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Marine resource management and coastal livelihoods: an Atlantic perspective

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ABSTRACT

Marine ecosystem resources play important roles in coastal countries, providing numerous benefits and services. This paper examines opportunities and challenges to managing marine resources, promoting coastal protection, and supporting coastal livelihoods for select Atlantic Basin coastal countries. Through in-depth case study analyses of four Atlantic Basin countries – Canada, Guatemala, Guinea-Bissau, and Venezuela – we explore the relative importance of marine resources, management measures, challenges and trade-offs, and opportunities for improving marine management and sustainable resource use. The case studies highlight the great environmental, socioeconomic, and political diversity found throughout the Atlantic Basin. At the same time, common challenges and opportunities for marine resource use and management within these countries and across the wider Atlantic can be identified, revealing the need for the strong regional cooperation to promote sustainability, protect marine resources and coastal areas, and maximize benefits for coastal populations.

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1. Introduction

This paper was written as a deliverable for Work Package 5, Resources and Environment, of ATLANTIC FUTURE, a 3-year collaborative research project funded by the European Commission under the Seventh Framework Programme (FP7). ATLANTIC FUTURE aims to study the rationales of cooperation in the Atlantic Basin and to consider interregional links and transatlantic engagement in the context of ongoing redistribution of power and rebalancing of relations around and within the Atlantic space. Work Package 5 examines resources and the environment in the Atlantic Basin and assesses how these factors shape and affect the emergence of an Atlantic area. Here, we consider the dynamics of marine resources and ecosystems in the Basin by asking: What are the opportunities and challenges for managing marine resources, promoting coastal protection, and supporting coastal livelihoods for select Atlantic Basin coastal countries? Where can shared opportunities or challenges be identified?

Europe, Africa, and the Americas are bound together by the Atlantic Ocean, yet countries in the Atlantic Basin exhibit great diversity in marine ecosystems, marine resources, and resource use patterns that lead to (or are the result of) the existence of different management systems. International and regional bodies and instruments play important roles in governing the Atlantic Ocean, although commitments must ultimately be carried out through national authorities. Management and decision-making at the national or local level may more directly impact certain marine ecosystem services and aspects of human dependency, versus governance measures at the global level. At the same time, activities within a country's waters cannot be isolated and transboundary challenges such as exploitation and depletion of migratory fish stocks, marine pollution, spread of invasive species, and global climate change. Global cooperation and commitments are needed to comprehensively and successfully meet these major challenges. We explore the importance of coastal resources and marine management through in-depth analyses of four case study countries, which showcase varying environmental, socioeconomic, and political conditions, and analyse the available data to help answer the above research question.

The research question is motivated by the fact that coastal protection and economic development are often postulated in theory and evidenced in practice as being at odds with each other. It is thus of interest to identify countries that manage to balance the two competing goals with each other or that might even be able to create a net benefit for ecosystem conservation from particular economic policies and growth pathways. Learning from their approaches and successes could provide insights – and hopefully transferable or adaptable ideas – to other countries. This hope is based on the assumption that such policies indeed exist at the macro-level and hence that successful management of both coastal ecosystem protection and maintenance of economic livelihoods is not solely a function of highly localized management decisions and other contextual factors such as culture, place, and institutions. This assumption is important because we use the macro-level Ocean Health Index (Halpern et al 2012) to identify case study countries that represent a diverse mixture of coastal protection and economic livelihood evaluations.

Analysis is performed through examination of the importance of marine and coastal resources for national economies and coastal livelihoods in the selected countries, management measures selected and employed to protect and preserve marine resources, key challenges the countries face in managing marine resources, and opportunities for improving ocean health and governance. From here, we attempt to identify common challenges and opportunities in the wider Atlantic and to discern inter-linkages between management commitments.

2. Background

In 2010, the world population exceeded 6.8 billion people with expectations to reach ten billion by 2030. Significantly, 2.9 billion people, or 44% of the global population, lived within 150 kilometres (km) of the world's coastlines (UNAO 2010). The average population density in coastal areas is estimated to grow to 80 people per square kilometre (km²), or twice the world's average population density. This figure could reach up to 500 - 1,000 people per km² in densely populated coastal areas (Creel 2003). In addition, coastal populations are increasing faster than those of inland populations in many countries.

Dependence on marine and coastal ecosystems is recognized in academic discussions and at a political level (Rogers et al 2014; EEA 2014). The term 'ecosystem services' refers to the benefits that people attain from ecosystems. These services can be split into four main categories: provisioning services (food, medicinal resources, ornamental resources, raw materials); regulating services (regulation of climate, diseases, wastes and water quality, air purification, disturbance prevention, and moderation); cultural services (recreational, aesthetic, and spiritual benefits); and supporting services (lifecycle maintenance, photosynthesis, and nutrient cycling) (UNEP 2006).

Marine and coastal areas are highly relevant in economic terms. Humans depend on coastal and marine resources for food provision and other goods. Fisheries and fish products alone provide direct employment for roughly 38 million people, with an estimated 15 million fishers employed aboard fishing vessels in the marine capture fisheries sector (UNEP 2006). In Europe, for example, maritime and coastal activities contribute about 330 to 485 billion Euro in Gross Value Added and employ about 5.4 to 7 million people (EEA 2014). However, coastal communities vary greatly throughout the world, with both some of the richest and poorest communities living near coastlines. More than a sixth of the world's population relies on fish as their primary, if not only, source of animal protein (UNEP 2006). Additionally, coastal ecosystems provide other resources such as salt, pharmaceuticals, shells, aquarium fish, pearls, and corals (Böhnke-Henrichs et al. 2013), as well as tourism and recreation opportunities. Marine and coastal tourism is one of the world's fastest growing sectors (Hall 2001) and constitutes a significant share of national income in many developing countries (IOC/UNESCO et al. 2011).

Healthy marine and coastal ecosystems provide physical security and prevent the spread of waterborne diseases. Mangroves and coral reefs are known to buffer land from waves and storms, lessening the damage of natural disasters on coastal communities. They also play significant roles in purifying effluents of heavy metals and toxic substances and remove harmful air and water pollutants which can cause serious illnesses or even death (Cook et al. 2005; UNEP 2006).

Finally, marine and coastal ecosystems can provide spiritual and cultural significance not valued through market transactions. Many people who live farther inland, with no direct reliance on coastal and marine areas, nonetheless retain spiritual connections to the sea and admit concern for its condition. Certain cultures have long histories tied to marine settings and biodiversity, inherently linking cultural heritage and identity to these environments (Böhnke-Henrichs et al. 2013; UNEP 2006).

