary for the final step, which is to seize the shipment. In this respect, capabilities both on the high seas and in coastal or port security are necessary. It is far easier to seize a bulk shipment aboard a merchant vessel or fishing ship (with cargoes up to several tons) than to halt multiple small loads after transfer at sea or

unloading in a port. The success of these high-seas operations relies on a combination of intelligence, surveillance, and interdiction capacities.

One of the main difficulties encountered in intelligence exchange and cooperation among various agencies and countries is the reliability and, even more, the security of the information received. The risk is high in some countries that information could pass (intentionally or not) to smugglers, foiling operations. The sensitivity of these operations is so high that any inadvertent or deliberate divulgence of information puts them at risk. This may be particularly the case in dealing with vulnerable states, where it is not always possible to rely on the authorities to protect information, yet it may also be a danger in developed countries. The chapter's authors have experienced instances in which leaks or disclosure of information by mistake or because of insufficient awareness of its sensitivity led to operational failures.

On the second point, harmonizing enforcement of existing conventions by all states is the priority rather than the development of new conventions. Such harmonization is the basis on which to conclude the bilateral agreements necessary to give force to the international legal framework. Consideration should also be given to existing instruments governing international cooperation to combat seaborne drug trafficking that extend the maritime jurisdiction of the contracting states, including the aforementioned 2003 Caribbean Regional Maritime Agreement and the 2008 Caribbean Community (CARICOM) Maritime and Air Space Security Cooperation Agreement. Existing instruments that address maritime interdiction in other contexts may also be considered. For example, the boarding provisions of the 2005 protocol of the Convention for the Suppression of Unlawful Acts of Violence against the Safety of Maritime Navigation provide the most recent international accord on procedures for boarding at sea. A principal aim would be to identify and gather information about the applicable domestic legislation of the Atlantic states. Moreover, all states that are not yet parties to the United Nations Convention against Corruption signed in December 2003 in Merida, Mexico[37] and the United Nations Convention against Transnational

[37] Among them, several Caribbean states, as well as Suriname, Ivory Coast, Gambia, Guinea, Equatorial Guinea.

Organized Crime signed in December 2000 in Palermo, Italy[38] should be encouraged to ratify them.

Finally, it is important to recall that revenues from these illegal activities are used to destabilize some states, making them ideal places for drug dealers to conduct business. Cooperation programs, such as those sponsored by UNODC (the Container Control Programme) or the EU (SEACOP and AIRCOP) are thus essential to help such states fight against drug trafficking. In West Africa, an operational response plan adopted in 2009 is an important step in this fight. The initiative, which is currently funded by the EU, has to be sustained in order to reach its goals.

Terrorism

As mentioned before, one type of terrorist activity is the use of the maritime transportation system to smuggle terrorists or terrorist materials into a targeted country. Because of the impracticality of boarding and controlling all ships before they enter a port, and in particular the difficulty of searching container ships at sea, the necessary actions to counter this kind of terrorist threat are more those of onshore and port authorities than maritime ones.

The U.S. Container Security Initiative (CSI) provides a good, if expensive, way of countering these plots. In order to address the threat posed by terrorists using a maritime container to deliver a weapon, the CSI envisions a security regime to ensure all containers that pose a potential risk for terrorism are identified and inspected at foreign ports before they are placed on vessels destined for the United States.

This regime is based on three core elements:

- Identification of high-risk containers, based on advance information and strategic intelligence;
- Prescreening and evaluation of containers before they are shipped; and

[38] Among them, Saint Lucia, Barbados, Ivory Coast, Angola, the Republic of Congo, the Democratic Republic of Congo, and Sierra Leone.

- Use of technology to prescreen high-risk containers so that screening can be done rapidly and not slow down trading operations.

In accordance with this initiative, several countries in the southern Atlantic have installed container screening equipment in their ports. With the exception of South Africa, in its port at Durban, no African states have such equipment, but Brazil, Argentina, and several Caribbean states do.

Arms Trafficking

Aside from UN Security Council resolutions specific to the circumstances of North Korea, Iran, and Syria, there is no international convention dealing with the battle against offshore arms trafficking. At the international level, weapons smuggling countermeasures can be put into effect only through bilateral agreements between the intercepting state and the flag state, provided a resolution establishing an arms embargo exists. On its own, the 2003 American Proliferation Security Initiative (PSI) constitutes only a partial answer to the fight against arms trafficking. Indeed, the PSI has as its sole objective preventing the illicit trade and distribution of equipment, technologies, and know-how that can be used in the design and the manufacturing of weapons of mass destruction. It is not an international convention but rather an intelligence exchange platform between partners that can lead to requests to intervene on ships. The United States has thus looked for bilateral mutual inspection agreements through which to implement PSI. They have been accepted by nine States (the Bahamas, Belize, Croatia, Cyprus, Liberia, Malta, the Marshall Islands, Mongolia, and Panama).

No comparable instrument exists for conventional weapons trafficking. Even if authorization can always be requested ad hoc from the flag state, it is imperative to be able to prove to that state's authorities the illicit character of the cargo in order to justify criminal prosecution.

This has been possible only in rare occasions, for example, UN Security Council Resolution 1701 in 2006, which imposed an arms embargo on the Lebanon and its implementation by the maritime component of the United Nations Interim Force in Lebanon, or

Security Council Resolutions 1874 and 1929 for North Korea and Iran, which encourage the cooperation of states to allow the open-sea interdiction of the ships suspected of transporting goods subject to embargo.

Atlantic Maritime Routes

As is true for many heavy goods and those carried in bulk, maritime conveyance is widely used by those who transport weapons of all sorts in violation of the letter or the spirit of national and international law and rules. Maritime transport accounts for most of the seizures and suspect shipments of military equipment, dual-use goods, and missile technology originating from or destined for states under comprehensive United Nations sanctions, such as Iran and North Korea.

It is also a primary means of delivering large shipments of heavy conventional weapons and military equipment to fragile states in the developing world. These flows have included deliveries of arms, ammunition, and other military equipment to zones of conflict in Africa such as the Democratic Republic of the Congo and Sudan. Studies have found that sea passage has been the primary means of illicit deliveries of small arms and light weapons to non-state combatants in Colombia, Somalia, and Sri Lanka (Griffiths and Jenks 2012).

Additionally, several African states are notorious as points of entry for small arms and light weapons (frequently mentioned are Nigeria, Cameroon, and Equatorial Guinea). Most of the arms are of Russian or European origin, but it seems that they are mainly conveyed by illegal dealers and sellers working for their own account.

Detection and Surveillance

As in the case of drug interdiction, the main responsibility for countering arms trafficking at sea falls to intelligence. In most cases, though, ships carrying loads of smuggled arms operate under normal conditions of navigation, and the nature of their cargo cannot ordinarily be determined by surveillance techniques. It is therefore the use of automatic tracking systems such as AIS or LRIT, combined with intelligence, that allows these ships to be monitored and provides information to security or customs forces.

Satellite surveillance is in this case a complementary means and aids in keeping tabs on a non-cooperative target trying to evade the normal tracking systems.

Keep in mind that it is difficult to board and inspect these ships in international waters thanks to the legal rights of the flag state and in the absence of the mutual boarding agreements noted above. The strength of the naval forces necessary to conduct such an operation safely against the resistance of often dangerous people is also considerable.

The emphasis should therefore be put on port supervision, which provides a good opportunity to inspect the ship, its cargo, and crew's quarters. Even if these inspections are ostensibly carried out for reasons of safety, environmental, or labor standards, they allow the port state to carefully scrutinize the cargo carried by the ship.

Similarly, any actions taken against arms trafficking by sea are included in global customs controls in the ports, and there is no specific action against this type of illicit activities. They are included in a global framework of countering illicit activities, the Agreement Concerning Co-Operation in Suppressing Illicit Maritime and Air Trafficking in Narcotic Drugs and Psychotropic Substances in the Caribbean Area from April 2003.

A Way Forward

If the coming into effect of the Convention for the Suppression of Unlawful Acts of Violence against the Safety of Maritime Navigation in 1992 could reinforce the Proliferation Security Initiative (PSI) by giving it a permanent legal framework, likewise, the fight against conventional weapons trafficking can make advances only if organized by an international legal instrument in the manner of what already is in place for drug trafficking or illegal immigration.

Nevertheless, the situation is much more complex because if there is no legal trafficking of drugs (with exception of therapeutic use in limited quantities), nor of persons (migrants, slaves, or others), the transport of and trade in weapons is mostly legitimate. It is thus necessary to have sound information to stop a ship in the high seas under suspicion of illicit arms trafficking. An unjustified decision to board or seize cargo could lead to disputes among nations and

involved parties and could have an adverse effect on cooperation in similar cases later on. The technology and strategic analysis used in the U.S. Container Security Initiative probably would help hone the accuracy of interdictions.

Human Trafficking

Last but not least among the range of illegal endeavors is human trafficking. If the slave trade persists nowadays in the form of trafficking in women for sex,[39] the main concern for maritime authorities is nonetheless the course of illegal immigration, which too often leads to deaths.

Atlantic Maritime Routes

The main routes for illegal immigration in the Atlantic are:

- between the western coast of Africa and the Canary Islands for people from sub-Saharan countries and looking for refuge in Europe;
- between African countries in the Gulf of Guinea, where flows are highly dependent on the relative political and economic situation at any given time; and
- in the Caribbean, from South America and Central America toward the United States and Canada, and between Latin America and the European Caribbean islands. It is impossible to describe in detail all the possibilities for transit and destination in this region.

Another pattern of illegal immigration exists between some African countries, but it does not chiefly use maritime routes.

These immigrants resort to two primary methods of transport: stowing away aboard merchant ships (a small percentage of the total) and cramming onto small craft that are all too frequently unseaworthy.

[39] These women are occasionally transported by sea using the same networks that are used for drug and weapons smuggling.

Detection and Surveillance

Given the characteristics of this traffic and the kinds of vessels more frequently used by smugglers, detection and surveillance challenges are of two kinds:

- Obtaining information about transit routes, dates of departures, and destinations; and
- On-scene surveillance by aircraft, radar, and ships in order to identify and intercept trafficking boats.

Reliable intelligence is essential to countering these activities effectively. As an example, in 2001, in order to counter illegal immigration coming from Syrian ports, France stationed ships nearby so as to be able to intercept the immigrants' craft as soon as they reached international waters. Shortly after it implemented this policy, that route was abandoned and others opened elsewhere. Constant intelligence updates are thus needed to keep track of these metastasizing flows.

All concerned countries have tried to intercept vessels used by illegal immigrants with the idea of sending those aboard back to their departure ports or countries. These actions often have proved ineffective because coastguard units, and even merchant ships, have been confronted not with illegal immigrant passengers but with desperate survivors in the water amid the wreckage of their craft, leaving no other option than to save them and bring them in their own countries.[40]

These days, standard procedure is to bring people who are frequently in peril aboard ship, either because of the rotten boats used by traffickers or because the boat was deliberately holed when coastguard units approached. Later, bilateral agreements are used in order to send back at least some people to their native countries or the country of departure.

The only sure way to halt illegal immigration in the long term is by drying out the flow of migrants through economic development in their home countries. In the meantime, the best method of countering seaborne illegal immigration is to develop better

[40] In 2001, the Norwegian ship *MV Tampa* rescued illegal immigrants trying to reach Australia. Australia refused to admit them, in contravention of the Law of the Sea. The immigrants were finally taken to New Zealand and Nauru after several days' delay.

coordination with states used as departure points in order to help them to prevent such vessels from embarking in the first place.

Legal Activities Affecting the Marine Environment and Resources

Some economic activities that are conducted legally may have negative consequences for the marine environment and its resources. These enterprises are considered by some to be in the same category as illegal activities. However, the distinction ought to be maintained, which is not to suggest that these legal ventures should go unregulated or uncontrolled. Two short examples illustrate this point more clearly.

First, intensive fishing practices may lead to a dangerous reduction of fish stocks in some areas. Moreover, some take advantage of lack of regulations or surveillance capabilities to fish illegally under cover of complying with the rules. Further, some stakeholders deliberately oppose measures to tighten regulations or improve surveillance capabilities. But it is not fair to use these arguments to criticize and pillory all fishermen.

Second, maritime transport causes air pollution and poses a risk for the marine environment. But since this form of transport is less harmful to the environment per ton transported than any other, the responsible thing to do is to replace international road transport by short-distance connections by sea wherever possible. Efforts are being made to reduce further the environmental footprint of shipping. Improvements are on the way under the International Convention for the Prevention of Pollution from Ships (MARPOL); its Annex VI deals with air pollution and is reinforced by stricter EU legislation on sulfur dioxide emissions. It may be worthwhile to consider creation of Sulphur Emission Control Areas in West Africa, where densely populated coastal zones are subject to air pollution created by seaborne transportation. Firms engaged in maritime transport actors are trying to improve their operating procedures, as has been demonstrated by the reduction in average speed of container ships in the face of the recent economic crisis. It is hence of utmost importance to counter indiscriminate criticism of such activities, as has been leveled by certain NGOs because of air pollution or harm to the marine environment. When the further

progress has been made, shipping by sea will once again be a truly green means of transport.

There is nevertheless an interesting connection to make between these enterprises and the illegal activities presented earlier: extending maritime surveillance in order to monitor legal activities and protect the marine environment helps develop the tools necessary to counter illegal activities more effectively.[41] Sharing information among the various agencies and nations charged with enforcement is the crux of the matter.

Conclusions and Policy Recommendations

Based on this broad review of illegal and legal but regulated activities at sea, the main efforts at reform should be concentrated in these areas:

- wider exchange of information in order to give to any interested law enforcement service the opportunity to act against illegal activities to the best of its capabilities;
- fostering of interstate confidence and cooperation in order to overcome individual countries' shortcomings in terms of capacity, gaps in responsibility, and lack of openness. In this view, the development of coordination projects such as BlueMassMedare vital to achieving greater efficiencies;[42]
- an integrated and holistic approach toward all potentially destabilizing activities at sea;
- improving and developing coastguard services' ability to carry out their missions because it is easier to stop and seize a substantial illegal cargo than to chase multiple microcargoes ashore;
- enhanced cooperation with developing countries to help them enforce their authority in their coastal areas. This entails an

[41] The Marine Protected Areas network that is being implemented along the coasts and in the high seas and the development of maritime spatial planning will make it necessary to improve surveillance capabilities.

[42] BlueMassMed is a pilot project sponsored by the European Commission involving five countries with the aim of setting up integrated maritime surveillance in the Mediterranean Sea and its Atlantic approaches.

improved legal framework, more effective resources, including information systems and centers, and better training of agents;

- coordination to resolve conflicts of jurisdiction, which so often provide the means of evading justice for smugglers of all kinds;
- The development of satellite surveillance to ensure better coverage of the high seas and to provide tracking of non-cooperating targets. Satellite surveillance can be used to counter many forms of illegal activities at sea, but because such capabilities widely exceed the financial resources that many individual states can muster, they must be considered as a common tool, to be deployed on a global scale; and
- Refinement of the ongoing cooperation between various state agencies centering on intelligence, so as to better the chances of seizing illegal ships and cargoes.

These developments will better equip states to combat all illegal activities that abuse the freedom of the seas. Still, the difficulties that result from the confrontation between the rights of the coastal state and those of the flag state need also to be addressed. Will it be necessary, as some suggest, to negotiate a new Law of the Sea convention to resolve them?

A comprehensive approach to these problems is doubtless the best way to deal with them. While specialized forums are clearly necessary for some questions because illegal activities are not the only topic on the agenda, nonetheless global awareness of the maritime domain is certainly a good-guiding concept. A directive signed in 2002 by U.S. President George W. Bush aimed to reach an "effective understanding of anything associated with the global maritime domain that could impact the security, safety, economy, or the environment of the United States." The objective was to put together all information gained by U.S. agencies in order to get a comprehensive picture of maritime conditions and to be able to take appropriate decisions. That initiative should inspire our thinking on the subject, pointing out that comprehensive knowledge of all activities throughout the Atlantic is the starting point to counter criminality on the high seas, along the coasts, and in ports.

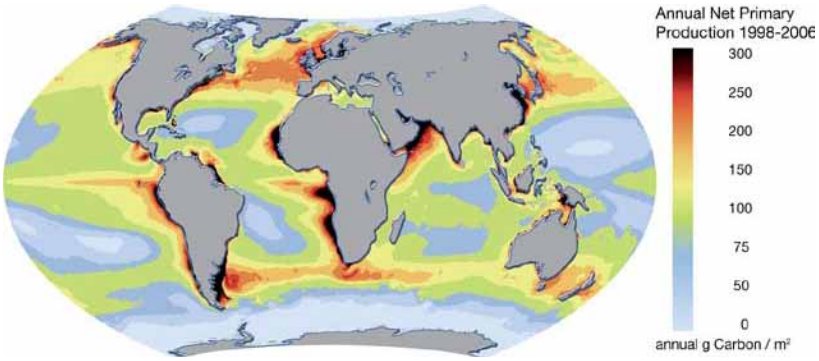
3. Fisheries: A Resource in Crisis

Paul Holthus, Xavier de la Gorce, and Anne-François de Saint Salvy

Introduction

Fisheries are probably the oldest form of human exploitation of marine resources. Good fishing grounds are often associated with areas of strong primary production of biomass in the oceans (Figure 8) (Nellemann, Hain, and Alder 2008), those areas with high concentrations of the microscopic phytoplanktons that form the base of the oceanic food chain. Some primary production is associated with upwelling, which occurs when winds blowing across the ocean surface push water away from an area and nutrient-rich subsurface water rises up from below. High-productivity areas in the Atlantic include a band extending across the North Atlantic, parts of the west coast of Africa that are associated with year-round coastal upwelling, the mouth of the Amazon River, the waters off Argentina below the Río de la Plata, and a narrow band of productivity extending from the shores of southernmost Patagonia to the Cape of Good Hope.

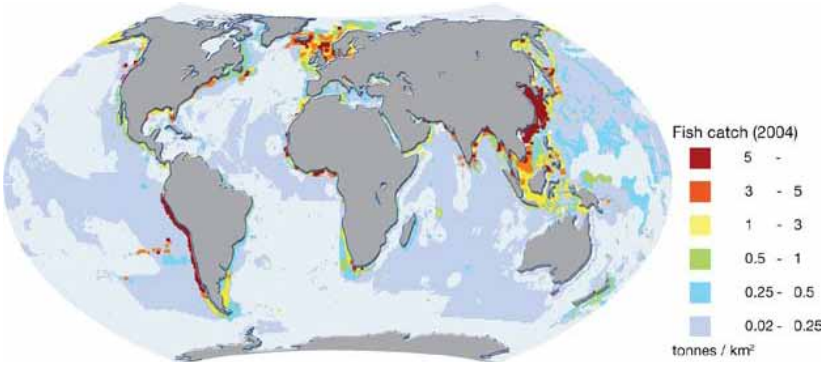
Figure 8 — Global primary production in the ocean



The world's most productive fishing grounds are confined to areas that make up less than 10 percent of the global ocean (Figure 9) (Nellemann, Hain, and Alder 2008). There is a strong correlation

between fishing activity and continental shelves, upwelling, and primary productivity. In the Atlantic, the major fish catch areas have been in the northeast (NE) waters between Europe and Greenland, the offshore banks of the northwest (NW), and portions of the upwelling areas of West Africa. Although overall catches have declined considerably in most northern areas, this pattern still held good in the recent past.

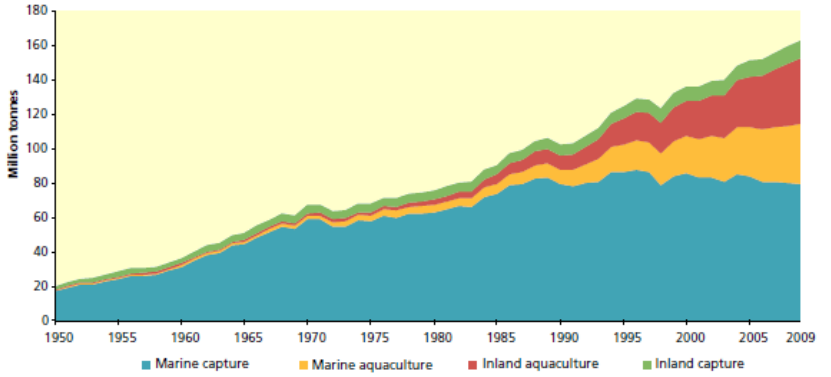
Figure 9 — The world's most productive fishing grounds



Marine fishery catches increased from 16.7 million metric tons (MT) in 1950 (86 percent of total world production) to a peak of 87.7 million MT in 1996. Since then, global landings of fish and seafood have declined gently, with fluctuations reflecting the variation in catches from a few highly productive areas, particularly in the northwest and southeast Pacific areas that account for a large portion of pelagic species catches. Marine fisheries stabilized at about 80 million MT in 2009, which now represents 49 percent of the world's fish production since aquaculture has been growing rapidly (Figure 10) (Food and Agriculture Organization 2010).

Fisheries developed rapidly in the late 1950s and 1960s and again between 1983 and 1989. The first boom is believed to have been caused mainly by postwar expansion of shipbuilding, by new technologies such as steam and motor trawlers in the 1960s, and by most coastal states' extension of their jurisdiction to 12 nautical miles, which encompasses a good percentage of the continental shelf as well as the ocean's most productive upwelling zones (Sanchirico and Wilen 2007; Engelhard 2008). The second rapid expansion is associated with the extension of national jurisdiction

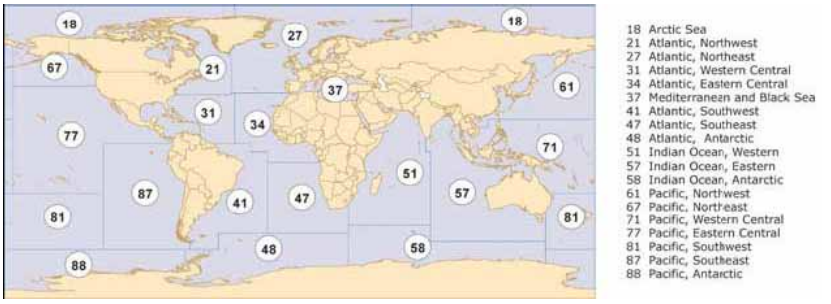
Figure 10 — World production of fisheries and aquaculture



for the purposes of resource extraction from 12 to 200 nautical miles with the establishment of exclusive economic zones (EEZs) under the legal cover of the United Nations Convention on the Law of the Sea (UNCLOS) (Sanchirico and Wilen 2007).

The UN Food and Agriculture Organization (FAO) provides the most complete data set for fisheries, subdivided among major marine fishing areas. Seven FAO statistical major marine fishing areas make up the Atlantic (excluding the Mediterranean and Black seas): Northwest (Area 21), Northeast (Area 27), West Central (Area 31), East Central (Area 34), Southwest (Area 41), Southeast (Area 47), and the Atlantic Antarctic (Area 48) (Figure 11).

Figure 11 — FAO marine fishing areas

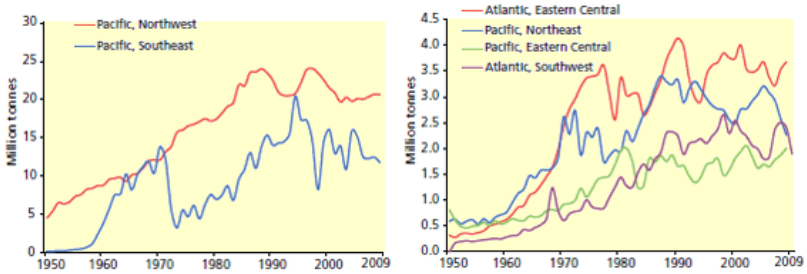


Based on average catches in the 2005–2009 period, the most productive fishery areas are the NW Pacific (25 percent), SE Pacific (16 percent), Western Central Pacific (14 percent), NE Atlantic (11 percent), and Eastern Indian Ocean (7 percent) (Food and Agriculture Organization 2010). All other FAO marine fishing

areas contribute less than 5 percent of the global total catch. This includes the other six FAO areas that make up the Atlantic: NW, W Central, E Central, SW, SE, and the Atlantic Antarctic.

The patterns of marine fisheries landings differ over time and from area to area and can be grouped into three types. The first are areas that have demonstrated oscillations in total catch but where a declining trend is not evident (Figure 12). In the Atlantic, this includes the E Central and SW areas.

Figure 12 — FAO statistical areas showing fluctuations in fish landings

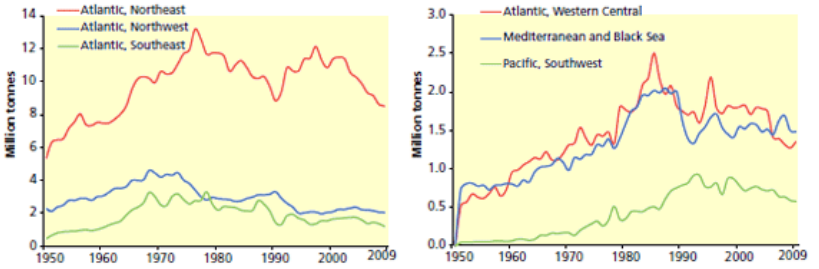


The second group consists of areas that demonstrate a decreasing trend in catch; this includes four of the Atlantic's seven fishery areas: NE, NW, W Central, and SE. The declines have occurred at different times: the NW Atlantic in the late 1960s, the NE and SE Atlantic in the mid-1970s, and the W Central Atlantic in the mid-1980s — largely indicative that areas adjacent to the most-developed countries experienced the earliest decline in catches. Most of the largest declines in global fisheries were in the Atlantic: NW (down 55 percent), W Central (down 46 percent), and NE Atlantic (down 35 percent).

The third group consists of FAO marine fishing areas that have shown a continual increase in catch since 1950, none of which are in the Atlantic.

In areas beyond national jurisdiction (ABNJ), the high-seas, including deep-seas, fisheries create international management challenges. Migratory tunas and related species such as billfishes are the most valuable high-seas fishery resource, with production highest in the Pacific, followed by the Atlantic and Indian Oceans.

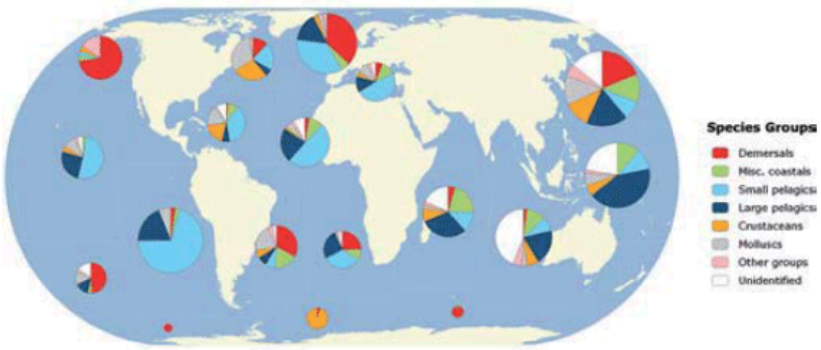
Figure 13 — FAO statistical areas showing a decreasing trend in fish landings



The harvest increased from less than 0.5 million MT in the early 1950s to 5.5 million MT in 2006. For deep-sea fisheries, catch peaked at 3.6 million MT in 2004 and then dropped to 1.9 million MT in 2009. The Atlantic Ocean contributed about 80 percent of total deep-sea catch between 2000 and 2005. The decline is largely attributed to a decrease in blue whiting catch in the Atlantic, from 2.4 million MT in 2004 to only about 65,000 MT in 2009, owing to a decline in recruitment of yearlings to the population, a drop in spawning stock biomass, and a reduction of quotas for allowable catch (International Council for the Exploration of the Sea 2011). Species composition varies from area to area around the world. Natural fluctuations occur in fish stocks, particularly for low-trophic-level species (those that are low on the food chain), creating changes in catch results. This is one of the greatest difficulties for stock management. In the NE Atlantic, demersal fishes (bottom feeders) were the most harvested species group in recent decades, followed by larger pelagics (those that roam near the surface) and small pelagics. Small pelagics were dominant in the E Central and W Central Atlantic (Figure 13) (Food and Agriculture Organization 2010).

Catch composition can change because of fishing pressure, for example, fishing down the marine food web (Pauly et al. 1998). As large, slow-growing predatory fishes at higher trophic levels are overfished, they are gradually replaced in fisheries landings by smaller, fast-growing fish and invertebrates from lower trophic levels. These changes reflect the effect of fishing on the abundance of target species and on the structure of other marine ecosystem communities, as well as the adaptation of industry and markets to previously unattractive or low-value species. In the Atlantic, for

Figure 14 — Catch species composition by main species groups in major fishing areas in 2009

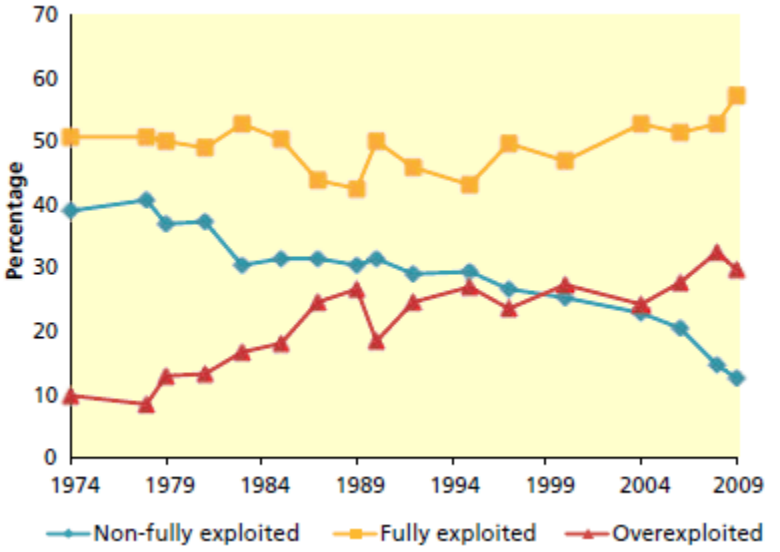


example, the mollusk and crustacean harvest increased noticeably in the NW sector following declines in demersal fish catches.

The FAO reviews and reports on marine stocks or species groups for each major marine fishing area to determine their status and exploitation trends (Figure 14) (Food and Agriculture Organization 2010). Of the fish stocks assessed, 57.4 percent were estimated to be fully exploited in 2009. These stocks yielded catches that were already at or very close to their maximum sustainable production. They are at some risk of decline if not properly managed. Among the remaining stocks, 29.9 percent were overexploited and 12.7 percent not fully exploited in 2009. The overexploited stocks produced lower yields than their biological and ecological potential. They require strict management plans to rebuild their abundance in order to restore full sustainable productivity. The not fully exploited stocks were under relatively low pressure. However, these stocks often are not highly productive. The potential for raising their catch may be generally limited. Nevertheless, proper management plans should be established before increasing the harvest rate of these not fully exploited stocks in order to avoid following the same path of overfishing.

The proportion of overfished stocks has increased from 10 percent in 1974 to 26 percent in 1989. After 1990, the number of overfished stocks continued to increase, but the rate slowed, reaching about 30 percent in 2009. The proportion of fully exploited stocks demonstrated the smallest change over time. The percentage dropped from about 50 percent at the start of the data collection

Figure 15 — Global trends in marine fish stock status from 1974 to 2009



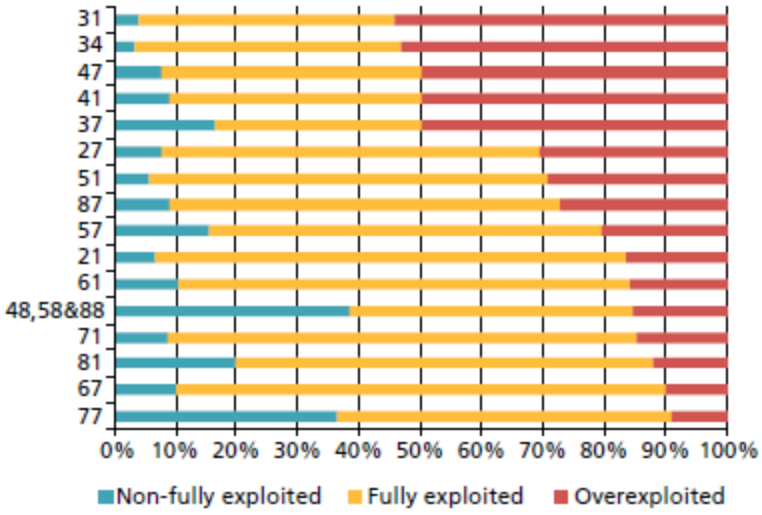
series in the 1970s to 43 percent in 1987 and has rebounded to 57.4 percent in 2009.

The rise in fully exploited stocks after 1990 may seem to indicate the positive impact of fishery management in maximizing production. However, close attention must be paid to all fully exploited stocks to ensure that they are not overexploited in the future. Similarly, the deceleration in the rate of increase of overfished stocks after 1990, in comparison with the 1980s, suggests that some fish resources have benefited from the improved management efforts of coastal states and the international community.

In the Atlantic, however, a less sanguine verdict on management is warranted. Four of its seven marine fishing areas lead the world with the 50 percent or more of stocks overfished: the W Central, E Central, SE, and SW. Other Atlantic fishery areas had 15 to 30 percent of their fish stocks overexploited (Figure 15). However, it is important to keep in mind that in some parts of the world there are relatively large numbers of stocks or species groups whose state of exploitation is undetermined by the FAO, such as in the W Central Atlantic.

Figure 16 — Percentages of fish stocks in different status by major fishing areas in 2009

Note: W Central Atl- Area 31, E Central Atl- Area 34, SE Atl- Area 47 and SW Atl- Area 41



Overfishing, damage to productive areas, and fishing down marine food webs are responsible for the reduction of fish and seafood biomass, which ultimately leads to inshore and traditional fishing grounds becoming less fruitful. With up to 80 percent of the world's primary catch species exploited beyond or close to their harvest capacity, fisheries move to new areas and stocks as catches diminish, creating new challenges for sustainable fisheries management. This trend is particularly evident in the Atlantic.

Focus on the Southeast Atlantic

The Eastern Central Atlantic marine fishing area and Southeast Atlantic area together extend from the Strait of Gibraltar to the Cape of Good Hope, and out to the midpoint between Africa and the Americas — encompassing half of the South Atlantic.

In the E Central Atlantic, the highly productive Guinea Current ecosystem extends from Guinea-Bissau to the northern boundary of Angola, bathing the exclusive economic zones of 13 western African nations. The Guinea Current is warm and tropical, with nutrient-rich seasonal upwelling.

Commercial fish catch there rose steadily from 1950 through the mid-1970s and has fluctuated between 2.5 and 4.1 million

MT since that time (Food and Agriculture Organization 2010). Since the 1960s, pressure by foreign and local industrial fleets has placed the fisheries in the region at risk (Kaczynski and Fluharty 2002). The catch attributed to foreign fleets jumped dramatically from the late 1960s through the mid-1970s, primarily focused on small pelagics and tunas. At the same time, coastal states steadily developed their national fisheries, particularly in recent decades, when their percentage of the total catch in the region increased to 72 percent.

Various commercial vessel types (purse seiners and other types of seiners, midwater and demersal trawlers, gillnetters, and others) contribute almost equally to the total national catch of the countries in this region. Landings steadily increased from 1950, with a peak of 900,000 MT in 2000 (Sea Around Us Project 2009). A diverse assemblage of coastal fish species and shrimp caught with traditional gear are important here (Sherman and Hempel 2008).

An increase in reported landings over this same period appears to have compensated for the decline in the mean trophic level of the catch (Pauly and Watson 2005). While skipjack tuna, small pelagic fish in the northern part of the Gulf of Guinea, and offshore demersal fish and cephalopods are underexploited (Mensah and Quaatey 2002), the overall level of exploitation in this area is substantial (Abe et al. 2003).

Several stocks, including small pelagics and shrimps in the western and central Gulf of Guinea and coastal demersal resources, are fully exploited or overexploited. Heavy exploitation of yellowfin and bigeye tuna stocks appears to be depleting these highly migratory species (Mensah and Quaatey 2002). Inshore trawling fisheries have led to declining biomass and catch per unit effort (a statistical measure of overexploitation) for demersal species (Koranteng and Pauly 2005). Since the mid-1970s, the mean trophic level of the reported landings has shifted downward, indicating that food webs of the Guinea Current pelagic zone are being more thoroughly exhausted. Fisheries, having depleted more vulnerable large predatory fish at the top of the food chain, ultimately target smaller fish, even jellyfish (Pauly 2007).

Further south, in the SE Atlantic, the inshore area is dominated by the Benguela upwelling, encompassing the EEZs of Angola,

Namibia, and Atlantic-facing South Africa, which supports one of the most productive regions in the world, rich in pelagic and demersal fish (Sherman and Hempel 2008). Total landings increased steadily from 1950 to a peak of about 3 million MT in 1978, followed by a general decline, down to about 1.1 million MT in 2004. Approximately 60 percent of commercially exploited stocks in the Benguela upwelling pelagic zone have collapsed, while another 10 percent are overexploited (Sea Around Us Project 2009).

Most of the commercially important stocks within the region were subject to intense fishing pressure in the 1960s and 1970s, leading to severe declines in abundance. While large numbers of foreign fleets operated locally in the 1970s and 1980s, Namibia and South Africa have been responsible for the largest percentage of the catch since the 1990s. Since the mid-1970s, the mean trophic level of the reported landings has been relatively stable in this region (Pauly and Watson 2005), although total catch by weight declined over the same period. A decline in both catch and mean trophic level is particularly strong off Namibia, where jellyfish now dominate the food web (Lynam et al. 2006). The serial decline in stock quantities and catch per unit effort is caused, in part, by overfishing, excessive fleet and processing capacity, the catching of undersized fish, and inadequate fisheries management (Sherman and Hempel 2008). As a result, the fisheries have experienced years of catches well below the maximum or optimal sustainable yields. Fish populations in the region migrate across national EEZ boundaries, and all three countries have experienced significant declines in the catch for all major fishery resources, making this a critical transboundary issue (Hampton et al. 1999; Tapscott 1999).

The Shift from North to South

Unsurprisingly, spatial analysis of global fisheries indicates that maximum catches were achieved in the Northern Hemisphere, along the coasts of developed countries, much earlier than in other parts of the world (Watson and Pauly 2001). Global fisheries catch totals have been maintained only through the expansion of fisheries from the Northern to the Southern Hemisphere and into fishing grounds that are further offshore and in deeper waters. In the Atlantic, fishing activity is following the wider trend, moving to

deeper waters and from the North Atlantic to the South Atlantic, as exemplified by the Spanish fleets (Figures 17a and 17b).