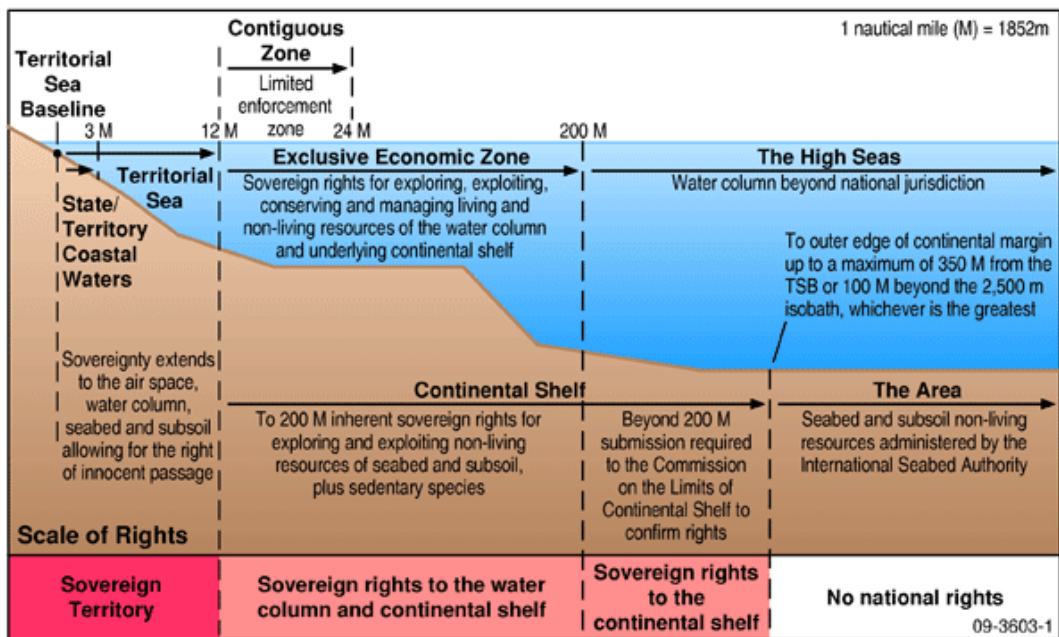
Ecosystem changes can impact the provision of these services and directly affect human well-being. Major drivers of change in marine and coastal ecosystems which influence the flow of benefits to humans range from global issues to regional problems. Anthropogenic climate change has been a global concern for decades and many believe that climate change will cause broad-scale uncontrollable change to oceanic temperatures and ecosystems which support ocean life (Gjerde and Breide 2003).

Ocean acidification is linked to the phenomenon of global climate change and increased levels of atmospheric carbon dioxide (CO₂). The world's oceans absorb most of the anthropogenic CO₂ released into the atmosphere, leading to reduced pH levels and to oceans becoming increasingly acidic, with critical implications for marine ecosystems and biodiversity (Bates and Peters 2007; Worm et al. 2006).

Overfishing, another anthropogenic pressure, is one of the greatest threats to marine biodiversity and continued sustainability of marine resources (Billé et al. 2011; Lester et al. 2013; Barbier 2012). Impacts of overfishing threaten not only biodiversity levels and ocean habitats, but ecosystem structures and future food supplies (Gjerde and Breide 2003; UN Secretary General 2012). Of the world's oceans, the Atlantic was the first to be fully exploited and overfished (UNEP 2006). Pollution and waste also present a range of disturbances to the marine environment. These include marine dumping, plastics and litter, nutrient-loading from land-based activities, and atmospheric deposition (Gray 1997; Gjerde and Breide 2003). Coastal and marine pollution have been known to cause large-scale hypoxia events and harmful algal blooms which can decrease fish stocks and harm human health (UNEP 2006; Lau 2012). Pollution also affects ecosystem resilience which can lead to habitat loss and reductions in biological diversity (IOC/UNESCO et al. 2011; Ruckelshaus et al. 2008). Many other human activities, such as shipping and ports, deep sea mining, offshore wind farms, aquaculture, tourism and recreation, and other marine and coastal activities also put pressure on marine and coastal ecosystems and can lead to environmental degradation and loss of resources.

Acknowledgement of the importance of coastal ecosystem products and services has led to legally binding international agreements and regional commitments promoting sustainable governance of marine and coastal ecosystems. The main legal framework which governs use of the oceans and seas is the United Nations Convention on the Law of the Sea (UNCLOS). Established in 1982, UNCLOS produced zones measured from baselines along the coast which govern sovereign rights to marine and coastal resources. The Exclusive Economic Zone (EEZ), which extends to 200 nautical miles (nm) from a country's coastline, grants sovereign rights to explore, exploit, conserve, and manage all living and non-living resources of the water column and underlying continental shelf (Kimball 2005; de Fontaubert 2001). Areas which extend beyond EEZs lie outside any one country's national jurisdiction, and thus represent the high seas. Where countries are granted certain rights within their respective EEZs, these do not extend to the high seas. UNCLOS grants Member States freedoms of the high seas which include the freedom of "navigation, fishing, marine scientific research, laying of undersea cables and pipelines, construction of artificial islands and other installations permitted under international law, and other unspecified activities (e.g., deployment of undersea vessel tracking and intelligence gathering devices)" (Kimball 2005). These freedoms must take into account part XXI of UNCLOS which calls for the protection and preservation of the marine environment.

Figure 1. Illustration of maritime zones on UNCLOS delimitation



Source: Symonds et al. 2009.

In an attempt to cover governance gaps within UNCLOS, the United Nations (UN) drafted the UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks (FSA) in 1995. This agreement enforced the principle that Member States should cooperate to ensure conservation and promote optimum utilization of fisheries resources both within and beyond EEZs (UNCLOS 2013). In the same year, the Convention on Biological Diversity (CBD) issued the Jakarta Mandate which highlighted the importance of marine and coastal biodiversity protection and called for the development of marine and coastal protected areas (de Fontaubert 2001).

In addition to international agreements and marine governance, the selected case studies have regional commitments to protect or conserve coastal and marine environments. In accordance with the FSA, countries are required to cooperate either directly or through regional organizations to sustainably manage fisheries in the high seas. These regional organizations are commonly referred to as Regional Fishery Bodies (RFB), which aim to conserve, manage, and develop fisheries (Vasconcellos 2006; RFB 2014a). RFBs have various mandates ranging from advisory to legally binding. RFBs with management mandates are called Regional Fisheries Management Organizations (RFMOs) (RFB 2014a). The geographic range of RFBs and RFMOs can encompass both sovereign and international waters (RFB 2014b). Regional seas programs and agreements operate using a regional approach whereby neighbouring countries collaborate and carry out action plans to protect their shared marine environment.