With many traditional, shallow fishing grounds depleted, fisheries are increasingly targeting deep-water species on the continental slopes and seamounts. Whereas trawling in shallow coastal waters is often carried out by smaller vessels, deepwater and high-seas bottom trawling requires large, powerful ships. These fleets, mostly based in industrialized countries, fish intensively and for months at a time across the ocean. The spatial distribution of the big Spanish fishing fleet over the years provides a striking example of this phenomenon.

Figure 17a — Average catch by Spain in the 1950s

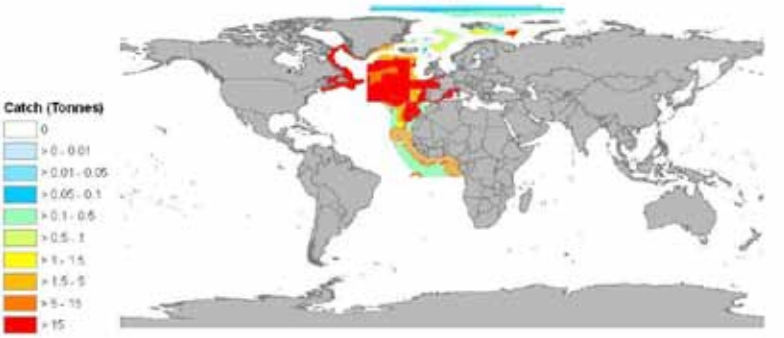
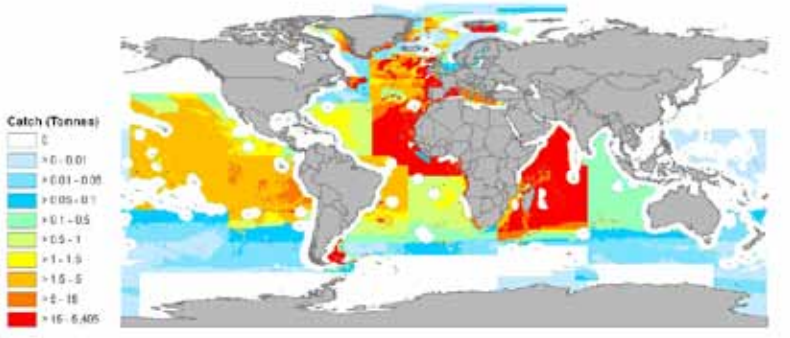


Figure 17b — Average catch by Spain from 2000 to 2004



The challenge is clearly to ensure that the mistakes made in the northern Atlantic are not repeated in the southern Atlantic.

Developments in the Southeast Atlantic allow for little optimism in this regard. It seems clear that improvements in fisheries management on a national level, which countries in the North Atlantic have struggled to introduce, with only partial success, are badly needed also in the Southeast Atlantic in order to achieve sustainability.

The situation for migratory fish stocks in particular is further complicated by the unsatisfactory functioning of their regulatory bodies, which require transnational cooperation to be effective.

Governance for Transboundary Fisheries

Regional Fishery Bodies (RFBs) are the primary mechanism through which the conservation, management, and development of transboundary fisheries is undertaken by states, usually as parties to an international fishery agreement. Some RFBs manage all the fish stocks found in a specific area, while others focus on particular highly migratory species, notably tuna, throughout vast geographical areas.

The RFBs are open both to countries in the region ("coastal states") and countries with interests in the fisheries concerned. Though RFBs are composed of independent states, they are not supranational organizations. States come together under the aegis of a RFB because of their common interest and concern for conserving and managing their fish stocks. Therefore, RFBs can only be as effective as their members permit.

The primary reason for establishing RFBs is to manage fish stocks throughout their range of distribution. They must take into account the need for compatible conservation and management measures in areas within and beyond national jurisdiction for the sake of boundary-straddling, highly migratory, or high-seas migrating stocks.

The functions of RFBs vary. They can include the collection, analysis, and dissemination of information and data, coordinating fisheries management through joint schemes and mechanisms, serving as a technical and policy forum, and taking decisions relating to the conservation, management, development, and responsible use of resources. Some RFBs have an advisory mandate,

and provide advice, proposals, or coordinating mechanisms that are not binding on their members. Some RFBs have a management mandate — these are called Regional Fisheries Management Organizations (RFMOs). They adopt fisheries conservation and management measures that their members must comply with.

The RFBs related to the Atlantic are as follows. Those with asterisks are RFMOs (Figure 18a and 18b):

- International Commission for the Conservation of Atlantic Tunas (ICCAT)*
- Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR)*
- NorthEast Atlantic Fisheries Commission (NEAFC)*
- Northwest Atlantic Fisheries Organization (NAFO)*
- Fishery Committee for the Eastern Central Atlantic (CECAF)
- Caribbean Regional Fisheries Mechanism (CRFM)
- Regional Fisheries Committee for the Gulf of Guinea (COREP)
- Fishery Committee of the West Central Gulf of Guinea (FCWC)
- International Council for the Exploration of the Sea (ICES)
- North Atlantic Marine Mammal Commission (NAMMCO)
- North Atlantic Salmon Conservation Organization (NASCO)
- South East Atlantic Fisheries Organisation (SEAFO)
- Subregional Fisheries Commission (SRFC)
- Western Central Atlantic Fishery Commission (WECAFC)

Strengthening the performance of RFBs in order that fish stocks may be better conserved and managed is thus another major challenge facing Atlantic fisheries governance. The role of RFBs, with solely an advisory mandate, and their relationships with RFMOs should be examined. Their work may lead to improved national fisheries governance and harmonized regional measures, and they contribute to the efforts of RFMOs in areas such as

Figure 18a — Regional fishery bodies

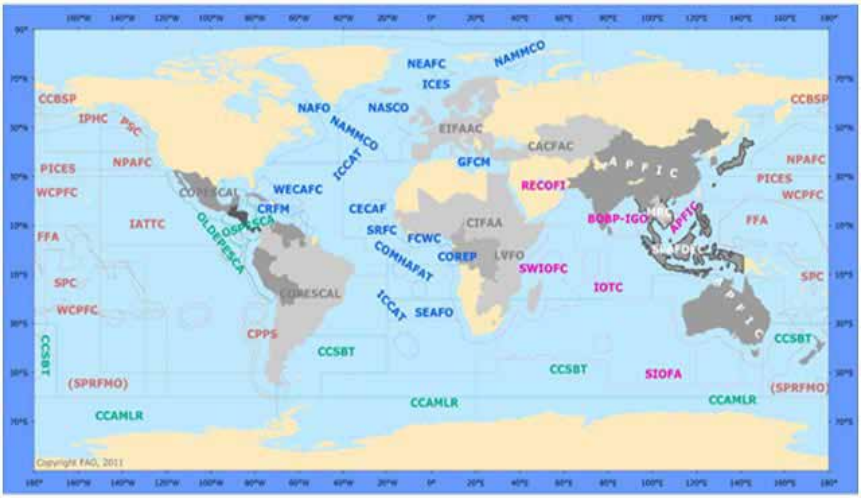
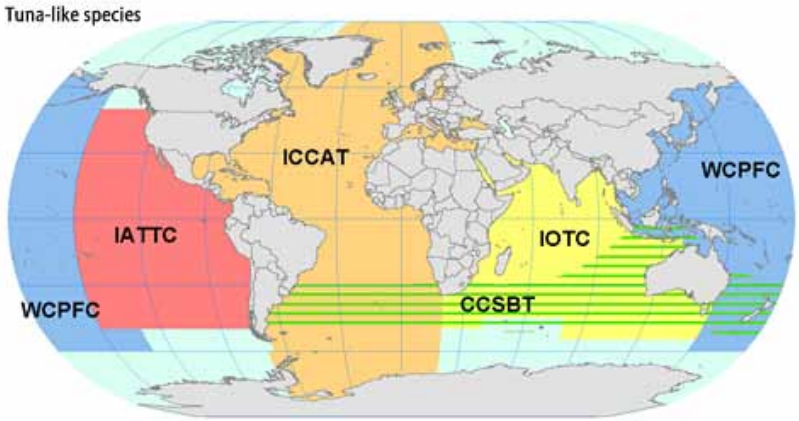


Figure 18b — Regional fishery bodies for tuna and tuna-like species



monitoring/control/surveillance, information exchange, and scientific advice. As helpful as the RFBs are, though, RFMOs with strong mandates need to be introduced wherever they are currently lacking.

Many existing RFMOs are taking steps to improve governance through implementing an ecosystem approach to fisheries and adopting the precautionary approach. They are also working to tighten international cooperation, promote transparency, deal with non-members, and enhance monitoring, control, and surveillance measures, including the implementation of mandatory vessel monitoring systems, the development of vessel lists, and the

adoption of regional schemes for port state measures. But there is very little real coordination between these various organizations. In particular, the lack of a global ledger of illegal fishing vessels greatly harms policing efforts.

The perceived lack of action by RFMOs and their inability in some cases to stem stock declines are related to a lack of political commitment by some of their members. Unyielding positions incompatible with sound regional fisheries management can block efforts pursued by RFMOs to tackle conservation and management challenges. Members must collaborate effectively and take difficult decisions if they are to be successful, even if not all have congruent interests.

Subsidies

A critical policy aspect of transboundary fisheries in the Atlantic relates to subsidies and incentives, which are seen as one of the root causes of overcapacity and overfishing. Distant-water fishing fleets are fueled and kept afloat by subsidies and incentives, without which their operation would not be economically viable.

Fishing subsidies are defined as direct or indirect financial transfers of funds from public entities that help make the fishing sector more profitable than it would otherwise be. Fishing subsidies can generally be divided into three categories: beneficial, capacity-enhancing, and ambiguous. *Beneficial subsidies* enhance the recovery of fish stocks through conservation, monitoring, and control of catch rates. Beneficial subsidies include programs such as fisheries management, research, and the establishment of Marine Protected Areas. *Capacity-enhancing subsidies* stimulate overcapacity and overfishing by artificially boosting profits (or trimming costs so that fishing ventures that looked unviable previously are now worth trying) that compound the more general problem of resource overexploitation. These include programs such as fuel subsidies, boat construction and modernization assistance, fishing port construction and renovation, price and marketing support, processing and storage infrastructure, fishery development projects, tax exemptions, and foreign access agreements. *Ambiguous subsidies* can lead to positive or negative impacts on fishery resources depending on the design of the program. Some

examples include fisheries assistance programs, decommissioning and buyback programs, and community development programs.

Overfishing, overcapacity, and overcapitalization are linked to the way access to fish stocks is regulated, the way in which fishery participants react to different types of regulations, and the way in which subsidies affect participation in fisheries. Direct subsidies are defined as payments to recipients, as when the government gives grants to fishermen to buy new vessels. Indirect subsidies are transfers that do not have a specific recipient. These include financial transfers or policies, such as trade sanctions, that benefit domestic fishing vessels over foreign competitors.

Fishing subsidies can create incentives to fish more even when catches are declining. The results of overfishing and excess fleet capitalization are reduced economic efficiency and failure to maximize the potential economic benefits from the resource. The contribution of the world's marine fisheries to the global economy is substantially smaller than it could be. The lost economic benefits are estimated to be on the order of $50 billion annually. Over the past three decades, the cumulative global loss is on the order of $2 trillion (World Bank and Food and Agriculture Organization 2009).

Governments have many ways to subsidize the fishing industry. From tax breaks to direct cash payments, from income support to free port facilities, from cheap fuel to reduced insurance, the variety of subsidies is a bureaucrat's dream. Governments want to encourage investment in a sector that helps provide food security and offers jobs in coastal regions.

Even subsidies designed to help reduce fleets, such as "vessel buyback" or decommissioning programs, have often failed to achieve their goals. In several cases, buyback programs have provided funds that actually wind up being used for new technologies that increase overall capacity. In other cases, capacity reductions have been achieved in one nation's waters simply by exporting capacity to foreign fishing grounds, a phenomenon that has played a significant role in the "serial depletion" of commercial fisheries.

By encouraging overfishing and dependence on public support, subsidy regimes can produce unsustainable results regarding

employment. In the case of Newfoundland, generations of subsidized fishermen have ended up contributing to the collapse of one of the world's most valuable and productive fisheries, the North Atlantic cod, resulting in massive and long-lasting unemployment.

The lost benefits, or the difference between the potential and actual net benefits, can be largely attributed to two causes. First, with stocks depleted, there are simply fewer fish to catch, and therefore the cost of catching them is greater than it could be. Second, the massive fleet overcapacity, often described as "too many fishers chasing too few fish," means that the potential benefits are also dissipated through excessive fishing effort (World Bank and Food and Agriculture Organization 2009).

The world's largest economies provide the largest subsidies, often to support fishing operations in the waters of other countries. The EU uses public money to buy access for its fleet to the waters of developing West African states, whose own fishing capacity remains underdeveloped. For example, EU subsidies enable large European shrimp trawlers to fish the waters of Guinea-Bissau by underwriting up to 46 percent of their operations — allowing them to stay in business even after actual profits from catches have dropped to zero. The EU fishing industry receives a significant amount of government subsidies, which have promoted the massive overcapacity of its fleets. The European fishing fleet is estimated to be two to three times greater than what sustainable limits would allow.

In addition, the fisheries in many European countries are unprofitable and represent a poor investment for taxpayers. In 2009, fishing sector subsidies totaled €3.3 billion (about $4.6 billion), more than three times greater than the amount typically quoted in public figures. In 13 countries, subsidies were larger than the value of the fish catch (Schrooer et al. 2011).

In the United States, a study found that, from 1996 to 2004, U.S. federal and state governments provided an estimated $6.4 billion in subsidies to the U.S. fishing industry — an average of $713 million per year (Sharp and Sumaila 2009). Federal funding accounted for 79 percent of the total subsidies. Commercial fishermen are exempt from federal and state fuel taxes. Fifty-six percent of the government funds went to subsidies classified as "harmful" to

fishery resources, which means that they are likely to increase overcapacity, and the remaining 44 percent went to subsidies that were "ambiguous."

Lopsided subsidy distribution also distorts international trade in fish products, skews prices, and affects market access and production patterns. Continuing subsidies contribute to a decline in the wealth of global fish resources, harvest operations that become ever more inefficient, even growing poverty in fishery-dependent communities, which merely ramps up political pressure for subsidies, at a time of heightened risks of fish stock collapses. The fisheries sector, rather than being a net contributor to global wealth, is an increasing drain on society.

An agreement to reduce and eventually eliminate capacity-enhancing fisheries subsidies for the Atlantic is urgently required. The political difficulty of achieving this makes it the third major challenge to achieving sustainable fisheries in the Atlantic.

Illegal, Unreported, and Unregulated Fisheries

The task of RFMOs is made more difficult because the legal fisheries that they regulate are not the only source of stock depletion. Illegal, unreported, and unregulated (IUU) fishing also depletes fish populations, destroys marine habitats, distorts competition, puts honest fishers at an unfair disadvantage, and weakens coastal communities, particularly in developing countries. It is therefore one of the triggers of social and political difficulties in many countries, for example, Mauritania and Senegal on the Atlantic. IUU fishing is probably also one of the problems that foster piracy since poor fishermen, unable to feed their families, provide a ready and willing workforce for freebooters.

In its operational plan against IUU fishing, the FAO gives a global definition of this activity that is generally agreed to by all parties and provides a sound basis for dealing with it, clearly distinguishing the pertinent agents in the fight against IUU fishing. This chapter has, however, largely dealt with unregulated fisheries above. They represent the gaps in the RFMO system.

Illegal fishing refers to activities:

- conducted by national or foreign vessels in waters under the jurisdiction of a state without the permission of that state or in contravention of its laws and regulations;
- conducted by vessels flying the flag of states that are parties to a relevant regional fisheries management organization but operating in contravention of the conservation and management measures adopted by that organization and by which the states are bound, or flouting relevant provisions of the applicable international law; or
- in violation of national laws or international obligations, including those undertaken by cooperating states in a relevant regional fisheries management organization.

Unreported fisheries, or underreported fisheries, are also illegal, strictly speaking, as catch controls are, of course, based on reported numbers. Some countries clearly have insufficient control systems. But in countries where such controls are conducted seriously, it is not so easy to cheat. Control mechanisms are examined under the heading of surveillance below. Attention thus turns to fisheries that are regulated mainly by regional conventions, in places where a lack of effective control leads to extensive illegal activities.

North-South Contrasts

There are few lawbreakers in the northern Atlantic, where illegal actions are strongly constrained by security forces and the situation can be said to be under control. In other areas, mainly off the Atlantic coasts of Africa, this is not the case. Regional fishery bodies in western Africa, which are numerous, have nearly all put in place various regulations, but these are frequently ignored. But the main focus regarding illegal fisheries has to be the southern Atlantic, where the extent of these illegal actions is significant and the means of control, both at sea and in the ports, very limited.

A study published by the World Bank with the FAO in 2009 under the suggestive title of *The Sunken Billions* stated that at least $50 billion is stolen worldwide through illegal fishing, diverting profits that ought to be earned by official and legal fisheries in the area. It is mostly the economies of the southern countries

that are the victimized by the phenomenon. Off the coast of Somalia, in the Indian Ocean, such deprivation is one of the roots of piracy. Moreover, this massive siphoning of money gives illegal fishing companies the wherewithal to use various means to prevent coastguard or fisheries control units from impeding their activity. It is difficult to gain comprehensive information about these companies and their owners. In many cases, the ship, if really registered, may be owned by a complex chain of companies that often makes it impossible to reach the real owner. If some indicators point to companies from certain Asian countries, only judicial proceedings are able to find the truth, and even then, not always.

In contrast, efforts to combat IUU fisheries in the Barents Sea have so far been successful, and thus, overfishing in that region has been significantly reduced. The International Council for the Exploration of the Sea (ICES), which provides the scientific information guiding the setting of quotas there, has estimated that illegal cod fishing of has been reduced from 166,000 tons in 2005 to 40,000 tons in 2007.

As explained earlier, nearly all of the Atlantic is covered by regional fisheries commissions trying to establish and implement rules. Coordinated action by these regional commissions is of great importance infighting IUU fishing because ships breaking the rules are often used to fish in one area and off-load their fish into ports of another area. But currently there is insufficient harmonization between these commissions. In the same way, there is no global system able to record catches and exchange information.

In the far southern Atlantic, where fishing takes place under the regulations of CCAMLR and the watch of regional fishery bodies, an increasing level of illegal fishing has been reported for Antarctic krill and Patagonian toothfish (marketed in North America as Chilean sea bass). Illegal vessels in the Southern Ocean also use destructive fishing methods, such as gillnetting, and do not follow conservation measures designed to prevent seabird bycatch or other environmental impacts. However, there has been a positive development in the form of the FAO's Agreement on Port State Measures to Prevent, Deter, and Eliminate Illegal, Unreported and Unregulated Fishing. The agreement, which is in the process of

being ratified, establishes a series of rules for fishing vessels that will make it much more difficult for illegal vessels to operate. These rules include stepped-up inspections of vessels requesting port entry and denial of entry to vessels unable to demonstrate that their catches are legal.

Establishing an effective system of detecting and countering illegal fisheries is thus the fourth challenge facing sustainable Atlantic fisheries.

Detection and Surveillance

Fisheries control uses essentially two types of action. The first is power over landings in ports and at markets, which both monitors legal activity and prevents selling of illegally fished cargo. The second takes place at sea, to detect and seize ships undertaking illegal fishing. For this to be successful, surveillance of vast areas is necessary, for which satellites provide the only powerful solution.