Over the past decade, ecosystem-based management (EBM) of marine resources has become popular with policymakers, management agencies, academics, and scientists (Arkema et al. 2006). This type of management scheme primarily aims to manage the ecosystem as a whole, rather than focusing on particular species or sectors (Halpern et al. 2010; Lester et al. 2013). One tool for implementing of EBM is the establishment of marine protected areas (MPAs). MPAs provide a framework for integrated area-based biodiversity conservation and, if effectively managed, can maintain ecosystem structure and function, protect species and habitats, and enable sustainable use of marine resources (Gjerde and Breide 2003). MPAs act as a means of buffering ocean services

from harmful anthropogenic activities by regulating or prohibiting human activities in these areas. MPAs, therefore, can have the benefit of enhancing marine conservation, benefitting certain fisheries, preserving areas of cultural significance, protecting area aesthetics for recreation, tourism, or existence value, and promoting research and education (Halpern et al. 2010). When used in isolation, individual MPAs may not support marine species to a desired extent. Some target and threatened species use coastal and marine areas too large to be effectively encompassed within a single reserve (Agardy et al. 2011). Thus in regard to fisheries, other management measures such as quotas are also needed to ensure sustainable resource management.

3. Methodology

While the countries of the Atlantic are linked by a common body of water, they are vastly different in social, political, economic, and environmental contexts. In this regard, the aim of this paper was not to provide overarching recommendations as to how the entire Atlantic marine area could be better managed, but to show key examples of opportunities and challenges Atlantic countries face when improving the protection and use of marine and coastal resources. To conduct the research in this paper, four case studies were selected for in-depth assessment. The methodology for the selection of the case studies, as well as the assessment, is described below. The term ‘Atlantic Basin’ is subject to multiple definitions. However, for the purposes of this paper in considering coastal protection and economies, we apply a narrow definition that includes only those countries bordering the Atlantic Ocean.¹

3.1. Case study selection

The recently published Ocean Health Index (OHI, developed by a large consortium of marine science and conservation organizations, academics, and other research groups under the leadership of Dr. Benjamin Halpern at UC Santa Barbara, was used as the basis for identifying the case studies. The OHI is a composite indicator that aims to evaluate the condition of marine ecosystems on the basis of 10 fundamental goals: natural products, food provision, artisanal fishing, carbon storage, coastal protection, tourism and recreation, livelihoods and economies, sense of place, biodiversity, and clean water. A country’s overall Index score is the average of the 10 goal scores. These goals, selected by the OHI researchers, are seen to represent a set of key ecological, social, and economic benefits that when considered jointly describe the state of health of oceans. According to the developers of the OHI, “[a] healthy ocean is one that can sustainably deliver a range of benefits to people now and in the future” (Halpern et al. 2012).

¹ This includes: *Africa*: South Africa, Angola, Benin, Cameroon, Cape Verde, Cote d’Ivoire, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Equatorial Guinea, Liberia, Morocco, Mauritania, Namibia, Nigeria, Republic of Congo, Democratic Republic of Congo, São Tomé and Príncipe, Senegal, Sierra Leone, Togo. *South and Central America and the Caribbean*: Argentina, Bahamas, Brazil, Cuba, Dominican Republic, Guyana, Haiti, Suriname, Trinidad and Tobago, Uruguay, Venezuela, Antigua and Barbuda, Barbados, Belize, Colombia, Costa Rica, Dominica, Grenada, Guatemala, Honduras, Jamaica, Nicaragua, Panama, St Kitts and Nevis, Saint Lucia, St Vincent and the Grenadines, and Bermuda. *North America*: Canada, United States, Mexico. *Europe*: Belgium, Denmark (including Greenland and Faroe Islands), France, Germany, Iceland, Ireland, Netherlands, Norway, Portugal, Spain, and the United Kingdom.

Under the OHI, a goal scores highest when the maximum sustainable benefit is achieved through methods that do not compromise the ocean's ability to deliver that benefit in the future. Each goal is evaluated on the basis of four dimensions:

- Present Status is a goal's current value (based on the most recent available data) compared to a reference point.
- Trend is the average percent change in the present status for the most recent 5 years of data.
- Pressures are the sum of the ecological and social pressures that negatively affect scores for a goal.
- Resilience is the sum of the ecological factors and social initiatives (policies, laws, etc.) that can positively affect scores for a goal by reducing or eliminating pressures.

Albeit designed for all of the world's ocean ecosystems and coastal nations, and not just the Atlantic Ocean, the OHI's assessment represents one of the most comprehensive and rigorous data collection and measurement efforts undertaken to date. In selecting case studies, we chose to rely on the OHI, and the scientific information and data that it assembles, as a thorough assessment of ocean health at the national level. To address our research question, we selected two of the OHI goals, consisting of two sets of underlying indicator data, which measure the extent to which countries and territories are adequately protecting their coastal areas while providing coastal populations with sustainable coastal livelihoods and economies. The two component goals are defined as follows:²

- Coastal protection: This goal aims to assess the amount of protection provided by marine and coastal habitats to coastal areas that people value, both inhabited (homes and other structures) and uninhabited (parks, special places, etc.). Evaluated habitats are sea grass, coral reefs, mangroves, salt marshes, and sea ice (all as they apply to the specific coastal region studied; in other words, scores are scaled to avoid penalizing a country that naturally lacks one of the habitats).
- Coastal livelihoods and economies: This component tracks the dual aspects of jobs and revenue produced from marine-related industries with the ultimate goal to maintain, i.e., avoid the loss of, coastal and ocean-dependent livelihoods (i.e., jobs) and productive coastal economies (i.e., revenues), while also maximizing livelihood quality (relative wages). It does not attempt to capture any aspects of job identity (i.e., the reputation, desirability, or other social or cultural perspectives associated with different jobs).

To select case studies for analysis, countries/territories that scored either high or low on these two goals were identified. This was to allow assessment, and comparison, of countries/territories having both good and poor performance each. Potential case study candidates were all countries/territories that scored in the top third or the bottom third on both components, respectively. We required that to be considered for the case study analysis, the country must have a valid score in both components, i.e., no missing value. Before deciding on these relative thresholds we experimented with a variety of decision rules, including the global mean, the global median, other percentile

² The indicators included in the two components and the detailed calculations are explained in the supplementary material in Halpern et al. 2012.

values (25th and 75th percentile) and static thresholds of different magnitude (e.g., 25 points at the low end and 75 points at the high end of the distribution). In the end, thresholds equivalent to the top and bottom third offered the largest differentiation between countries/territories performance on the selected components while still including Atlantic basin countries. The resulting Atlantic Basin countries in each category are shown in Table 1.

Table 1. Countries/territories with OHI scores for the coastal protection and coastal livelihoods and economies in the top or bottom third

Countries/territories in the bottom 33rd percentile	Countries/territories in the top 33rd percentile
Guadeloupe and Martinique	Canada
Guinea-Bissau	Guatemala
Mexico	
Nicaragua	
Nigeria	
Northern Saint Martin	
Puerto Rico	
US Virgin Islands	
Venezuela	

As the table shows, there are far more countries/territories in the Atlantic Basin that score relatively poorly on both coastal protection and coastal livelihoods and economies. Only Canada and Guatemala received top-third scores. From a case study selection perspective, these two countries offer interesting choices: Canada represents a high-income country with a well-developed commercial fishing and marine resources sector that contributes significantly to employment and GDP in coastal Atlantic communities, but less so nationwide. Guatemala, on the other hand, is a low-middle income country according to the World Bank's classification, in which the fishing industry is a significant source of employment, export revenue, and artisanal value in local coastal communities.