This has to be complemented by high-seas capabilities to exploit information rendered by the satellites to seize the contravening ships and backed by a legal framework. Such a strategy has been deployed in the Indian Ocean by France, Australia, and more recently the Seychelles to battle illegal fishing in their respective southerly island dependencies' waters. The efficiency of this strategy results from a broad coordination of various means: satellites to provide near real-time pictures of the areas of concern, intelligence gathering, and high-seas frigates and marines.

This coordination between intelligence and enforcement is a prerequisite for success against organized and determined smugglers, who use whatever means available to evade security forces, including an extensive network of agents to survey the movements of patrol ships. Even if all the necessary techniques to control fishing operations are in place, they require that the ships are properly equipped, identifiable, and cooperative.[43]

There are three types of nations able to counter illegal fisheries: flag states, coastal states, and port states. On this topic, there is policy conflict between the nations of different types; what matters is

[43] INMARSAT has, for example, a whole new generation of satellites that could provide real-time CCTV footage of fishing on all vessels.

coordinating their efforts. Whereas the main developed countries have the means to implement regulations and control fishing activities, the same is not true of developing countries, which need more help.

Nevertheless, many concerned countries in Africa, for instance, have already established lists of authorized and unauthorized fishing ships. These lists are the first step necessary to deal with illegal fisheries.

A Way Forward

One of the main tools used to counter illegal fisheries is to combine satellite surveillance with a list of authorized or licensed vessels allowed to operate in a designated area. In order to be comprehensive, these lists require compliance from the vessel operators. Even then, if information about unauthorized ships is not able to reach the coastguard units in operation, the tool will remain inefficient. In addition, it is not sufficient to catch illegal fishing ships detected on those "black" lists if adequate sanctions are not taken by the flag state concerned or by the coastal state itself.

If actions such as those taken by France and Australia in the southern Indian Ocean prove efficient, it is certainly because those two nations implement real sanctions against suspect ships. Besides their shared surveillance in these areas, both countries send frigates or patrol ships to intercept illegal fishing vessels, which are then brought to French or Australian ports and subject to prosecution. In some cases, ships have been confiscated and, as in the case of the Honduran fishing ship *Apache,* transferred to the navy to be used as a patrol unit.

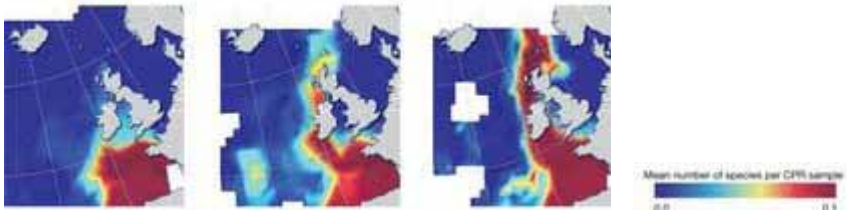
More developed and widely shared fisheries control in the southern Atlantic would improve the efficiency of law enforcement on the high seas. It implies not only improved surveillance but also coordinated action between the coast guards of African countries. Putting in place such a system represents the fifth major challenge for Atlantic fisheries. The costs of rising to this challenge can be minimized by including fisheries control among the government functions using an integrated system of surveillance, as set out in Chapter 2.

Climate Change

Oceans are affected by climate change, which results in temperature increases and a rise in sea levels, as well as differences in wave patterns, circulation, ice cover, freshwater runoff, salinity, oxygen levels, and acidity. Climate change is bringing additional large-scale, long term modifications to ocean productivity and fisheries. Many productive fishing grounds depend upon sea currents for maintaining life cycles for the sustenance of fish and other marine life. It may slow down oceanic thermohaline circulation and continental shelf flushing and the cleaning mechanisms critical to coastal water quality and nutrient cycling in more than 75 percent of fishing grounds (Nellemann, Hain, and Alder 2008).

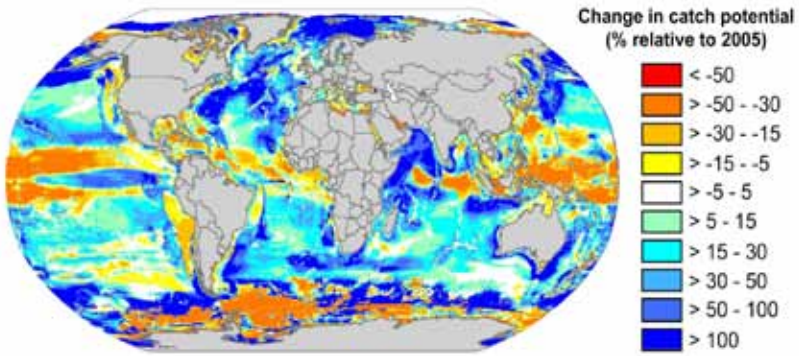
As water temperatures increase, shifts in ranges and variations in algal, plankton, and fish abundance have already been observed in high-latitude oceans, with a poleward movement of warmer-water species of plankton, fish, benthic, and intertidal organisms. The clearest evidence of this change is in the NE Atlantic. Warmer-water copepod species (a subclass of free-swimming crustaceans) moved northward by 10 degrees of latitude (about 1,000 kilometers, or 625 miles) within the 40 years up to 1999, a pattern that has continued since. The changes observed so far in the North Sea have taken place with a temperature increase of only about 0.5°C. Temperatures are expected to continue to rise, with a possible annual average increase of 6°C north of the latitude of Scotland by 2100. If this occurs, it will lead to a further poleward movement of marine organisms. Species that are representative of Arctic and cold temperate waters have shown a similar movement, retreating to the north. An increase in the northerly range of a number of warm temperate and subtropical fish species has been observed, with evidence of dispersion along the continental slope to the west of Europe and in some cases establishment of breeding populations of species such as red mullet, anchovies, and sardines in the North Sea, much further north than ever recorded before (Figure 19) (Nellemann, Hain, and Alder 2008).

Figure 19 — Change in marine species distribution over time correlated with warming waters



Climate-change-related alteration of species distribution patterns will affect fisheries catch probabilities, creating winners and losers. Projections for the Atlantic indicate that offshore temperate waters in the North and South Atlantic, as well as the Arctic, may show the largest increase in fisheries potential. Conversely, equatorial and Gulf of Mexico waters may see declines (Figure 20).

Figure 20 — Change in catch potential due to effects of climate change

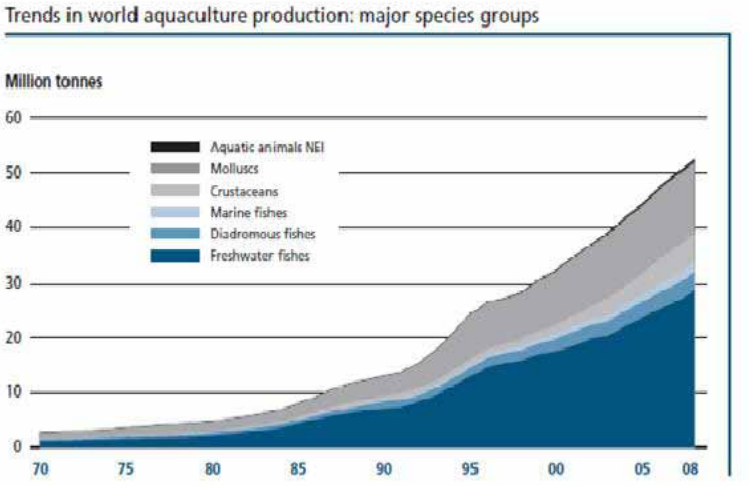


It seems clear that these distributional changes will need to be reflected in the mandates and areas of operation of RFMOs. Otherwise, slowing down or putting a stop to climate change is not specifically an Atlantic issue.

Aquaculture

Marine and inland aquaculture has expanded substantially in the past two decades (Figure 21) (Food and Agriculture Organization 2010). Aquaculture continues to be the fastest-growing animal-based food-producing sector and to outpace population growth, with per capita supply increasing from 0.7 kg in 1970 to 7.8 kg in 2008, an average annual growth rate of 6.6 percent (Food and Agriculture Organization 2011).

Figure 21 — Trends in world aquaculture production



Note: NEI = not elsewhere included.

Source: FAO. The State of World Fisheries and Aquaculture 2010. Rome, FAO. 2010. 197p.

Aquaculture will overtake capture fisheries as the leading source of food fish before long. While aquaculture production (excluding aquatic plants) was less than 1 million MT per year in the early 1950s, production in 2008 was 52.5 million MT, with a value of $98.4 billion. Aquatic plant production through aquaculture in 2008 was 15.8 million MT (live weight equivalent), with a value of $7.4 billion, representing an average annual growth rate in terms of weight of almost 8 percent since 1970. If aquatic plants are included, total global aquaculture production in 2008 amounted to 68.3 million MT with a first-sale value of $106 billion.

World aquaculture is heavily dominated by the Asia–Pacific region, which accounts for 89 percent of production in terms of quantity and 79 percent in terms of value. This dominance is mainly because

of China's enormous contribution, which accounts for 62 percent in terms of global quantity and 51 percent of global value. In contrast, aquaculture production in the countries bordering the Atlantic is a minor component of global totals: Europe (3.6 percent), South America (2.2 percent), North America (1.5 percent), and Africa (1.4 percent), with some of this taking place in areas other than the Atlantic coasts.

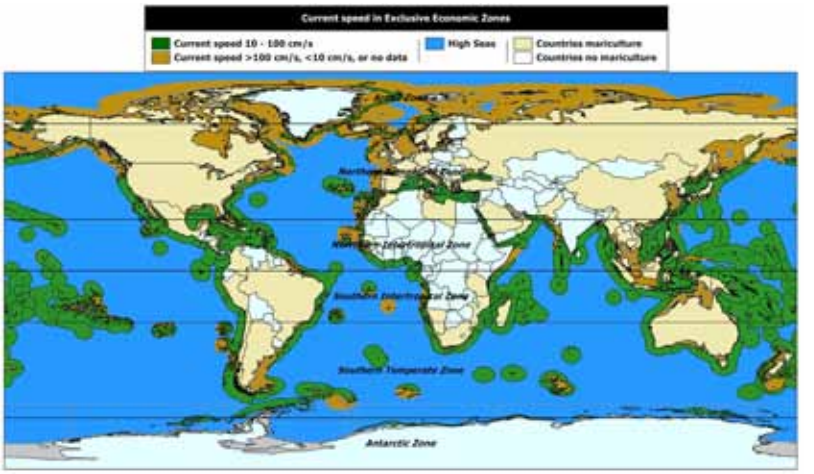
While world aquaculture production will continue to grow in the coming decade, the rate of increase in most regions will slow, with variations among regions. The highest average annual growth in the period 1970–2008 was in Latin America and the Caribbean (21.1 percent), followed by Africa (12.6 percent), Europe (1.7 percent), and North America (1.2 percent). In 2008, the top 15 aquaculture-producing countries harvested 92.4 percent of the total world yield of food fish from aquaculture. Of the 15, 11 were from the Asia–Pacific region, only one was purely an Atlantic nation (Norway), and one was both an Atlantic and Pacific nation (the United States). In the Atlantic, countries formerly leading in aquaculture development such as France and Spain experienced falling production in the past decade.

Much of the attention is directed toward growing marine fish species with medium to high-value. Floating cages have proved the most cost-effective production system across a range of farm sizes and environments (Bostock et al. 2010; Halwart, Soto, and Arthur 2007). Cage units can be sized and arranged flexibly to meet the needs of the farm. Economies of scale supported by mechanization have helped to reduce production costs substantially. Expansion is straightforward by increasing cage volume or the number of units. Larger cages, especially those in more exposed locations, become difficult and costly to manage with manual labor, so a range of specialist service vessels and equipment has been developed, especially for salmon farming, to overcome such constraints, thus leading to a whole new, specialized maritime sector.

The suitable offshore areas in the EEZ with potential for cage aquaculture of finfish can be projected based on current speed and depth range (Figure 22) (Kapetsky et al. 2010). High current speeds (excessive hydrodynamism) are problematic for culture structures and finfish production (owing to costs associated with

higher metabolic rates); very low current speeds may cause organic enrichment of sediment and quality loss for certain species. Based on these criteria, the majority of South Atlantic waters along the coasts of Africa and South America, as well as the wider Caribbean, are suitable for cage aquaculture.

Figure 22 — Offshore areas in the EEZ with potential for cage aquaculture



Closer inshore, the cultivation of marine mollusks (mainly bivalves) and seaweed using simple methods has a long history in many countries and has become widely established as a highly labor-intensive coastal livelihood. Since the 1990s, there has been significant scaling up of production and the introduction of specialized equipment allowing for larger sites and greater labor efficiencies. Total output of mollusks from coastal waters in 2008 was 12.8 million MT, valued at $12.8 billion. A further 15.7 million MT of seaweeds were cultivated in coastal waters in 2008, valued at $7.4 billion (Food and Agriculture Organization 2011).

The marine environment will be the most scalable and economic medium for algal/seaweed cultivation for fuel. Marine ecosystems present an interesting opportunity for algae culture because of the large tracts of ocean available at low cost, the free availability of nutrients, and the potential freeing up of land areas that could be used for food crops instead. There are more than 100 companies worldwide cultivating algae for conversion to fuel. For example,

in Norway, Seaweed Energy Solutions has patented the first-ever modern structure to enable mass seaweed cultivation on an industrial basis.

4. Marine Natural Resources Extraction

Paul Holthus

Introduction

Thematically, the scope of marine resource extraction considered here includes the following: living marine resources (fisheries and aquaculture), mineral resources, biological/pharmaceutical resources, and renewable energy resources. Each of these extractive resources has its own unique geographic pattern across the Atlantic Basin. The chapter does not cover hydrocarbon resources, which have been addressed in a separate report.

The geographic scope under consideration encompasses the entire Atlantic Basin. This includes the associated waters of the Gulf of Mexico and the Caribbean but not the connected, semi-enclosed seas of the Mediterranean and the Baltic. In the far north, the Atlantic is connected to the Arctic Ocean, which it influences and is influenced by, and these interactions merit consideration. In the extreme south, the Atlantic merges into the circumpolar Southern Ocean, linking the waters of the Atlantic to Antarctica.

The biophysical features of the Atlantic partake of a global range of broadly defined marine eco-regions. Nearshore marine areas are very diverse, which is attributable to the Atlantic encompassing a nearly continuous north-south latitudinal, biogeographic gradient of continental land masses stretching from the Arctic to nearly sub-Antarctic on each side. The margins of the Atlantic-facing continents include significant areas of continental shelf, most of which is contained in the exclusive economic zones (EEZs) of the countries bordering the ocean. The ultimate extent of these EEZs is still not fixed, with significant areas under consideration as extended continental shelf, notably the Portuguese application for an area of the Mid-Atlantic Ridge around the Azores. Outside the EEZs, the Atlantic consists of an extensive area of deep seabed/high

seas, otherwise known as the areas beyond national jurisdiction (ABNJ).

Each of these broadly defined eco-regions supports a diverse set of ecosystems that are relatively well known in general terms. The nearshore and continental shelf areas support ecosystems with species, populations, habitats, and functions whose status and trends have become increasingly well documented. However, there is still much to learn regarding processes, interactions, and the effects of human activity, particularly climate change. Also, the specifics of ecosystem status and threats vary in different parts of the Atlantic. In the ABNJ, discoveries of new ecosystems, for example hydrothermal vents and cold seeps, have occurred relatively recently, new species continue to be identified, and the understanding of major oceanic ecosystem processes continues to be refined.

Living marine resources have driven much of the history of human exploration and exploitation of the Atlantic, and major industrial fishery resources are distributed along many of the continental shelf waters of the Atlantic Basin. These include some the world's most important and productive fisheries, such as the Northwest Atlantic cod fisheries (which have not yet recovered from overexploitation in the late 20th century),the fisheries of West Africa, offshore fisheries of the Southern Atlantic and Southern Ocean, and Antarctic fisheries (krill, for example). Closer to shore, artisanal fisheries are critical to coastal communities in many parts of the Atlantic, notably the Caribbean and West Africa. More recently, aquaculture has become an important economic activity, especially for salmon and a few other species, along inshore areas of several Northeast Atlantic countries. Nearshore marine aquaculture is also beginning to develop in Brazil, Argentina, and a few Caribbean countries. The issues raised by fisheries and aquaculture are dealt with in Chapter 3.

Some of the Atlantic's mineral resources are well-known, long-utilized nearshore materials like sand and gravel that are especially important for the industrialized North Atlantic countries. Others are untapped deep-seabed reserves in the ABNJ, access to which is on the frontier of science, technology, policy, and politics. The discovery of biological resources for pharmaceutical or other

biotechnological value is also on the leading edge of human use and exploitation of marine resources. Renewable energy resources consist of offshore wind, wave, and tidal energy developments. These are largely an inshore venture at this time and are dominated by developments in the Atlantic coastal waters of Europe. Offshore renewables are spreading further south in Europe, with significant potential uptake in the offshore waters of New England and perhaps Canada.

Mineral Resources

Mineral resources of the Atlantic Ocean may be vast, but so far the race to stake rights to deep-sea sites remains in its infancy. Atlantic precious metal deposits, whether contained in polymetallic sulfides, cobalt-rich crusts, or manganese nodules, are all located in the ABNJ and therefore fall under the regulation of the International Seabed Authority (ISA). Established in 1982 as part of the UN Convention on the Law of the Sea (UNCLOS), the primary function of the ISA is to regulate deep-seabed mining and ensure that the marine environment is protected from any harmful effects that may arise during mining activities, including exploration. However, the ISA Mining Code has so far created regulations to permit prospecting only for polymetallic sulfides and manganese nodules, effectively forbidding by default prospecting for cobalt-rich crusts as well as deep-sea commercial mining of any resource at this time.

Within the exclusive economic zones of countries lie two other mineral resources that are outside of ISA control. First, methane hydrate exploration in the Atlantic, spearheaded by the United States, is a growing area of interest as countries look for new natural gas reserves. Second, sand and gravel mining continues to grow as the demand for construction materials increases with industrialization, but this is not without environmental consequences.

Polymetallic Sulfides

Polymetallic sulfide deposits are found along the undersea meeting points of tectonic plates, where intensive volcanic activity from plate movement results in the formation of hydrothermal vents. Ocean water that has seeped through the Earth's crust into

subterranean chambers becomes heated by magma and mixed with molten metal compounds. This mixture of superheated seawater and minerals, known as hydrothermal fluid, is then discharged from these hydrothermal vents ("black smokers") at temperatures of 400° Celsius (752° Fahrenheit) (International Seabed Authority 2008). Upon contact with the surrounding, colder seawater, metal sulfides in the hydrothermal fluid precipitate and leave deposits of copper, lead, zinc, iron, and even gold and silver. In the Atlantic Ocean, such hydrothermal vents are found along the Mid-Atlantic Ridge (and thus in the North Atlantic), with most being outside of EEZ areas (Figure 23).