From the candidates in the bottom third of the component score distribution, we selected Guinea-Bissau and Venezuela. Guinea-Bissau offered an interesting case study because it is the only country that ranks in the bottom third across most of the ten OHI goals, thereby offering a kind of 'worst-case' comparison for our assessment. The motivation for choosing Venezuela was a combination of several factors, including that all of its coastline falls into the Atlantic Basin, progressive fishing policies such as a 2009 ban on bottom trawling, and a strong dependence on revenue generation from marine resource exploitation for national income.

The final set of countries thus represents a mixture of continents and geographies (North America, South America, and Western Africa), incomes and economic development stages (high, middle, low-middle, and low income) as well as diverse fisheries and marine resource management approaches.

3.2. Methodology for case study analysis

Once the countries were selected, desk-based research, in-depth literature reviews, and statistical analyses were conducted to collect the information necessary to answer the research question and related sub-questions. Additional research measures, such as interviews or new data collection, were outside of the scope of this paper.

- Research question: What are the opportunities and challenges for managing marine resources, promoting coastal protection, and supporting coastal livelihoods for select Atlantic Basin coastal countries?
- Sub-question 1: What is the importance of marine and coastal resources in national economies and coastal livelihoods in selected Atlantic Basin countries?
 - What is the relevance of marine and coastal resources for the country's economy, society, and culture and what is the relationship that the country has with the Atlantic – is it an inward-looking nation that is more interested in, e.g., agriculture or land-based sectors or does it have a strong maritime/fishing presence? What percentage of the population lives on the coast? What is the country's main industry and where is it based? How many people are employed in maritime activities?
- Sub-question 2: What management measures do selected Atlantic Basin countries employ to protect and preserve their marine resources?
 - What are current initiatives for coastal protection and for protecting coastal livelihoods in the country? Where is attention focused? Is there are strong interest from the policy side in protecting coasts and livelihoods? What external/bilateral activities and trade, international agreements, and frameworks are relevant? How are initiatives implemented?
- Sub-question 3: What are the key challenges (e.g., environmental, socioeconomic, and political) that selected Atlantic Basin countries face when managing marine resources?
 - What are the different challenges that countries face when managing, preserving, and protecting their marine and coastal resources? Are these mostly environmental challenges? What socioeconomic or political challenges restrict countries from developing and/or implementing successful policies?

4. Case studies

The following section describes the results of the case study analyses for Canada, Guatemala, Guinea-Bissau, and Venezuela. For each case study, a brief, general background is provided, followed by an overview of the socioeconomic uses of marine and coastal resources (sub-question 1), a description of governance and management measures employed in the country (sub-question 2), and the key challenges the country faces in terms of marine and coastal resource protection (sub-question 3).

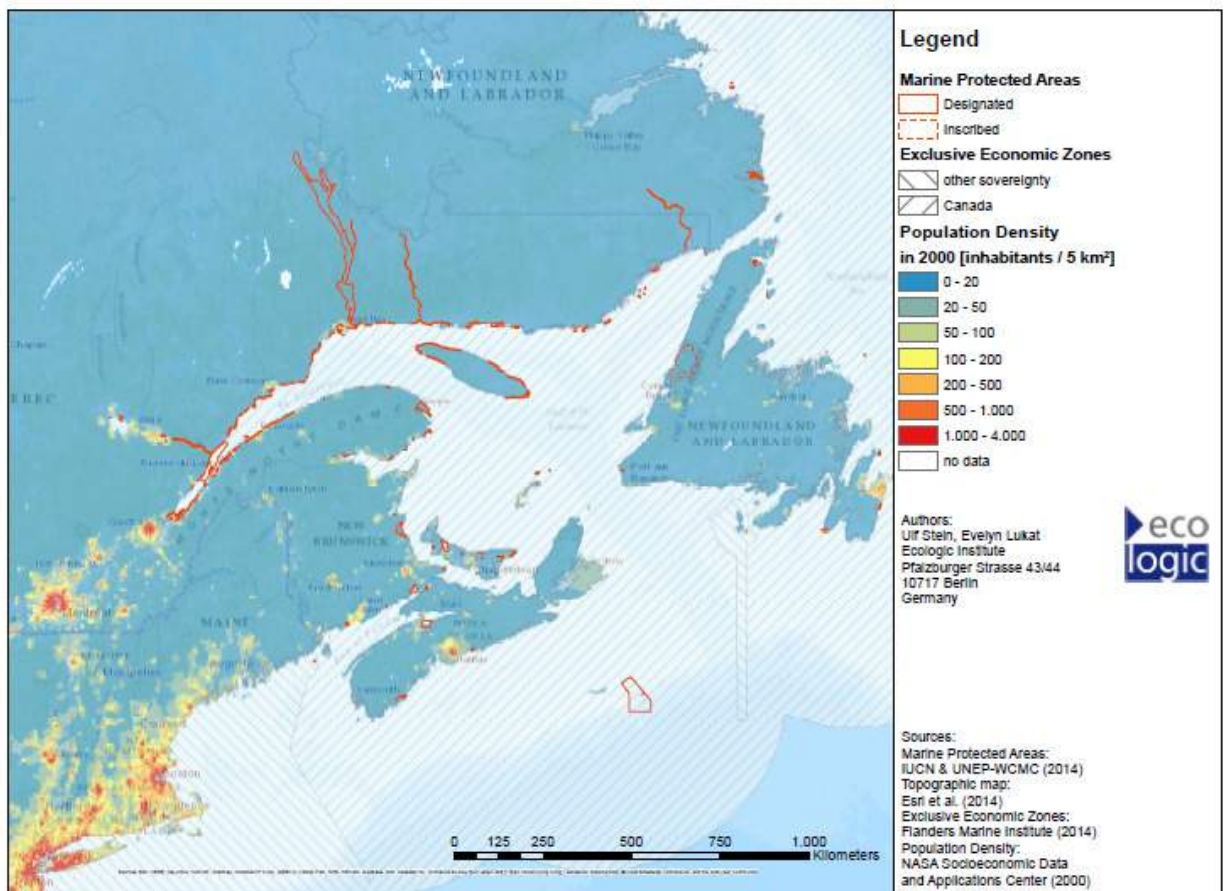
4.1. Canada

Canada has the world's longest coastline – spanning the Atlantic, Pacific, and Arctic Oceans – of which approximately 21%, or 52,000 km, borders the Atlantic (Parks Canada 2010). Canada's Atlantic waters are some of the most productive in the world. The cold Labrador Current and the warm Gulf Stream mix, along with waters from the Gulf of St. Lawrence, to create a unique environment. The large spatial and temporal variations support a highly diverse and productive biological community and trophic structure. Sea ice conditions range from seasonal fast and pack ice conditions to year-round open water.

Four provinces fall within Canada's Atlantic region: New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island. An estimated 23% of Canadians live in coastal communities and many hold jobs in the ocean sector (DFO 2008). Canada is a high-income economy, and is a member of the Organization for Economic Cooperation and Development (OECD) and Group of Seven (G7) with a high-tech industrial society, highly skilled labour force, and abundant natural resources, including significant oil reserves and an expanding petroleum sector.

Figure 2. Marine Protected Areas and Population Density in Eastern Canada

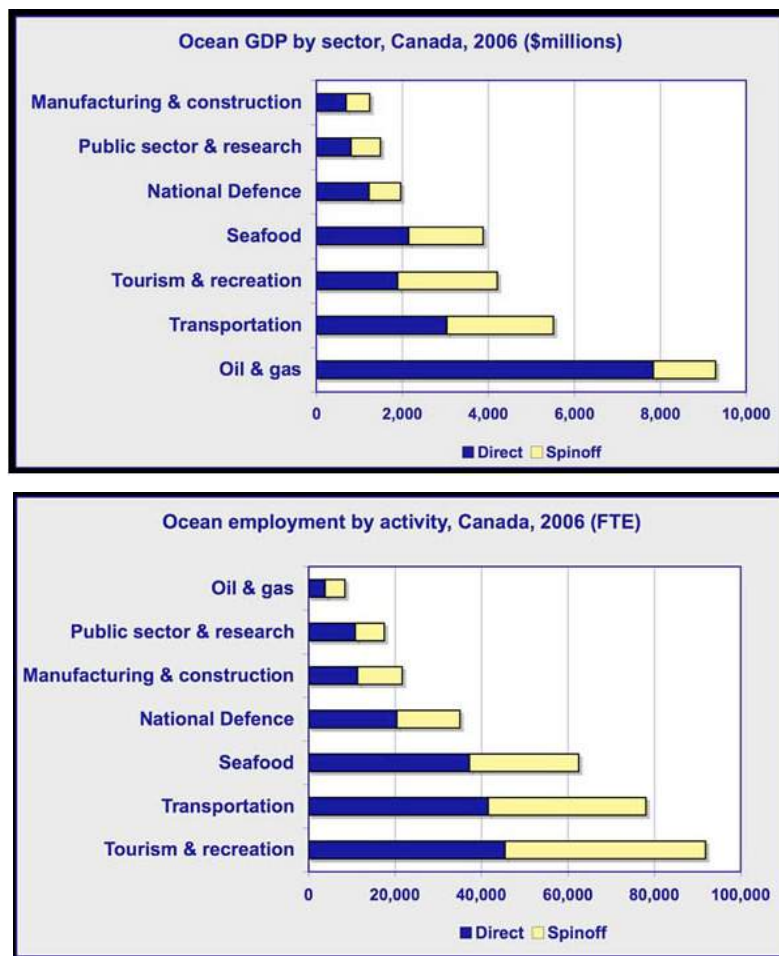
Marine Protected Areas and Population Density in Eastern Canada



Socioeconomic uses of marine resources and coastal areas

Many Canadians in Atlantic Canada hold jobs in the ocean sector, including in commercial fishing, shipping, tourism and recreation, manufacturing, and offshore oil and gas. The sector generated an estimated 17.7 billion CAD in direct gross domestic product (GDP) in Canada in 2006, contributing to 1.9% of gross GDP and 2.0% of total employment (DFO 2013). While of lesser importance for other parts of the country, the ocean sector accounted for approximately 66% of contribution to GDP and over 50% of employment in Atlantic Canada in 2006 (Ibid.). The high economic contribution is largely based on offshore oil and gas activity, followed by the seafood industry. Employment, however, is lead by jobs in the seafood industry, followed by tourism, and then marine transportation. Public sector jobs, primarily for Department of National Defence and Fisheries and Oceans Canada, made up 20% of regional employment in 2006.

Figure 3. Ocean GDP and employment in Canada



Source: DFO 2013.

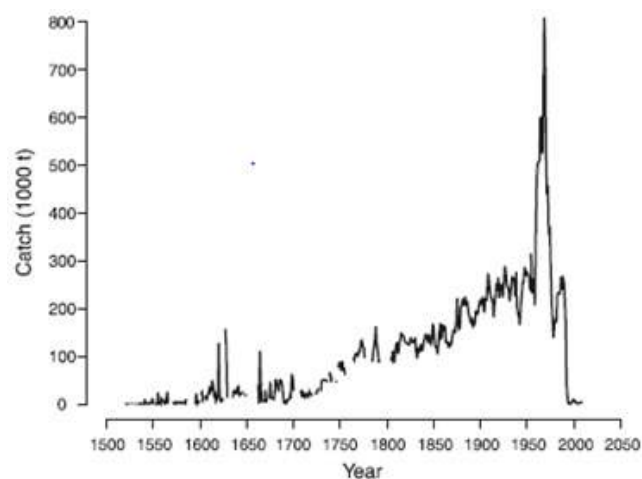
Atlantic coastal economies in Canada diversified in recent years, expanding activity in industries such as aquaculture, marine tourism, and oil and gas. The offshore oil and gas industry contributes to the economy of Atlantic Canada significantly. Activity has concentrated on the continental shelf offshore from Nova Scotia and from Newfoundland and Labrador (Office of the Auditor General of Canada 2012). Offshore production was predicted to decline; however, major new discoveries in 2013 suggest that new oil and gas frontiers may be opening instead (Eaton 2014). Current offshore production in Newfoundland and Labrador is approximately 280,000 barrels of oil per

day – or about 40% of Canada’s light crude production (Ibid). For Canada as a whole, oil and gas are a major source of revenues and a growing sector.

Governance and management

In the early 1990s, Canada’s formerly abundant Grand Banks fisheries experienced a severe collapse. As a result, in 1992, Canada placed a moratorium on cod fishing in the North Atlantic, a move that was first intended as a temporary two-year measure, but has for the most part remained in place. The economic consequences of the fisheries collapse were disastrous for coastal communities on Canada’s Atlantic coast. The Atlantic cod (*Gadus morhua*) fishery was historically one of the world’s richest and significantly shaped societies in Newfoundland, as well as Nova Scotia and the Gulf of St. Lawrence (Hamilton and Butler 2001). Northern cod stocks had sustained an annual fishery of approximately 250,000 metric tonnes until the 1970s, with catches peaking at 800,000 tonnes in the late 1960s (May 2009). During the summer of 1992, Northern cod biomass fell to 1% of earlier levels (Hamilton and Butler 2001). The collapse of the Northern cod fishery resulted in layoffs of 30,000 – 40,000 people (and many more indirectly affected) and a subsequent 2-3 billion CAD in government aid (Hutchings et al. 2012a). In 1996, only 56% of all income in Canada’s three most fisheries-dependent regions (South Coast, Notre Dame, and Northern Peninsula) came from employment, rather than government subsidies (Hamilton and Butler 2001). The moratorium affected tens of thousands of Newfoundland workers, and resulted in increased unemployment, changes in demographics as people left coastal communities, shifting economic activities (increased reliance on informal economy and eventual diversification to other industries like tourism and offshore energy), and increased reliance on government assistance. In addition to socioeconomic changes, the collapse also marked an environmental shift: from an ocean ecosystem dominated by cod and predatory groundfish to higher prevalence of lower trophic-level invertebrates and pelagic forage fish species (Ibid; DFO 2012a).