Figure 23 — Polymetallic sulfide deposits on the seabed

While current knowledge indicates that the majority of Atlantic hydrothermal vents are clustered in the central Atlantic Ocean, in the ABNJ, there is too little information to determine the full extent of polymetallic sulfide deposits in the Atlantic since only some 5 percent of the 60,000 kilometers (37,282 miles) of oceanic ridges worldwide have been surveyed in any detail (International Seabed Authority 2008). Nevertheless, an ISA-sponsored research team indicated that roughly 4 million metric tons of sulfide ore exists at the Trans-Atlantic Geotraverse hydrothermal mound in the central Atlantic (Hoagland et al. 2010). The possibility that hydrothermal vent areas, like the Trans-Atlantic Geotraverse, may contain massive amounts of valuable metals has sparked global interest in

prospecting such sites. Only Russia has begun polymetallic sulfide exploration in the Atlantic. In July 2011, the ISA approved Russia's application to conduct prospecting for gold and copper deposits in a 100-square-kilometer (38.6-square-mile) area in the central Atlantic that may contain 40 times more gold than Russia's largest land-based gold source (Galushko and Arcilla 2011). The only other countries currently investing large sums of money in the physical exploration of polymetallic sulfide deposits are China, Australia, and Canada, but none of their mining sites are in the Atlantic, and only China has been approved by the ISA for mining in the ABNJ.

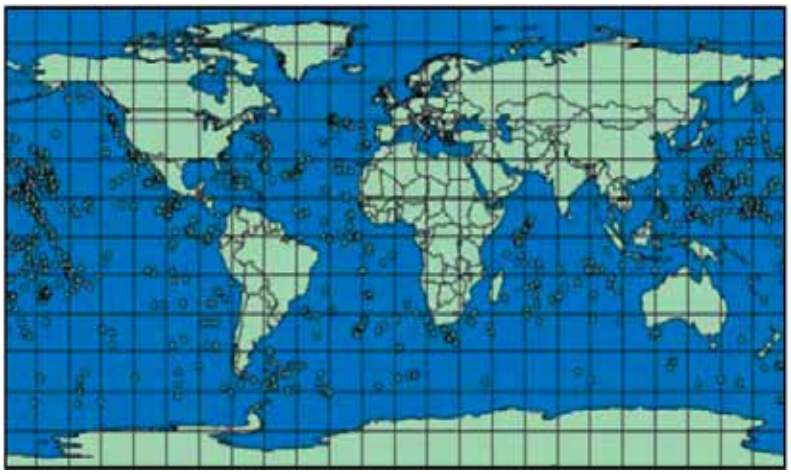
The environmental impacts of the mining of polymetallic sulfide deposits have been considered, but no firm regulations to ensure minimal destruction of hydrothermal vent communities during commercial mining have been set up. Approximately 500 new animal species have been found around hydrothermal vent areas (both active and inactive vents) and the value that these species hold for better understanding the biological processes of metabolism, evolution, and adaptation is tremendous (International Seabed Authority 2008). Absent a full understanding of the environmental risks posed by polymetallic sulfide mining, many mining operations, such as those in Papua New Guinea by Nautilus Minerals, are choosing to only explore within EEZs. Until commercial mining regulations that minimize environmental damage are set up, mining in the Atlantic ABNJ will likely remain exploratory.

Cobalt-Rich Crusts

Cobalt-rich crusts are found throughout the world, on the flanks and summits of seamounts as well as on undersea ridges and plateaus, where ocean currents have swept away top sediments. The resulting crust can contain varying quantities of cobalt but also titanium, cerium, nickel, platinum, manganese, phosphorus, thallium, tellurium, zirconium, tungsten, bismuth, and molybdenum (International Seabed Authority 2008). Some seamounts may be as large as mountains on land, but only a small percentage of the total predicted number of seamounts has been explored. There are far fewer seamounts in the Atlantic than the estimated 30,000 in the Pacific, and Atlantic seamounts have

been far less sampled, so estimating the full size and extent of Atlantic cobalt-rich crusts is not easy (Figure 24). The difficulty in excavating mineral deposits from seamounts has also contributed to a lack of interest in the prospecting of cobalt-rich crusts.

Figure 24 — Cobalt-bearing ferromanganese crusts sampling points



Mining of cobalt crusts is much more difficult than extracting manganese nodules or polymetallic sulfides for two main reasons: separating the mineral-rich crust from the underlying substrate is difficult, and the steep slopes associated with seamounts make the use of excavation equipment more challenging (Maribus 2010). These extraction issues, combined with the limited knowledge about the mineral value contained by seamounts, make it clear why there are currently no seamount prospecting ventures underway. Since 2006, the ISA Legal and Technical Commission has been working on advancing the exploration of cobalt-rich crusts but still needs to better clarify which seamounts will be allowed for exploration (International Seabed Authority 2008).

Seamounts themselves harbor a wide range of species, and the impact that mining may have on these communities is not well known. The high level of endemism and the considerable diversity of species at some seamounts make them hotspots for biodiversity in the ocean. They are also important mating areas for some of the ocean's top predators (Gubbay 2003). The ISA currently has no regulations on cobalt-rich crust mining.

Manganese Nodules

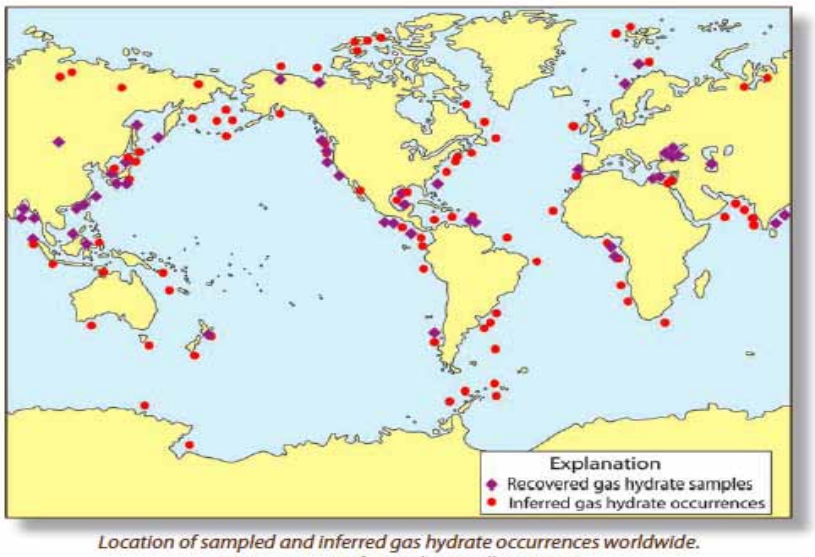
Manganese nodules, also called polymetallic nodules, are circular rock formations made of layers of iron and manganese that have been found on ocean floors throughout the world. Most nodules are about the size of potatoes and vary in abundance, depending on the location, with some seafloor areas being covered up to 70 percent by nodules. While manganese and iron make up the majority of nodules (29 percent and 6 percent respectively), silicon, aluminum, nickel, copper, cobalt, and trace amounts of titanium are also present. At present, prospecting of manganese nodules occurs in only three areas of the world's oceans, where the greatest densities of nodules have been forecast: the center of the North Central Pacific Ocean; the Peru Basin in the Southeast Pacific Ocean; and the center of the North Indian Ocean. There are currently no countries mining manganese nodules, either for research or commercially, in the Atlantic Ocean.

Methane Hydrates

With increasing energy needs around the globe, more countries are using natural gas (which is predominately methane) as an alternative to traditional energy sources. Offshore methane hydrates are natural gas trapped in cages of frozen water molecules and are present in both the Arctic and in certain undersea environments. Most marine methane hydrates are found in the sediments of Earth's outer continental margins and, therefore, largely within EEZs, particularly as these are extended to include all continental shelves (Figure 25). Yet, while the worldwide volume of methane held in methane hydrate formations is believed to be immense, the exact quantities are uncertain. Estimates range from 100,000 to more than 1,000,000 trillion cubic feet (Tcf) of submerged natural gas in total (Reynolds 2012). Nevertheless, the prospect of tapping into a significant, long-lasting energy resource has led to exploration of the possibility of methane hydrate mining in the Atlantic.

In May 2012, the United States completed the first successful prospective drilling of undersea methane hydrates in the Gulf of Mexico. The Gulf Coast is presumed to hold methane hydrate reserves of 220,000 Tcf — nearly 100 times as much as current U.S. gas reserves (United Nations Environment Programme 2011).

Figure 25 — Location and occurrence of gas hydrate deposits



Location of sampled and inferred gas hydrate occurrences worldwide. (Map courtesy of Timothy S. Collett, USGS)

There are estimated to be around 1,300 Tcf of methane hydrates off of the eastern United States in the undersea Carolina Trough, but no wells have been drilled thus far to confirm this figure (U.S. Department of Energy 2011). Other countries along the Atlantic that are exploring methane hydrate deposits within their EEZs include Barbados, Morocco, Nigeria, and Angola (United Nations Environment Programme 2011).

Methane is a potent greenhouse gas, and the total amount of carbon stored in methane hydrates amounts to many thousands of metric gigatons, far exceeding the quantity of carbon in the atmosphere today. Safety protocols to prevent methane gas leaks at drill sites are consequently a major issue. Concern has also been raised about undersea landslides occurring as a result of methane hydrate extraction effectively removing support for ocean floor sediment layers. The possibility that this activity might trigger tsunamis has also been raised.

Coastal and Near Shore Sand and Gravel Mining

The extraction of coastal sands from nearshore seabeds, has been carried out throughout the 20th century. Sand is used to make a variety of goods including glass, concrete, and a plethora of other construction materials. Furthermore, beach sand is less expensive than other mined sands because it is already separated from mud,

rock, etc., and is easy to remove with construction vehicles or by hand. In the Atlantic region, coastal sand mining occurs in Europe, North and South America (including the Caribbean), and Africa. Economic growth coupled with efficient extraction technologies and non-existent sand mining laws in many countries has resulted in abusive practices in coastal sand extraction. Atlantic countries involved in beach sand mining include Morocco, Uruguay, Puerto Rico, Argentina, Brazil, France, Liberia, and South Africa. Morocco is thought to be the country worst affected by excessive coastal sand mining (Pilkey et al. n.d.). Throughout the Caribbean, illegal sand mining ventures are leaving beaches stripped bare, with the worst case being the recent removal of 500 truckloads of sand from Coral Springs beach in Jamaica (Davis 2012).

Unsustainable coastal sand mining creates multiple problems for the surrounding community, including the destruction of natural beaches and the ecosystems they protect (such as dunes, wetlands), habitat loss for globally important species (turtles, shorebirds), damage to nearshore marine ecosystems, accelerated shoreline erosion rates, reduced protection from storms, tsunamis, and powerful waves, and economic losses through tourist abandonment and degradation of coastal scenic beauty (Young and Griffith 2009).

Despite the low unit value of its basic products, the construction sand and gravel industry is a major contributor to growth and an indicator of general economic well-being. Sand and gravel resources worldwide are extensive. However, because of environmental restrictions, a geographic distribution in which often the reserves are located far from growth centers, and quality requirements for certain uses, sand and gravel extraction is uneconomical in some cases. In some countries, the most important commercial sources of sand and gravel have been glacial deposits, river channels, and river flood plains. Other countries routinely mine offshore deposits of aggregates for construction projects.

Offshore aggregate deposits occur where they do because of geologic history. Marine sands and gravels are mainly found along the courses of ancient rivers, formed during the last Ice Age, when sea levels were much lower than they are now. Their sediments were submerged and reworked by rising sea levels as

the glaciers melted about 15,000 years ago. Marine aggregates are therefore localized, as the floor of the sea is not the same everywhere and the resource can only be extracted where it is found. Economic considerations include transportation distances and the characteristics of the deposit, with 50 kilometers (31 miles) as a rule of thumb for maximum haul distance, but this number is based on local costs for transporting the sand and gravel by barge. Transportation distances from port to the site where the sand and gravel will be used are important. The characteristics of a deposit that make it attractive include large volume and a low percentage of fine sediment. It is also important that the deposit be thick and that the material underlying it not be mud or other fine sediment. Sea grass beds tend to trap fine sediment and can render an otherwise economic deposit too "dirty."

The marine aggregates industry can conflict with other seaside activities in a competition for space. The nearshore environment is particularly heavily used for general navigation, ports, oil and gas, pipelines, cables, fisheries, and, more recently, offshore wind farms. Marine aggregate dredging may also interfere with recreational activity like diving, yachting, or maritime cultural heritage, such as shipwrecks and prehistoric sites associated with landscapes submerged by rising sea levels. Other concerns include destruction of artifacts and cables/pipelines, etc. (Geological Society n.d.).

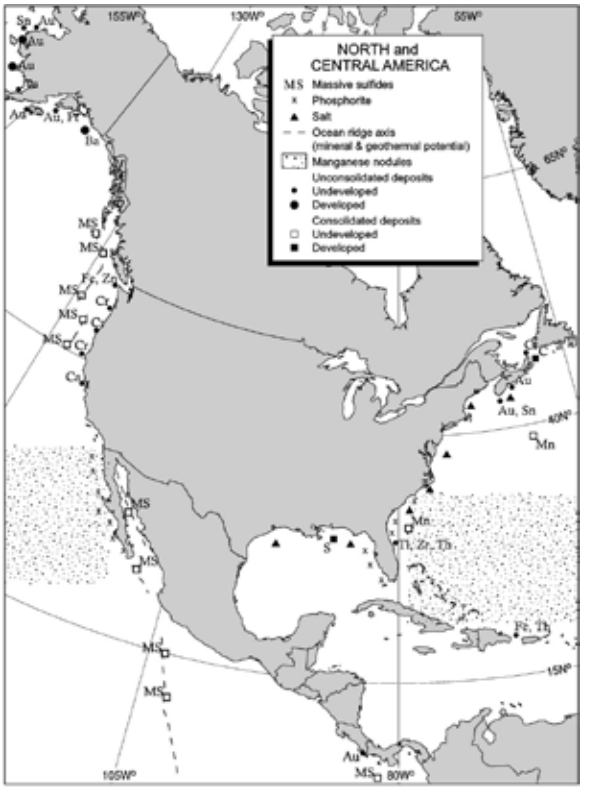
Sand and gravel are recovered at many sites in the coastal zones of Canada and the United States primarily for beach restoration and shore protection (U.S. Geological Survey 2012). The United Kingdom, Netherlands, Denmark, and Japan all have well-established marine sand and gravel mining industries. Britain is one of the world's largest producers of marine aggregates. Although dredging affects less than 1 percent of the country's territorial waters, it provides 20 percent of the sand and gravel needed in England and Wales. The industry operates 28 purpose-built marine aggregate dredgers extracting marine sand and gravel from 70 production areas. The area dredged amounts to 0.016 percent of the U.K. seabed and produces 24.29 million metric tons per year delivered to specialized marine aggregate wharves in the United Kingdom (and Europe for use by the construction industry) (British Geological Survey 2007). In the United Kingdom, the Crown Estate owns the mineral rights to the seabed and issues

commercial licenses to explore and extract sand and gravel. An extraction license is only granted if permission to dredge is given by the Department for Communities and Local Government in England, or by the Welsh Government or the Scottish Executive. Typically, license areas lie between 5 and 35 kilometers (3 and 22 miles) offshore at depths of between 10 and 40 meters (33 and 131 feet). Marine aggregate sources in Britain are expected to last at least a further 50 years at present levels of extraction (British Marine Aggregate Producers Association n.d.).

Other Offshore Minerals

In North America and Central America, lime (calcium carbonate) is dredged from shallow-water areas where it has precipitated, particularly on the Bahama Banks, a shallow, subsiding carbonate plateau constructed of layers of limestone attaining a thickness of kilometers (Figure 26). Beds of Jurassic salt up to kilometers in thickness underlie sediments of the continental margin off eastern North America and the Gulf of Mexico (Rona 2008).

Figure 26 — Offshore mineral map of North America

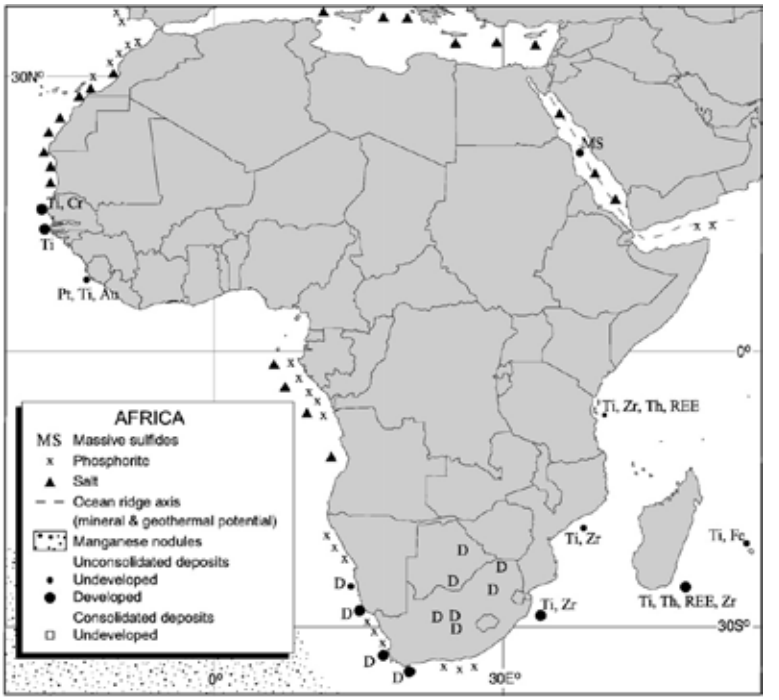


In South America, lime precipitated by marine plants is recovered from the Brazilian continental shelf (Figure 27). Kilometers-thick layers of Aptian salt are present in basins underlying the Brazilian shelf margin, where salt structures are associated with offshore petroleum (Rona 2008).

Figure 27 — Offshore mineral map of South America

In Africa, a large placer deposit diamond area encompasses beaches and the adjacent continental shelf from 100 meters (328 feet) above to at least 200 meters (626 feet) below sea level and extends

Figure 28 — Offshore mineral map of Africa



between 450 kilometers (280 miles) south and 300 kilometers (186 miles) north of the present Orange River that bounds Namibia and South Africa. More than 75 million carats of diamonds have been produced from this section of the Namibian littoral extending 5.5 kilometers (3 miles) offshore and 20-35 kilometers (12-22 miles) inland over nearly 100 years, 95 percent of which are gem quality, making this the richest diamond placer known. In Namibia, recovery of high-quality marine diamonds using seafloor mining machines and drills on four offshore production vessels increased from 30,000 to 570,000 carats per year over the past decade. The offshore mining of diamonds has the potential to generate conflict in the region thanks to competing claims for these resources.

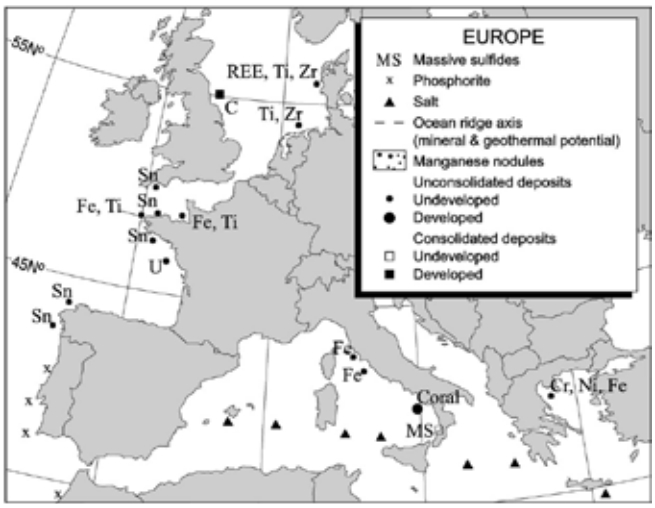
The estimated total value of global diamond production (marine and non-marine) in 2004 was $11.8 billion. Exploration for marine diamonds has also been conducted off the coasts of West Africa, Australia, and Indonesia, but without commercial success.