Figure 4. Catches of northern Atlantic cod



Source: Hutchings and Rangeley 2011.

The collapse was the result of a number of factors, many of which are still under debate. Overfishing was the first and foremost contributor. Following World War II, when technology and fishing capacity leapt forward, fishing practices changed and in the offshore banks, especially during spawning season, new industrialized trawlers appeared. A series of poor management decisions made over decades, inadequate understanding of the marine ecosystem, and flawed stock assessments further

contributed to the decline in cod populations (Milich 1999). In addition to overfishing and management measures, environmental conditions such as cooler water temperatures and changes in interaction among species are also seen to have played roles (DFO 2012a; May 2009).

In 1994, Canadian enforcement officers boarded and seized the *Kristina Logos*, a Portuguese-crewed vessel sailing under a Panamanian flag of convenience, 45 km outside of Canada's EEZ. The *Logos* was using practices that violated fish and net size rules and targeted juvenile stocks, outraging many Canadians who were suffering under the effects of the cod moratorium and particularly sensitive to foreign "stealing" and depletion of stocks (Milich 1999). Soon after, Canada promulgated regulations to allow it to search and seize foreign fishing vessels on the high seas, aimed at preventing foreign overexploitation of marine resources, particularly groundfish such as cod and flounder, by allowing the government to enforce Northwest Atlantic Fisheries Organization (NAFO)³ measures against stateless vessels and those of specified flag of convenience⁴ states (Coastal Fisheries Protection Act 1994). This authority was exercised in several more high profile incidents: a vessel sailing under a Panamanian flag of convenience, 45 km outside Canada's EEZ the following year, and in March 1995, the Canadian Coast Guard detained two illegally fishing Spanish vessels (Brander 2013).⁵ Canada argued that since the Spanish vessels were breaking NAFO regulations, the Coast Guard were taking rightful disciplinary action, while others saw the seizures, occurring outside of Canada's EEZ, as violations of international law (Ibid). Spain brought a claim against Canada before the International Court of Justice, although Canada had amended its acceptance of the compulsory jurisdiction of the court, thereby precluding its resolution of the matter (Akiba 1997). The EU also threatened sanctions against Canada, while Canada maintained that action was necessary to protect depleted stocks (Ibid). Ultimately, Canada and the EU reached an interim agreement limiting but not excluding the EU from further participation in the Grand Banks fisheries (Ibid). Today, though illegal catch in the Northwest Atlantic has decreased since the 1990s, it continues, including from vessels from Spain, Portugal, and Russia (Brander 2013; NAFO 2014).

Canada and its Atlantic neighbour to the south, the U.S., reached an informal bilateral agreement to address stock declines in the 1990s with the Transboundary Resource Assessment Committee and later Transboundary Management Guidance Committee (TMGC) (Hawkins 2010). The TMGC allows for non-binding guidance on fisheries management and annual agreements on catch limits. While largely successful, the cooperative arrangement between the two countries has met some challenges: In 2009, the U.S. proposed a lower harvest level, based on domestic regulations to promote stock rebuilding, than the Canadians would agree to, leading to a discrepancy between the countries' limits (Ibid.).

Stocks have still been unable to reach original levels, despite little to no fishing of large groundfish since the mid-1990s (DFO 2012a). Limited recreational and artisanal fishing reopened, but cod populations have failed to recover, despite restrictive management measures. Theories for why include recruitment failure, high fishing mortality, elevated natural mortality, poor fish condition, ongoing fishing activity (directed fisheries,

³ NAFO is an RFMO that was founded in 1978 and coordinates management of high seas migrating and straddling stocks, including setting fishing quotas and other conservation measures. In 1994, NAFO imposed a moratorium on cod consistent with Canada's own. (Dunlap 1994).

⁴ Ships are often registered in countries with open registries, allowing any ship to be registered regardless of the nationality of the crew and allowing for ships to avoid obligations to follow international regulations, where the flag country has not ratified agreements. In the case of the *Kristina Logos*, Portugal was a member of NAFO (through the EU), and subject to NAFO regulations.

⁵ Spain was a NAFO Member (through the EU), while Panama was not.

incidental catches, bycatch, food and recreational fisheries, surveys, illegal activity) and predation from gray and harp seals (Bousquet et al. 2013; Hutchings and Rangeley 2011). New fisheries have now begun to take the place of the cod fishery. As dominant groundfish predators declined, species that had been preyed upon such as shrimp and snow crab proliferated (DFO 2012a; Hutchings and Rangeley 2011). Fisherman have turned to species such as shrimp, crab, and lobster which are 'luxury species' and higher in value. Demand for these species flagged during the economic downturn and federal and provincial governments stepped in with economic stimulus measures, including \$75 million for sustaining lobster production (OECD 2011).

Adoption of the Oceans Act in 1997 represented an important new direction in management of Canada's oceans, towards taking an ecosystem-based, integrative management approach (Oceans Act, S.C. 1996). The Act was not only of national importance, but from a global standpoint was also a leading example of ecosystem-based management (Hutchings et al. 2012a; Guinette and Alder 2007). First proposed in 1987, the national oceans policy committed the Government of Canada to an integrated management, precautionary, and sustainable development-based approach and set the national policy direction and framework for ocean management (Mageau et al. 2010). The Oceans Act is comprised of three parts: Part One recognises Canada's maritime zones, consistent with UNCLOS, and commits the government to meeting conservation and management responsibilities within these areas; Part Two provides the Minister of Fisheries and Oceans with authorities to implement Canada's approach to oceans management, provides for the development of a national strategy as a policy framework, and calls for the development of programmes for marine protected areas and integrated management plans; and Part 3 assigns responsibilities and authorities, identifying the Minister of Fisheries and Oceans as the lead federal authority for oceans management. Canada's Oceans Strategy, called for by the Oceans Act, provides for an integrated approach to ocean management, coordination of policies and programs within the federal government and across all levels of government, and implementation of integrated management planning and decision-making structures (DFO 2002).

The Fisheries Act is Canada's central fisheries management policy and gives broad powers to the Minister of Fisheries and Oceans for the management, conservation, and protection of fish resources (Fisheries Act, R.S.C., 1985, c. F-14). These powers are widely discretionary and allow the Minister to award licenses or leases for fisheries or fishing, allocate harvests among user groups, and protect fish habitat and prevent pollution. The Fisheries Act is considered outdated, and has not been updated to reflect modern management principles, as legislative attempts to do so have failed (Mageau et al. 2010; VanderZwaag 2013). DFO has, however, issued a number of new policies in the past decade to update Canada's fisheries framework, such as the 2009 Sustainable Fisheries Framework, which serves as an umbrella for other policies and initiatives on conservation, sustainable use, and monitoring (DFO 2009). Another is the 2009 Fishery Decision-Making Framework Incorporating the Precautionary Approach which outlines methodology for applying the precautionary approach in making decisions on harvest levels for commercial fisheries, based on defined upper stock and limit reference points. When a stock falls below reference points into a "critical" zone, the Framework requires a rebuilding plan to be put in place.

The Species at Risk Act (SARA) was created to prevent wildlife species from becoming extinct. The Act protects species at risk and their critical habitats Species at Risk Act (SARA, S.C. 2002, c. 29). SARA requires recovery strategies and action plans to be prepared for listed endangered and threatened species and management plans for species of special concern and puts in place various prohibitions, such as prohibiting persons from killing, harming, harassing, or taking an individual of a listed endangered or threatened species. Atlantic cod has been recommended for listing multiple times

by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), but so far the federal government has resisted (Baker 2013; Hutchings and Rangeley 2011). Listing the species as endangered would entail stringent restrictions on fishing and the implementation of a recovery strategy. SARA listing is ultimately a political decision, rather than a scientific determination, and the government has chosen not to list the fish because of potential socioeconomic impacts (VanderZwaag 2013; Mageau 2010).

Canada has policies in place to protect the rights and interests of indigenous groups for fisheries and marine resources as well as to increase indigenous participation in co-management of marine resources. These policies implement legal rights of Aboriginal groups to fish for food, social, and ceremonial purposes, which take priority, following conservation, over other resource uses (DFO 2012b). Consultation is required when fishing rights may be affected. The 1992 Aboriginal Fisheries Strategy and Aboriginal Aquatic Resource and Oceans Management Program, applicable in areas under Fisheries and Oceans Canada (DFO) management and where land claims settlements have not established alternative regimes, seeks to provide opportunities for co-management.

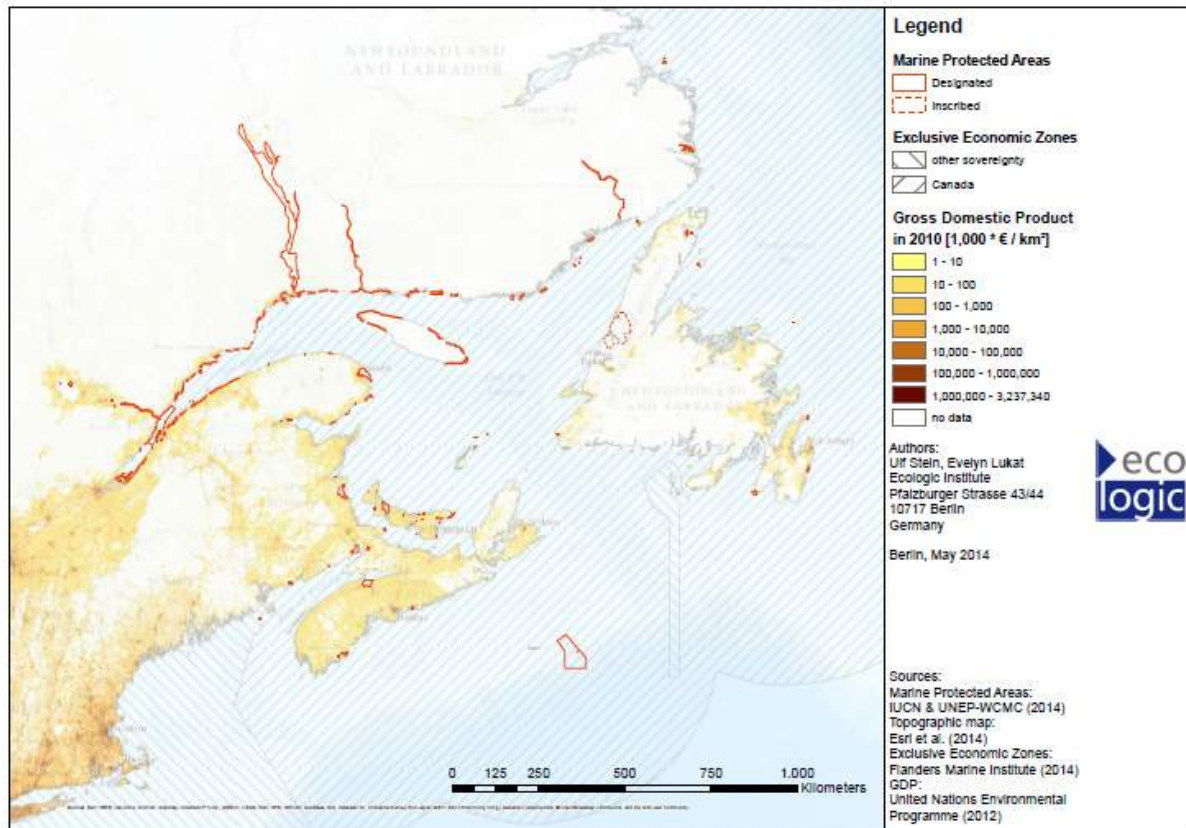
The Oceans Act commits the Government of Canada to develop and implement “a national system of marine protected areas on behalf of the Government of Canada” to protect and conserve: commercial and non-commercial fishery resources and their habitats; endangered marine species and their habitats; unique habitats; and marine areas of high biodiversity or biological productivity. The Oceans Strategy directs the Minister of Fisheries and Oceans to lead and coordinate the establishment of a national system of marine protected areas, a goal that was further promoted in the 2005 Oceans Action Plan (DFO 2005a). MPAs can be designated by three Canadian agencies: Fisheries and Oceans Canada (DFO) (under the Oceans Act), Parks Canada (under the Migratory Birds Convention Act), and Environment Canada (under the Canada Wildlife Act). Canada's Federal Marine Protected Areas Strategy outlines how these respective programs can coordinate and collectively contribute to a network (DFO 2005b).

As part of an integrated management approach, as envisioned by the Oceans Act, establishing MPAs is intended to take into account stakeholder input - working with provincial and territorial governments, Aboriginal groups, industry, academia, and environmental organizations - and other ecological, social, cultural, and economic considerations (DFO 2014). Community involvement and participation has successfully occurred in the establishment of MPAs (Kearney et al. 2007). In one particular example described by *Kearney et al.*, lobster fishermen in Eastport, Newfoundland, having concerns over the health of local stocks, initiated participatory research projects in cooperation that led to conservation management recommendations and eventually to designation of a new MPA (*Ibid*).