Phosphorite, both relict (principally Miocene Epoch) and modern deposits, occurs on the western continental shelf of Africa off of

Morocco, Namibia, and South Africa (Figure 28). Salt layers up to several kilometers thick lie buried beneath both western and eastern South and North Atlantic continental margins. The salt is associated with petroleum production and potential at sites on the continental margins of West Africa, eastern South America, eastern North America, and the Gulf of Mexico (Rona 2008).

In Europe, undeveloped phosphorite deposits lie adjacent to areas of deep-ocean upwelling on the continental shelf of northern Spain (Figure 29).

Figure 29 — Offshore mineral map of Europe



Bioprospecting

Bioprospecting (the exploration of biodiversity for new genetic resources of social and economic value) has yielded numerous products. Genetic resources have promise for use in the pharmaceutical, cosmetic, and food industries. Marine bioprospecting is the process of searching for, collecting, and commercially developing products from genetic resources found in marine organisms (United Nations University 2005). Marine bioprospecting has gained momentum in recent years as countries are realizing the unique medicinal potential of marine sources and the associated financial gains. Countries blessed with significant marine areas and biodiversity can indeed benefit.

The search for biologically active compounds has been underway for several decades in the relatively shallow and accessible coral reef areas. In contrast, it is only more recently that new technologies in deep-sea exploration and seafloor mineral extraction have created an interest in retrieving biological compounds of interest from the ocean depths. Biologically active compounds are most often found in organisms that have had to adapt to extreme conditions or in areas of high biological diversity.

Coral reefs and, to a lesser degree, coastal mangrove forests, are biodiversity hotspots. Coral reefs in particular support highly diverse arrays of organisms that are reservoirs of natural bioactive products, many of which exhibit structural features not found in terrestrial plants, animals, fungi, or protozoans. Mangrove forests are good sources of medicinal plants. The pharmaceutical industry has discovered several potentially useful substances from coral reefs, such as cytotoxicity (useful for anticancer drugs) among sponges, sea mosses, jellyfish, and starfish. Cone shells of the mollusk family Conidae are highly prized for their highly specialized toxins (conotoxins), applicable to many areas of medicine including pain control, cancer treatment, and microsurgery.

In the deep ocean, hydrothermal vents, cold seeps, seamounts, and submarine trenches are the major areas of exploration since these deep-sea zones are considered to be hotspots for "extremophiles" (organisms that can survive in extreme conditions). Because of the unique biological and physiological properties of extremophiles, they may contain important genetic resources.

The first marine resource for pharmaceutical use was developed in the 1950s, when a U.S. scientist developed antiviral, anticancer, and (ultimately) anti-HIV drugs that are still in use today from the genetic material of a sea sponge found off the coast of Florida (Demunshi and Chugh 2010). Since then, a host of medicinal drugs have been developed from marine bioprospecting, including Prialt, a painkilling drug derived from the venom of marine cone snails, and Yondelis (approved in 2008 by the FDA), an anticancer drug derived from the DNA of *Ecteinascidia turbinata,* a seafloor filter feeder (Maribus 2010).

While the total number of marine-derived drugs currently in use is minimal when compared to drugs originating from terrestrial species, more than 120 patents relate to compounds obtained from marine species (United Nations University 2005). Figure 30 lists some of the major pharmaceutical compounds, either in use or in the preclinical testing stage, that were isolated from marine organisms.

Figure 30 — Examples of pharmaceutically active compounds isolated from marine organisms

Table 1 List of examples for the pharmaceutically active molecules isolated from marine organisms

Pharmaceutical molecule	Use
Anabaseine (hoplonemertine toxin) Debromohymenialdisine (DBH)	Anti-Alzheimer agent
Bengamides and derivatives KRN7000 Lasonolides Manzamine A [preclinical] Neovastat® (AE-941) [preclinical] Spisulosine Squalamine	Antitumor/tumor growth inhibition
Debromohymenialdisine (DBH)	Anti-osteoarthritis agent
Cryptophycins Curacin A [preclinical] Diazonamide A [preclinical] Dictyostatin [preclinical] Discodermolide Dolastatins Eleutherobin [preclinical] Halichondrins Hemiasterlins (H-286) Latrunculins [preclinical] Laulimalide (and synthetic analogs) [preclinical] Peloruside A [preclinical] Sarcodictyins [preclinical] Vitilevuamide [preclinical]	Tubulin/actin interactive agents (primarily anti-cancer)

While it is difficult to provide solid information on marine bioprospecting trends in the Atlantic because the industry is in its early stages, certain assumptions can be made with the information available. Owing to the costs associated with marine scientific research and preliminary prospecting ventures, it can be safely concluded that the United States, Canada, and European nations will lead the way in Atlantic marine bioprospecting. The United States already has the highest number of patent filings related to marine research. Canada has the longest coastline in the world, and Norway has a long tradition of excellence in marine bioscience (Demunshi and Chugh 2010).

Figure 31 — Coral reefs of the Atlantic

Coral Reefs

In the Atlantic, coral reefs will be among the primary areas for bioprospecting. The Atlantic region includes 10 percent (26,000 square kilometers, or 10,039 square miles) of the world's coral reefs, which are predominantly in the Caribbean and the Bahamas Banks (Figure 31) (Burke et al. 2011). Reef types include fringing and bank reefs, as well as a number of long barrier-like systems, notably around Cuba and off the coast of Belize. The Bahamas group, which includes the Turks and Caicos Islands, is a huge system of shallow banks with reefs on their outer margins. Far out in the Atlantic Ocean, Bermuda represents an isolated outpost and has the most northerly coral reefs in the world, connected to the Caribbean by the warm Gulf Stream. An even larger gap separates the Caribbean reefs from a number of small reefs off the coast of Brazil.

The diversity of coral species in the Atlantic is comparatively low. While there are more than 750 species of reef-building corals across the Indian and Pacific Oceans, the Atlantic hosts fewer than 65. However, the Atlantic species that are reef denizens are unique, with more than 90 percent of fish, corals, crustaceans, and other groups being found nowhere else. Brazil's reefs have even less

diversity, showing strong links to the Caribbean but also hosting a number of endemic species.

The bioprospecting potential of coral reefs is being compromised by the progressive loss of these diverse habitats. In the Atlantic region, more than 75 percent of reefs are threatened, with more than 30 percent in the "high" or "very high" threat category (Burke et al. 2011). In more than 20 countries or territories in the region, including Florida, Haiti, the Dominican Republic, and Jamaica, all reefs are rated as threatened. The Bahamas have the largest area of reef rated as low in terms of threat in this region. Overfishing is the most pervasive menace, but marine-based pollution and damage, coastal development, and watershed-based pollution also pose significant dangers.

In addition, coral reefs are vulnerable to ocean acidification that affects the reefs' unique ability to produce large amounts of calcium carbonate (Kleypas and Yates 2009). The main reef-building organisms, corals and calcifying macroalgae, will calcify 10 to 50 percent less relative to preindustrial rates by 2050. Decreased calcification will likely affect the reef's ability to function within the ecosystem and thus the workings of the ecosystem itself. However, ocean acidification affects not only the organisms but also the reefs they build. The decline in calcium carbonate production, coupled with an increase in calcium carbonate dissolution, will diminish reef building and structural complexity that supports biodiversity on reefs.

Mangrove Forests

Mangrove forests cover more than 3.2 million hectares (7.9 million acres) on the African continent, representing about 19 percent of global coverage (Corcoran, Ravilious, and Skuja 2007) (Figure 32). They are distributed in three major coastal sections: western Atlantic (1.5 million hectares, or 3.7 million acres, 49 percent), central Atlantic (0.4 million hectares, or 1.0 million acres, 14 percent), and eastern Indian Ocean (1.2 million hectares, or 3.0 million acres, 37 percent). In the western and central Atlantic coastal sections, mangroves stretch from Mauritania in the northwest to Senegal in the Saloum Delta, from the Lower Casamance area of Senegal through Guinea-Bissau, Guinea, and Sierra Leone, to the Gulf of Guinea flanking the coastlines of West

and Central Africa from Liberia to Angola. Nigeria has the largest mangrove forest in Africa, located in the Niger delta, with up to 10,000 square kilometers (3,861 square miles) of mangrove stands.

Figure 32 — Mangrove forests of Africa

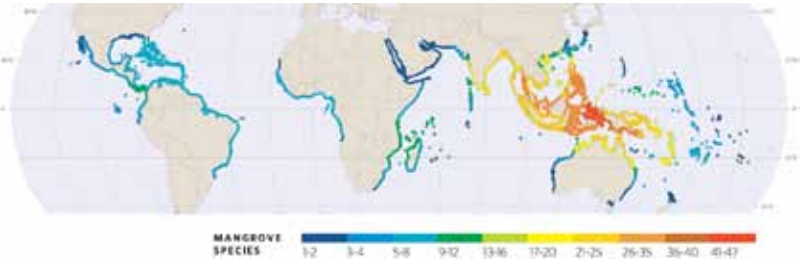
In the greater Caribbean, mangroves are found on almost every coastline, although there are wide variations in mangrove coverage depending on the geographic characteristics of each island or continental area (Spalding, Blasco, and Field 1997) (Figure 33). Low-relief coastal plains with ample freshwater inflows foster the most complex and largest forests. The most impressive forests are found along the coasts of Central and South America and the Greater Antilles, which have extensive river systems. In the eastern

Caribbean, steep shorelines, limited freshwater runoff from low, dry islands, and exposure of a large portion of the shorelines to powerful waves impose limits on mangrove development. Of the largest islands, Cuba has the most extensive mangrove coverage, estimated at 4,000 square kilometers (1,544 square miles). Along the coasts of Belize and Guatemala, mangroves, seagrasses, and coral reefs are intimately linked in what is considered the largest continuous reef in the Caribbean.

Figure 33 — Mangrove Forests of the Caribbean

South America supports about 11 percent of the world's mangroves, mainly on the coast of Brazil and up into Venezuela (Food and Agriculture Organization 2005). Mangroves in Brazil have a patchy distribution but cover large areas. The most extensive forests are found in the north, where wide tidal ranges combined with high rainfall provide suitable conditions, and along some estuaries mangroves extend up to 40 kilometers (25 miles) inland. Along the southeastern coasts, from Rio de Janeiro state to Santa Catarina state, mangroves are more sparsely distributed and restricted to river deltas, coastal lagoons, and the inner parts of bays. Species diversity in the mangroves of the Atlantic is much narrower than in the Indo-Pacific (Figure 34).

Figure 34 — Mangroves species diversity

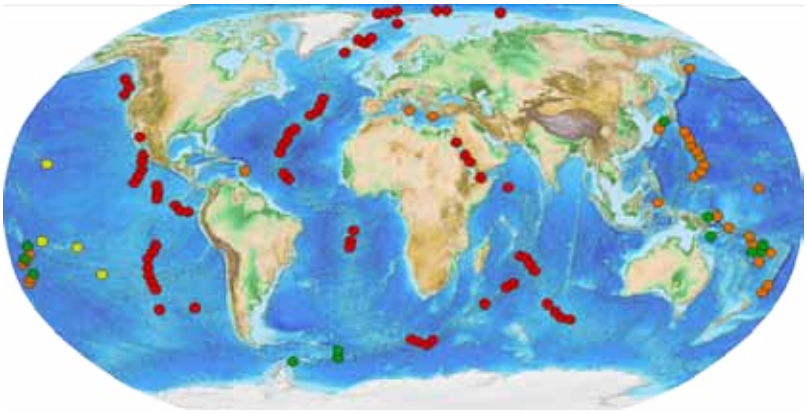


Mangroves have been subjected to enormous pressures and threats within recent decades, with great losses (Corcoran, Ravilious, and Skuja 2007). For example, more than 20 to 30 percent of the mangroves in West Africa and Central Africa have been lost in the past 25 years. Among the many causes at work were urbanization, infrastructure development, quarrying, salt and sand extraction, pollution from industries, agro-industrial chemicals, petroleum and gas exploitation, the absence of appropriate legislation, deforestation for smoking fish, and the proliferation of invasive species, including those driven by climate change effects accentuated by population growth. The nature of the threat appears to vary by region, with mangroves along the western shore of Mauritania suffering mainly from drought and salt intrusions, while mangroves in the Gulf of Guinea from Liberia to Angola suffer more directly from human encroachment: wood harvesting for fuel and construction, petroleum and gas exploration, and other economic activities along the coast. These patterns and pressures are repeated in most of the other mangrove areas around the Atlantic, with the addition of mangrove conversion to shrimp farms in parts of South America.

Hydrothermal Vents and Seamounts

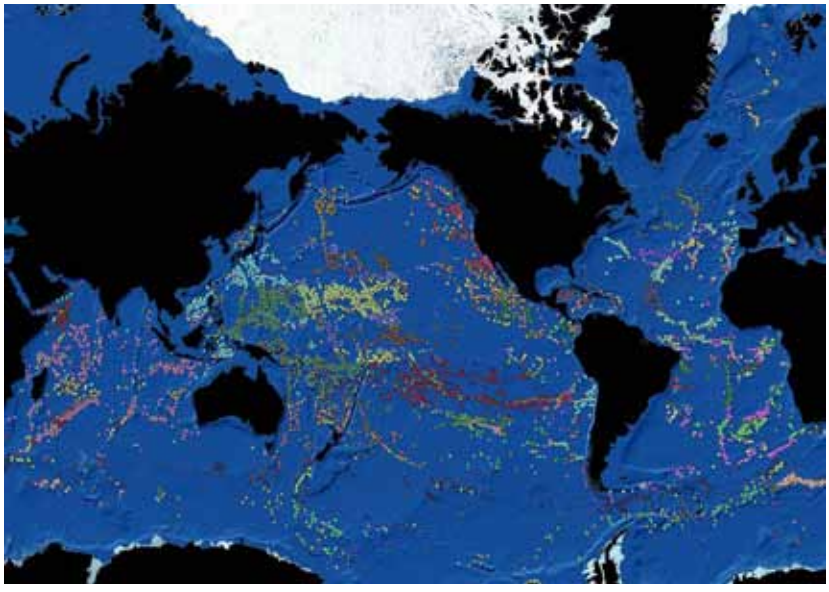
Hydrothermal vents are found along mid-ocean ridges, where magma from deep in the Earth emerges. A vent is typically formed as seawater penetrates the crust, is heated by the magma, and goes back into the ocean through a hot vent, bringing with it mineral substances (United Nations University 2005). In the Atlantic, hydrothermal vents are found on the Mid-Atlantic Ridge, in international waters of the North and South Atlantic (Figure 35).

Figure 35 — Hydrothermal vent distribution



Seamounts are characterized by active water circulation processes, which result in great richness of species belonging to the functional group of suspension feeders (animals that filter their food from the currents); taxa typical of seamounts are deep-sea corals, sponges, crinoids, hydrozoans, and ophiuroids (brittle stars). Several other studies have shown that seamounts are characterized by very high rates of endemism (United Nations University 2005). In the Atlantic, seamounts are also associated with the Mid-Atlantic Ridge but are also found in other parts of the ocean basin (Figure 36).

Figure 36 — Seamount distribution



The oceans surrounding the poles are home to the greatest diversity of unique species and extremophiles. In fact, 56 percent of the marine organisms harnessed and researched for bioactive compounds have come from the Antarctic marine ecosystem (Demunshi and Chugh 2010).

Areas beyond National Jurisdiction

Until international regulations dealing specifically with the extraction of marine genetic resources for commercial use are set up, marine bioprospecting will fail to reach its full potential in the Atlantic or elsewhere. Corporations will shy away from large-scale projects as a consequence of the lack of a legal framework for the establishment and ownership of intellectual property.

While both UNCLOS and the Convention on Biological Diversity (CBD) provide general regulations for the prospecting of genetic resources within a state's EEZ, there are currently no specific legal provisions to deal with marine bioprospecting in areas beyond national jurisdiction (Leroux and Mbengue 2010). Within a state's EEZ and on its continental shelf, UNCLOS does have rules in place to ensure that there is no conflict between the coastal state and a foreign vessel extracting biological resources. According to Article 56 (1) of UNCLOS, coastal states, as is their sovereign right, may grant or refuse foreign vessels permission for conducting bioprospecting (whether for scientific or commercial purposes) in their waters (Leroux and Mbengue 2010). Other UNCLOS regulations, such as ensuring that samples are being taken sustainably with minimal environmental harm (Article 192), also apply. Article 7 of the CBD reinforces UNCLOS regulations, requiring all member states to "monitor processes and categories of activities through sampling and other techniques" within their EEZs. Furthermore, Article 15 of the CBD sets up an Access and Benefit Sharing system to ensure that the party providing access to the resources, that is, the coastal state, receives benefits from the foreign research vessel in an equitable way (Pisupati, Leary, and Arico 2008).

Governance of marine bioprospecting in the ABNJ is far less well sorted out. The key issue causing the regulatory confusion about deep-sea marine bioprospecting is that the UNCLOS charter does not mention "genetic resources" or "bioprospecting." Because

marine bioprospecting was largely nonexistent during the drafting of the convention, it was never addressed specifically. However, general principles do apply, and there is a basic framework within which bioprospecting ventures must operate. Under Article 87 of the convention, marine bioprospecting is included in the "freedom of the high seas" right of all states. Therefore, every state may collect genetic material from the ABNJ so long as it does not violate environmental, pollution, or conservation rules set up by UNCLOS. Nevertheless, outside of these simple rules, there is no authority to ensure sustainable use of biological resources or to determine if an Access and Benefit Sharing system should be created.

While UNCLOS created the International Seabed Authority to deal with deep-sea mineral resources, no such organization was created to monitor biological resource extraction. The ISA's authority is limited to, "all solid, liquid, or gaseous mineral resources in 'the Area' at or beneath the seabed," so genetic resources fall outside of its regulatory mandate (Leroux and Mbengue 2010). The CBD also cannot deal with deep-sea genetic resources since its authority on ensuring access and benefit sharing is strictly limited to EEZ waters. Also, of key importance, genetic material may be patented and therefore may be the sole property of a company, so the question of ownership in the bioprospecting world is unique when compared to other ocean resources.

There is an ongoing debate among governments and international bodies in regard to the status of marine genetic resources under UNCLOS and whether they should be treated as resources to be used for "the common heritage" of humanity. Developed states that are conducting research efforts have pushed to maintain the status quo in marine bioprospecting since it is the information contained within the resource that is of interest. The argument is that since genetic information, and not a physical good, is the prize, bioprospectors can patent findings under the Agreement on Trade-Related Aspects of Intellectual Property Rights and are not obliged to divulge information publicly (Leroux and Mbengue 2010). However, other states, often those unable to conduct their own research, believe that bioprospecting should be included in the UNCLOS mandate covering material extraction from the international seafloor (Part XI) and monitored by the International Seabed Authority. The debate over the patentability of marine

genetic resources is far from resolved, as the UN informal working group on marine biological diversity has yet to propose any solutions.

Marine bioprospecting, as a formally recognized maritime extractive activity, has only come into the spotlight within the past ten years, so many of the issues facing genetic research in international waters should be resolved in the years to come. UNCLOS and the CBD could be amended to include bioprospecting regulations, or the authority of the ISA could be expanded to include genetic resources. Others have proposed the creation of a new body to oversee all bioprospecting ventures.

Without further clarification of the legal framework, bioprospecting by more advanced countries in the South Atlantic seems destined to add to geopolitical frictions in the region. The development of a common position by the Atlantic countries would thus represent a novel and useful way to contribute to the sustainable and peaceful harnessing of the basin's genetic riches.

Renewable Energy

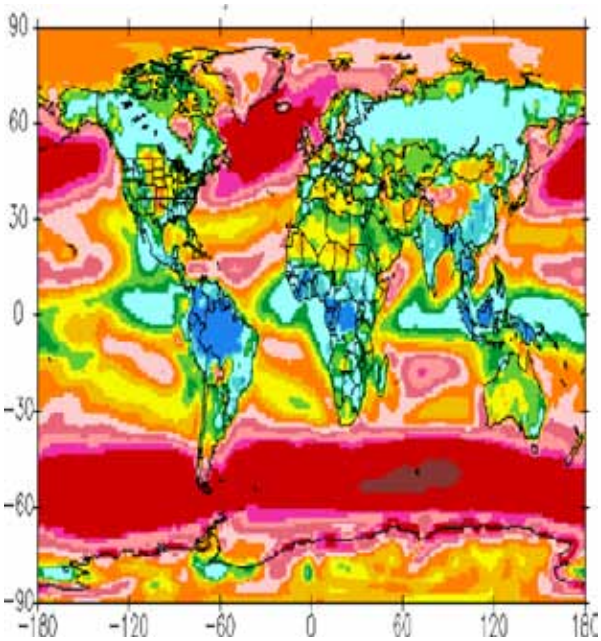
Offshore Wind Energy

Offshore winds tend to blow harder and more uniformly than on land, providing higher potential for electricity generation and smoother, steadier operation than land-based wind power systems. The Atlantic can generate considerable renewable energy from offshore wind, with a concentration of promising locations on both sides of the North Atlantic, especially during the northern winter. Although the South Atlantic also has relatively strong winds throughout the southern winter, these gust only on the South American side and are further offshore (Figure 37).

Globally, total installed offshore wind capacity amounted to 3,117.6 megawatts (MW) in 2010, of which 1,161.7 MW were added in that year. The growth rate of 59 percent in 2010 was far above the growth rate of the wind sector overall. The share of offshore facilities in wind capacity worldwide went up from 1.2 percent in 2009 to 1.6 percent in 2010.

In some parts of the Atlantic littoral, offshore wind generation has great potential to meet sustainable energy needs (Figure 38). In

Figure 37 — Offshore wind speeds



2010, offshore wind capacity continued to grow, with wind farms installed in the sea by12 countries. Ten of these were in Europe, where 10 gigawatts (GW) of capacity was installed, led by the United Kingdom, Denmark, the Netherlands, and Sweden. The European Union and the European Wind Energy Association have targeted installation of 40 GW of offshore wind power capacity by 2020 and 150 GW by 2030 (European Wind Energy Association 2011).

The United Kingdom has been the dominant player in offshore wind power over the past few decades (Figure 39). It accounted for more than half of the offshore market in 2010 and installed 653 MW of offshore wind turbines. With this growth spurt, Britain established itself as the biggest market for offshore wind turbines by far, with a total offshore capacity of 1,351 MW. In the United Kingdom, offshore wind represents 26 percent of total wind capacity and 59 percent of the new power generation capacity added in 2010. Denmark is the number two offshore wind power country with a 2010 offshore capacity of 854 MW, 22.9 percent of its total wind capacity. Offshore wind turbines represented 62 percent of the capacity added in Denmark in 2010 (World Wind Energy Association 2010).

Figure 38 — Average wind speeds at 100m above sea level in European waters

Note: >10 m/sec (blue); 8.5—10 m/sec (red); 7.5—8.5 m/sec (yellow); 6.0—7.5 m/sec (green)

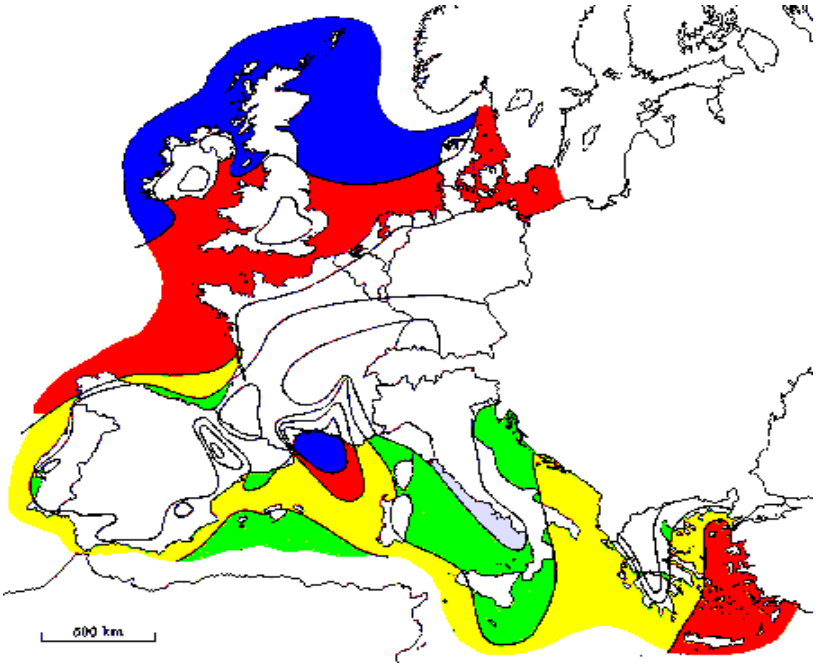
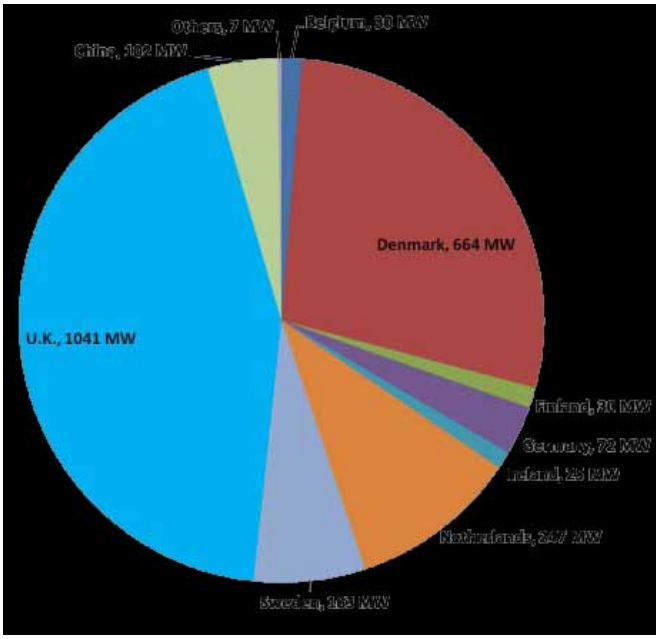
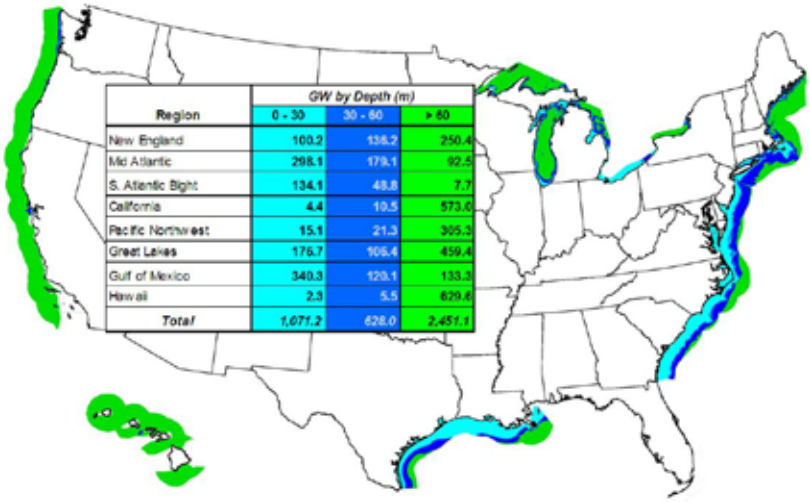


Figure 39 — Growth in generating capacity of offshore wind projects (1991–2010)



The United States has no offshore wind-generating capacity to date. However, about 20 projects representing more than 2,000 MW of capacity are in the planning and permit process. Most of these are in the Northeast and Mid-Atlantic regions. The availability of high offshore winds close to major U.S. coastal cities significantly reduces power transmission issues (Figure 40) (National Renewable Energy Laboratory 2010). In Canada, offshore wind energy developments are most likely to appear first in the Great Lakes.

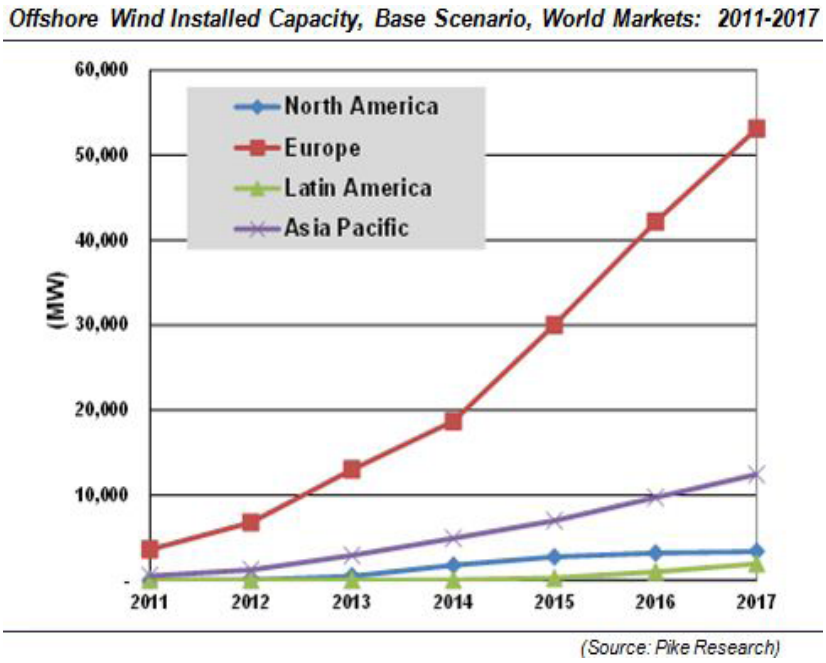
Figure 40 — U.S. offshore wind resources by region and depth



Europe is expected to continue to be pre-eminent in the growth in offshore wind energy (Figure 41). By 2035, the International Energy Agency (IEA) forecasts that capacity there will reach a minimum of 115 GW but more likely 180GW or as much as 340GW depending on renewable policies. The global offshore wind power market could be worth up to $273 billion a year by 2050. Still, many technical, financial, and logistical challenges need to be overcome for offshore wind energy to achieve its potential (United Nations Environment Programme and Bloomberg New Energy Finance 2011).

Offshore wind energy is moving further out in the oceans, with a growing portfolio of installation types (Figure 42). A primary challenge will be cost reduction. Developing the necessary support infrastructure entails one-time costs for customized vessels, port and harbor upgrades, new manufacturing facilities, and

Figure 41 — Projections for offshore wind capacity to 2017



workforce training. In general, capital costs are twice as high as those for land-based turbines, but that may be partially offset by potentially higher energy yields — as much as 30 percent or more. Following the pattern of land-based wind systems over the past two decades, offshore wind costs are expected to drop with greater experience, increased deployment of systems, and improved technology. To make offshore wind energy more cost-effective, some manufacturers are designing larger wind turbines capable of generating more electricity per turbine.

Figure 42 — Offshore wind energy platform types

The projected expansion in offshore wind energy, along with growing government interest and the massive investments already undertaken, is attracting a number of specialist firms to the sector. Because turbines account for almost 50 percent of the cost of an offshore wind park, wind turbine companies are critical to the industry. Companies with expertise in related areas such as the construction of foundations for the giant offshore turbines or the logistics of transporting them also get involved.

As almost 80 percent of the current global capacity has been installed in Northern Europe. European companies are ahead of others in terms of owning and operating offshore wind farms, and they have attained a high level of expertise in building and designing wind turbines. This is giving them a first-mover advantage as offshore wind farms are built in other places in the world. Vestas and Siemens, based in Denmark and Germany, respectively, have supplied more than 80 percent of the turbines to the European offshore wind market, and they also have strengths in electrical equipment, power transmission, and large-project construction. Gamesa, in Spain, and Suzlon Energy in India are other major turbine manufacturers, while companies in China are rapidly entering the market.

Since Europe leads in offshore wind energy, it is not a surprise that most of the big developers and operators are large European utilities. Although their origins lie in national energy development, many of these companies are developing offshore wind in several countries, often in partnerships. These include Centrica, a British company; DONG Energy, headquartered in Denmark; Airtricity, an Irish gas and electricity utility; EDF Group in France, one of the biggest power utilities in Europe; Iberdrola Renovables, the world's largest developer of renewable energy, based in Spain, which includes Scottish Power Renewables; E.ON, a German company; EDP of Portugal; RWE, a major German utility; and Vattenfall, a Swedish company and another of Europe's largest utilities. In the United States, the principal offshore wind development players include Deepwater Wind and NRG Bluewater Wind.

Ocean Energy

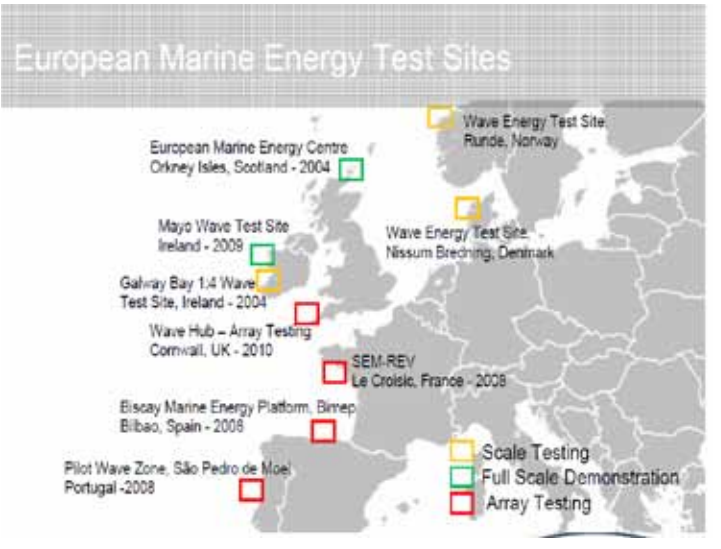
Ocean waves, currents, and tides carry immense amounts of energy. The world's oceans are estimated to contain more than

5,000 times current global energy demand. The IEA estimates that marine resources could feasibly provide 20,000 terawatt-hours (TWh) of electricity per year, which is more than the entire global generation capacity. To this can be added energy derived from temperature differences at various ocean depths (ocean thermal energy conversion, or OTEC) and energy derived from the differing salt content of freshwater and saltwater (osmotic power).

A variety of mechanisms are under development to convert ocean energy efficiently from these sources into electrical power, and several devices are being tested in the ocean. Others are on the verge of being test-ready, but the engineering challenges for technology developers remain immense. Getting pieces of equipment to survive for long periods of time in the harsh marine environment presents many challenges. Many of the devices in operation face long periods of downtime owing to the experimental nature of the industry at this stage and the difficult operating conditions. The rapid maturation of ocean power technologies depends upon deployment of substantial demonstration and commercial projects in nearshore areas.

In the Atlantic, some of the greatest potential and need for ocean energy is in the northeastern quadrant, and this is where the majority of the research and development is taking place. Currently, there are only a few hundred megawatts' worth of projects installed

Figure 43 — Ocean energy test sites in Europe



around the world, mostly in European waters (Figure 43). Little information is available on ocean energy potential or activity in the South Atlantic.

Much of the research and development on ocean energy is undertaken by major utility companies, many of whom are also involved in offshore wind energy development. These are primarily European but also include Korean firms. In Europe, major ventures are led by the United Kingdom's Scottish and Southern Energy and Scottish Power Renewables, Denmark's DONG, Ireland's Electricity Supply Board, Canada's EMERA/Nova Scotia Power and BC Hydro, Norway's Statkraft, Spain's Iberdrola, Sweden's Vattenfall, and Germany's RWE.

Wave Energy

The global technical potential of wave energy is estimated at 11,400 TWh per year. Its sustainable generating potential of 1,700 TWh per year equates to about 10 percent of global energy needs. There are various concepts for generating power from wave energy, most of which can be classified as three basic types:

1. *Oscillating Water Column.* Wave action causes water to move up and down in a chamber. The air in the chamber is displaced and forced through a turbine, which generates electricity. Pilot plants of this type have been set up in Portugal, Scotland, and Japan.

2. *Oscillating Bodies.* Facilities of this type use the motion of ocean waves to generate electricity. They include semi-submerged generators on which a float on a fixed counter bearing moves either sideways or up and down. Other systems consist of flexible mounted components that move against each other, putting hydraulic oil under pressure. The oil in turn drives a turbine. The "Pelamis" system, the world's first wave energy converter, was installed off the coast of Portugal in 2008 and connected to the power grid by an undersea cable.

3. *Overtopping.* Similar to a dam, overtopping devices have a reservoir that is filled by incoming waves to levels above the surrounding ocean. The energy of the water falling back to the ocean is used to drive a turbine. Prototypes of both floating

and fixed systems have already been installed in Denmark and Norway.

Tidal Energy

Tidal power plants work in a way similar to power plants at a reservoir — except that the water masses do not flow downhill but are moved back and forth with tidal flows. Tidal energy has been utilized commercially for some time. The Rance Tidal Power Station began operations in 1966 on the Atlantic coast in northern France, where the Rance River flows into the sea. At high tide, the water flows upstream through the large turbines of the power station, and at low tide it flows downstream again, generating 240 MW of power.

Similar facilities have been constructed over the past 20 years, as listed below, although these are considerably smaller:

- Annapolis Tidal Power Plant was built in 1984on the Bay of Fundy in Nova Scotia, Canada, and has a 20-MW power capacity.
- Jiangxia Tidal Power Station in Zheijiang, China, has a capacity of 3.2 MW.
- Kislaya Guba Tidal Power Station, a pilot plant on Russia's Kola Peninsula facing the Barents Sea, completed in 2004, has a 1.7-MW capacity.
- Uldolmok Tidal Power Station in Jindo County, South Korea, has a capacity of 1 MW, with plans to expand the capacity to 90 MW by 2013.

Planned tidal barrage developments include

- Incheon Tidal Power Station in South Korea will be the biggest tidal plant in the world when it is built, with a capacity of 1,320 MW, consisting of 44 turbines with 30-MW power capacity each. The cost of the power plant will be around $3.4 billion, and it has a planned completion date of 2017.
- The U.K. government was exploring construction of a16-kilometer (10-mile) barrier between England and Wales, where there is a tidal range up to 14 meters (46 feet). The

Severn Barrage would generate 5 to 6 percent of current electricity usage in England and Wales, but the project has been mothballed because of environmental challenges.

Current Energy

Currents can also be harnessed using submerged rotors that are driven by the motion of the water. It has been estimated that ocean current power stations and tidal power plants together could harness several 100 TWh of electricity per year worldwide. Tests have been carried out on some rotor concepts, such as the Seaflow system, whose prototype commenced operations off the English coast in 2003. Its successor, SeaGen, is operating in the Strangford Narrows off the Irish coast. Under this scheme, two rotors are mounted on the plant's tower. The blade angle and rotational speed can be adjusted to suit the prevailing current. Other designs focus on fixed, non-adjustable systems. One design and maintenance challenge is that current rotors face harsh stresses from currents and wave movements.

On the other side of the Atlantic, Verdant Power deployed six full-size tidal turbines in New York City's East River from 2006 to 2008 and successfully delivered energy. In early 2012, the company received the first commercial license for tidal power in the United States to develop a 1-MW pilot project in the East River, with the phased installation of up to 30 turbines. In Maine, three utilities gained approval in 2012 to negotiate with Ocean Renewable Power Company to develop tidal power facilities. In Canada, that same company and Nova Scotia's Fundy Tidalhope to install identical units in waters off Nova Scotia, where Bay of Fundy offers even greater tidal power potential.

Ocean Thermal Energy Conversion

Ocean thermal energy conversion utilizes the temperature difference between warm surface water and cold, deeper water to generate power. In order to drive the steam cycle in an OTEC power station, the temperature difference must be at least 20° Celsius (36° Fahrenheit). The warm water is used to evaporate a liquid that boils at low temperatures, producing steam that drives a turbine. Cold seawater (4° to 6° C, around 40° F) is then pumped up from a depth of several hundred meters and used to cool

and condense the steam back to liquid form. The cost of OTEC technology has been considered prohibitive, requiring pipelines of several hundred meters in length and powerful pumping systems. The U.S. government supported OTEC development and initial testing in the mid-1970s but withdrew its funding in the early 1980s. Interest has recently been rekindled, and a U.S.-Taiwanese consortium is now planning to construct a 10-MW facility in Hawaii. Public agencies and businesses in France have launched the IPANEMA initiative, which aims to promote both ocean-based renewable energy and OTEC technology. It is estimated that OTEC has the potential to harness several thousand TWh of electric power each year. The technology is more suited to warmer regions, and the temperature differentials in the Atlantic are not as promising as elsewhere.

Osmotic Power

Energy derived from the differential in salt content of freshwater and saltwater exploits the osmotic pressure that builds up between the two when they are pumped into a double chamber and separated by a special semipermeable membrane. The technology is in its early stages, but in 2009, the world's first osmotic power station was constructed on the Oslo Fjord to test the concept. The plant has been generating only a few kilowatts of electricity thus far. Global production capacity of osmotic power could amount to 2000 TWh annually.

Transmission Grids

For both offshore wind and ocean energy, the improvement of efficiencies in power transmission and distribution offers major opportunities and poses challenges. The power is most needed around the large, dense coastal population centers of the North Atlantic. In Europe, a "Supergrid" has been posited to link a variety of sources of electrical power from renewable sources, including possibly from North Africa, and transmit them around the continent. Along the East Coast of the United States, the Atlantic Wind Connection is being proposed by a consortium of energy transmission companies and Google as a grid to connect the Eastern Seaboard's hoped-for offshore wind potential to its customers in an efficient manner.

In the immediate future, as the number of wind farms increases rapidly, particularly in the North and Baltic seas, there are already challenges regarding how to connect the wind-power capacity and how to integrate it into the national power systems in an efficient and secure way, not to mention hooking into regional and Europe-wide transmission grids. Future wind farms may be up to several thousand megawatts in capacity, at distances of more than 200 kilometers (125 miles) from shore. For these wind farms in particular, bundling the electrical connectors at sea and carrying energy over a joint connector to onshore connection points can be more efficient than individual connections between wind farms and shore. This so-called hub connection design can reduce costs, space usage, and environmental impact dramatically.

The first offshore projects (in 1991) were all relatively modest in capacity and close to the coast, so conventional medium-voltage (MV) interconnections could be used, similar in principle to those of onshore wind farms, that is, the turbines were interconnected in a radial system at a voltage of 10 or 20 kilovolts, with an onshore substation link. Although the arrangement and voltage of the MV cables between turbines and to shore were identical to onshore wind farms, it was necessary to use submarine cable technology. At such voltage levels, suitable products and suppliers already existed. Subsea cable construction is "tri-core," that is, a single cable containing three phase conductors inside an external covering. The subsea cable also contains an optical fiber communications cable, whereas for onshore wind farms this is provided by a separate cable laid in the same trench as the MV cables. Methods were developed for cable entry to the offshore foundations, as well as cable support and termination.

The situation is changing for offshore installations. Not all large projects need offshore substations: those close to shore can follow the early practice of connection to shore at MV. However, since the maximum power that can be exported on the largest MV cable is on the order of 30-40 MW, a sizable wind farm will need a large number of cables. Providing landfall and onshore cable routes to an onshore substation for many cables might not be easy. For distances of more than a few kilometers, offshore substations are optimal because of the cost advantage of using a small number of high-voltage cables in the range of 120 to 150 kilovolts. The

cost comparison includes the capitalized value of the electrical losses, which are significantly lower when using higher voltages. The electrical equipment mounted on an offshore substation is very similar that for an onshore substation, with additional environmental safeguards.

Offshore substations are recognized as a major risk; a failure at the substation may have a significant effect on energy production. Designs have been developed to provide substantial redundancy; recent projects often have two transformers and two export cables to shore. For very large offshore wind farms, several offshore substations may be required, and there may then been advantage in providing redundancy by adding high-voltage connections between the substations. The MV cables linking turbines ("array cables") use existing subsea cable technology. The higher-voltage export cables necessary for offshore substations also use standard subsea cable technology.

Both onshore and offshore, alternating current is virtually universal for electricity generation, transmission and distribution. However, high-voltage direct current (HVDC) is used increasingly in specific circumstances. Converter stations at each end of a DC cable or overhead line convert AC power to DC and vice versa. HVDC in principle has advantages for subsea power transmission, and with recent developments in power electronic conversion technology, this has become a more attractive option for longer distances and larger wind farms. HVDC is being used by transmission system operators in Germany to connect several offshore wind farms arranged in clusters with a total installed capacity of 800 to 900 MW. This technology is likely to be used for the larger and more distant U.K. wind farms and is considered to be cost-effective for projects of around 500 MW with a cable route of around 100 km (62 miles).

The use of the technology offshore is still seen as a risk, given its relative immaturity, lack of widespread application, and perceived complexity. In addition, a substantial offshore substructure is needed to support the large converter stations. HVDC technology currently allows only "point to point" transmission. "Multiterminal" systems are technically feasible but have not yet been demonstrated on a commercial scale. This will be an important step in making

use of HVDC connections to offshore wind farms to provide interconnections between countries, as proposed in the "Supergrid" concept. This is also an important technical development for the German market, where HVDC hubs are being installed to service multiple projects in a regional cluster.

With an HVDC connection, there is substantially more design freedom for the wind farm electrical system and for the turbines. For example, it would be possible to run the wind farm electrical system at variable frequency. Higher frequencies could substantially reduce transformer size and cost. It might also be possible to achieve DC output directly from each turbine (European Wind Energy Association 2011).

The majority of the sites currently being considered for offshore wind projects are close to the European coast, not further than 100 kilometers from shore. This is in part attributable to the high cost of grid connection, limited grid availability, and the absence of a proper regulatory framework for wind farms that could feed several countries at once.

An intergovernmental North Sea Countries' Offshore Grid Initiative is being discussed to support;

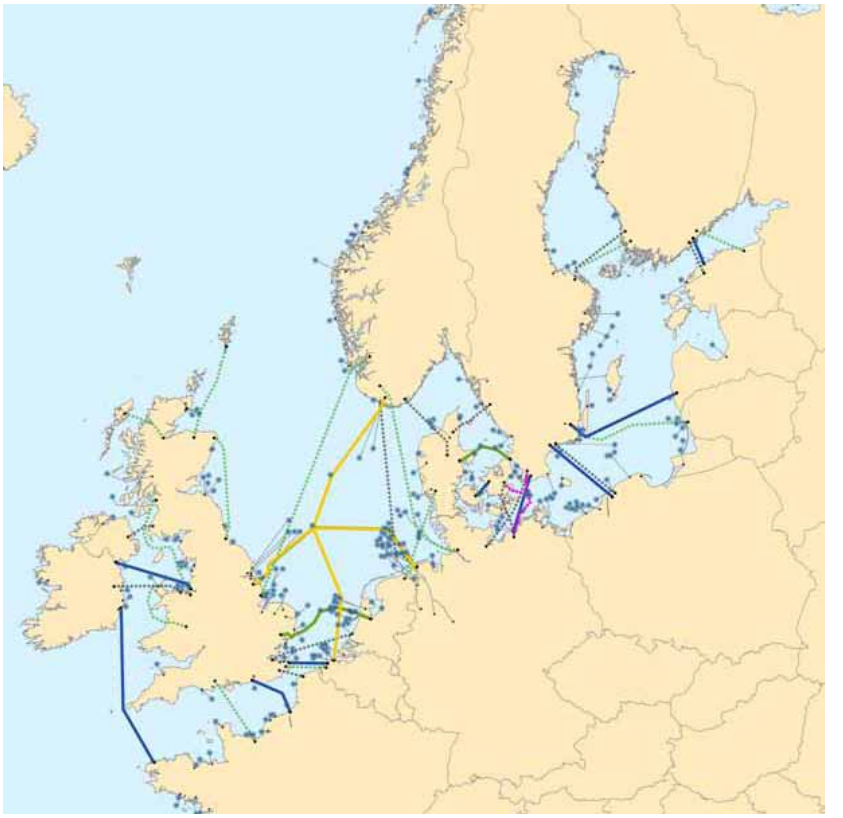
- improving the connection between big load centers around the North Sea;
- transmitting indigenous offshore renewable electricity to where it can be used onshore;
- bypassing onshore electricity transmission bottlenecks;
- developing more interconnections between countries and power systems to enhance trade and improve competition in the European energy market;
- integrating renewable energy;
- facilitating large-scale offshore wind-power plants and other marine technologies;
- employing spatial smoothing effects to diminish local fluctuations in wind and other renewable power, thus reducing

the variability of output and the resulting need for alternative systems;

- connecting to large hydropower capacity in Scandinavia, introducing flexibility into the power system to compensate for variability from wind and other renewable energy sources; and
- contributing to Europe's 2020 targets for renewable and CO_2 emission reductions.

Europe has ambitious targets for renewable energy deployment. By 2020, 20 percent of gross final energy consumption should be met by renewable sources. Offshore wind power is expected to deliver a large contribution. An installed capacity of 40 GW of offshore wind power is expected in Europe by 2020; by 2030, this could amount to 150 GW, of which about 126 GW will be located in Northern Europe (Figure 44). Once these wind farms or hubs are in place,

Figure 44 — Proposed North Sea Countries' Offshore Grid Initiative



they can be tied to interconnectors or interlinked with other hubs or to other shores, creating a truly integrated offshore power system (European Wind Energy Association 2010).

In the light of the above analysis, it seems safe to say that the alternative and renewable resources sector will continue to expand in the North Atlantic, and its rate of growth may even accelerate. In the foreseeable future, however, it does not seem likely that the same will apply in the South Atlantic.

Overall Conclusions

As in so many areas of world affairs, it seems that change is coming to the Atlantic Basin at an accelerating rate. What used to be an ocean apparently untroubled by major problems, with a northern realm of settled economic activity and established institutions in the form of transatlantic dialogue structures and the NATO alliance and southern regions seemingly without genuine potential to register on global radar screens, is now being shaken up by a series of significant developments. Most are positive. But some are fraught with various sorts of risks that the vacuum of transnational governance tends to enhance.

In the far north, the melting of the Arctic ice is destined, within the investment-planning time spans of ports and shipping lines, to lead to important new transportation routes between China and Europe and the East Coast of the United States, as well as new possibilities for Russian exports to the Atlantic Basin, using ships with icebreaking capability, and later to a similar development through the Northwest Passage of Northern Canada. Together with increases in cruise tourism in the region, this will pose new challenges for the development of a polar shipping code by the International Maritime Organization, and particularly for the coastal states with search and rescue capabilities.

In the northern reaches of the Atlantic, new trans-shipment port facilities will develop as a result. The relative importance of European ports is also likely to change for other reasons, as the size and draught of ships increases and alternatives for trans-shipment of traffic coming through Suez come on-stream, in Tanger-Med or Algeciras.

This is likely to be the only major change in the North Atlantic. Given the slow rates of growth of the northern economies and their increasing concentration on the export of higher-value goods of lower weight and volume and on services, overall trade volumes are

unlikely to see significant change in the foreseeable future, although their composition may evolve. The challenges posed by criminal activities seem unlikely to emerge as major threats in the face of highly developed coastguard and naval capacities and expected improvements in the systems of surveillance that enhance maritime domain awareness. It is true that the increasing congestion of offshore activities, driven in particular by the expected massive expansion of renewable energies, will pose problems, but the development of maritime spatial planning will provide a framework to deal with this, as it is gradually put into place on both shores of the North Atlantic.

In the South Atlantic, the situation is quite different. The booming economies on both shores, led by Brazil, South Africa, and Angola, will generate increasing trade flows, and large new deepwater port facilities are being developed in Santos, Suape, and Açu in Brazil; at Lobito in Angola; and at Walvis Bay in Namibia. The opening of the expanded Panama Canal will allow much larger ships to make the shorter passage from Brazil to China, and the pattern of shipping routes will evolve rapidly.

Economic activity will also grow rapidly offshore on both sides of the South Atlantic as oil and gas reserves come on stream and ancillary industries develop. New safety and new security demands will arise from these changes.

In addition, global fishing fleets are increasingly focusing their efforts on the southern Atlantic as stocks, particularly in areas beyond national jurisdiction, decline in northern waters. Control of illegal, unregulated, and unreported fishing thus presents a challenge to sustainable development of the basin and is emblematic of a general, and extremely serious, threat to the future prosperity and peace of the hemisphere. There is a vacuum in terms both of national maritime governance structures in most littoral states and any overarching system of cooperative governance, with the exception of ineffective regional fisheries commissions, between which information is insufficiently exchanged.

Within this vacuum, non-state groups pursuing illegal activities are thriving. Piracy and robbery at sea are a serious problem in the Gulf of Guinea, and there is reason to fear their rise in the Caribbean. The routes for trafficking drugs from South America

are evolving and diversifying and increasingly using the South Atlantic as a conduit. Human trafficking is on the increase, and there is a particular problem with illegal immigration flows in the Caribbean and from North Africa toward Europe. Illegal discharges of contaminants into the ocean go largely undiscovered and uncontrolled.

Detection of these activities relies on maritime surveillance systems, which are largely nonexistent beyond national borders in the South Atlantic. Interdiction depends on coastguard and naval capabilities, which are typically substandard, particularly off the African coast. And effective judicial pursuit of criminals is hampered by an insufficiently developed network of mutual assistance agreements between states. In general, there is vastly inadequate exchange of information between South Atlantic states with respect to illegal maritime activities. This applies as well to the exchange of intelligence of a classified nature, a particular handicap in the fight against terrorist activity.

One important reason for this governance vacuum is the heterogeneity of the South Atlantic, which we have seen fit to divide into four distinct zones for the purpose of analysis. The history of the southern basin goes a long way toward explaining why this is so, but the result is that there is no common awareness of the challenges, no common consciousness of sharing responsibility for the husbandry of a common resource, and no transnational governing structures, either formal or informal.

Another reason for the lack of multilateral initiatives in the region is the growth of often antipathetic national identities, accompanied by unilateralist approaches to the exercise of national sovereignty, much of which is traceable to and understandable by the differentiated histories of the various states. In coming to a collective commitment for their shared ocean they could learn much from experiences in the Northern Hemisphere: from NATO in the realm of security; from the CleanSeaNet system by which the EU deals effectively with illegal discharges in coastal waters; and from emerging models for integrated maritime surveillance such as BlueMassMed, and from maritime spatial planning.

But here, once again, history has left a legacy of bad blood and mistrust. The United Kingdom and France are still players in the

austral regions, by virtue of the extensive maritime territories surrounding their scattered island dependencies and by their traditional relations with African countries dating to colonial times. The United States is contributing to the increasing security presence in the southern seas through the re-establishment of its Fourth Fleet. These countries, as well as Spain and Portugal, with their long history of involvement in South America, are engaged in individual cooperation projects with national partners in the region, which can play a role in improving governance. But this engagement is sometimes interpreted as interference, and the attitudes of the larger southern states toward it can best be described as ambivalent, if not downright hostile.

In order for future economic activity to be sustainable and criminal actions to be frustrated, it is urgent that an Atlantic Basin consciousness be fostered and that a program of exchange of ideas, experiences, and expertise, leading to common projects for improving governance, be put in place. The authors see the following actions as providing a roadmap to sustainability through good governance.

A forum needs to be immediately created within which the southern countries can both share their own ideas and profit from the experience of the North. In the absence of an intergovernmental initiative and in view of the widespread mutual suspicions between countries, this could be a non-governmental undertaking sponsored by governments, businesses, and philanthropic institutions. Within this forum, southern countries should be encouraged, inter alia, to:

- Work with the regional fisheries commissions in the South Atlantic to set up a global list of all registered fishing vessels and ensure an effective system of exchange of information. This should lead to more effective fisheries management in the region and prevent a repetition of the depressing history of North Atlantic overfishing.

- Generalize existing databases for the systematic exchange of information on criminal activities and on the operational activities of countries' coastguard functions. This could eventually lead to the establishment of a "South Atlantic

maritime constabulary," charged with the maintenance of law and order on the seas.

- Move in the direction of introducing maritime spatial planning and developing holistic policies for regulating maritime activities.
- Develop a common system of surveillance of maritime activities in the Southern Atlantic, including shared satellite-based information.
- Strengthen coastguard functions and develop more common projects between nations' forces.
- Strengthen national legal frameworks and the reciprocal arrangements between them to allow for the more effective pursuit of criminal activity.
- Facilitate consultations for designing the rudiments of what could become a more comprehensive and integrated multilateral security architecture for the South Atlantic region.

The countries of the northern Atlantic should declare themselves ready, in the interest of a better husbandry of their common ocean, to assist this process with their resources, their expertise, and their experience. The Lanzarote Declaration perhaps provides a good starting point.

Over time, the activities of this forum should lead to the Southern states themselves setting up the kind of multilateral infrastructure that could someday lead to a South Atlantic security agreement designed to deal with the multiple challenges arising in the context of increasing "blue growth" in the region. That arrangement would replace the fractured governance of today with an integrated framework for sustainable shared development and would create a situation in which peace, security, and safety are a given.

Meanwhile, in the north, the littoral states will neglect the rapidly evolving role of the Arctic Ocean at their peril. Increased economic activity there points to new growth opportunities but also dangers for a fragile environment and for security as conceived broadly, which it would be foolhardy to ignore.

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About the Authors

The first chapter of this report, on geopolitical shifts in the Atlantic, was written by Armando Marques Guedes, former president of the Diplomatic Institute, Portuguese Ministry of Foreign Affairs. The second chapter, on illegal activities, had authorship by Xavier de la Gorce, former French secretary general of the seas, and Anne-François de Saint Salvy, former French maritime prefect of the Atlantic. The third chapter, on fisheries, is based on drafts by Paul Holthus, executive director of the World Oceans Council, and by de la Gorce and Saint Salvy. Holthusis responsible for the fourth chapter, on extraction of resources from the ocean. John B. Richardson, former head of the European Commission task force that designed the European Union's Integrated Maritime Policy, was responsible for overall editing and for the executive summary and introduction. The overall conclusions represent the joint work of all authors.