Finally, Canada has a framework in place to manage environmental and safety risks from offshore oil and gas exploitation. The Canada–Newfoundland and Labrador Offshore Petroleum Board regulates oil and gas activities in areas offshore from Newfoundland and Labrador and the Canada–Nova Scotia Offshore Petroleum Board does so in offshore Nova Scotia (Office of the Auditor General of Canada 2012). These bodies operate independently of both the federal and provincial levels of government, except for review of certain decisions (*Ibid*). Requirements for environmental assessment prior to drilling are overseen by the Canadian Environmental Assessment Agency, with involvement from other federal agencies such as the Department of Fisheries and Oceans, Environment Canada, and Natural Resources Canada.

Figure 5. Marine Protected Areas and Gross Domestic Product in Eastern Canada

Marine Protected Areas and Gross Domestic Product in Eastern Canada



Key challenges

The collapse of fisheries in Canada in the early 1990s has posed a major challenge for and imposed great economic costs on coastal communities. Since then, the economy has diversified and expanded into other sectors such as offshore oil and gas, marine tourism, and aquaculture, as well as into new fisheries. However, these industries pose their own environmental risks and management challenges. For instance, *Mageau et al.* report that past tensions have arisen over potential risks to biodiversity from aquaculture, with calls for prohibitions on operations (Mageau et al. 2010). Instead, a patchwork system of regulatory, licensing, and monitoring measures has been put in place. Besides overfishing and aquaculture, coastal zones in Atlantic Canada experience a wide range of pressures such as invasive species, habitat destruction and modification, the addition of nutrients and contaminants, modified freshwater inputs, and shipping (Canadian Science Advisory Secretariat 2010). Implementation of an integrated management approach, as envisioned by the Oceans Act, can help to provide coastal and marine protection in Atlantic Canada while growing these new industries. Following the Act, Canada has drafted numerous policy measures aspiring to a more sustainable, precautionary management approach, though implementation appears to pose its own challenges.

Some argue that Canada has fallen short of operationalizing its policies to meet marine management goals such as for integrated management and MPAs, as well as other commitments to marine ecosystem protection (Hutchings et al. 2012a; Guénette and Alder 2007, VanderZwaag 2013). *Hutchings and Rangeley* write that “although Canada has developed sound, conservation-based marine fisheries policy in recent years, it

has put very little of this into practice” (Hutchings and Rangeley 2011). For example, between 1996 and 2009, the area extent of MPAs increased only 24,000 km² and today only 1.25% of Canada’s territorial waters are protected (Hutchings et al. 2012a; World Bank 2014a). As of December 2013, only three of five Large Ocean Management Area (LOMA)⁶ pilot projects had finalized integrated management plans (Eastern Scotian Shelf, Beaufort Sea, Gulf of St. Lawrence) and the completed plans are largely aspirational, rather than setting forth concrete management measures (VanderZwaag 2013). This may be true for many aspects of Canada’s marine governance framework, whereby policies are more ambitious on paper than in practice and espouse laudatory principles but have been deficient in meeting these commitments.

A lack of legally-binding requirements has also slowed progress on implementing new measures (Hutchings et al. 2012b). The Oceans Act provides a relatively basic framework with no procedural measures or timelines for implementing integrated management or MPAs (Hutchings et al. 2012b). Meanwhile the Fisheries Act sets forth discretionary powers rather than prescriptive, science-based measures (Hutchings and Rangeley 2011; VanderZwaag 2013). SARA, too, is subject to discretionary decision-making, which has been dominated by political or socioeconomic factors. Moving from sectoral to integrated management has been challenging generally, particularly working with multiple levels of government and groups of stakeholder, and especially without more operational tools and concrete guidelines in place (Mageau et al. 2010). Slow progress on implementation may be partially attributable to the inherent challenges in executing new policy measures, particularly so as to incorporate a wide range of stakeholder and interests. Funding for programs and planning has been a problem as well (Jessen 2011; Guénette and Alder 2007). While policy implementation is in some ways lacking, Canada is strong in scientific research and since the 1990s has worked to develop new methods for identification of stock target and limit reference points to support precautionary management approaches (Hutchings et al. 2012a).

In failing to meet national policy objectives, Canada has also fallen short of meeting international commitments. For instance, through the CBD, Canada committed to a global target of protecting 10% of marine ecosystems by 2012 and committed to the Aichi Biodiversity Target to conserve, by 2020, at least 10% of coastal and marine areas in a network of protected areas (Hutchings et al. 2012a; VanderZwaag 2013). As of 2010, only 1.25% of Canada’s territorial waters were protected (World Bank 2014a). The UN Fish Stocks Agreement requires parties to take a precautionary approach to management that includes stock-specific reference points. Canada has not formally adopted reference points for management of most fisheries, including for the Northern cod, which still lack quantitative recovery targets (Hutchings 2012b). Canada has in other ways, however, contributed significantly to fisheries management reform in international waters, such as through encouraging NAFO to adopt harvest control rules and implement stock reference points and through efforts on IUU fishing within the UN and Food and Agriculture Organization (FAO) (Hutchings et al. 2012a; Mageau et al. 2010).

Beyond problems of policy, climate change has the potential to reduce coastal protection and pose threats to health and safety and damage local infrastructure (Chouinard 2008). Sea ice extent and thickness has been steadily decreasing in recent years. The Gulf of St. Lawrence, which has warm surface water during the summer and mostly southerly seasonal sea ice during winter, experienced record lows in 2010 (DFO 2012a). Sea ice extent and duration on the Newfoundland and Labrador Shelf was also

⁶ Large ocean management areas (LOMAs) are marine regions established for integrated management planning purposes. Canada has established five LOMAs: the Pacific North Coast, Beaufort Sea, Gulf of St. Lawrence, Eastern Scotian Shelf, and Placentia Bay/ Grand Banks Integrated Management Areas.

below normal in 2010 for the fifteenth year in a row (Ibid.). Sea ice has traditionally served as a protective barrier for shores against storm events, flooding, and erosion, but is now rapidly melting due to climate change, leading to an increase in coastal vulnerability and potentially to extensive shoreline erosion. Sea ice also forms an important habitat for numerous species, with the loss leading to significant shifts in marine food webs and species distribution (CAFF 2010; DFO 2012a). Sympagic organisms live on or immediately below sea ice, with thicker sea ice supporting more complex communities, and support pelagic and benthic ecosystems. Other climate change impacts to Canadian coastal resources include ocean acidification, which will affect primary productivity and higher organisms, particularly those forming calcium carbonate shells. Warming waters are expected to cause shifts in species distribution, although these are not yet well understood.

Extensive barrier island systems in Prince Edward Island, the Gulf of St. Lawrence, and on the coasts of New Brunswick and Nova Scotia are highly dynamic and sensitive to the impacts of storms, which are expected to increase in frequency and severity, coastal erosion, and sea level rise. However, these areas are also largely free of significant development, making adaptation easier (Prince Edward Island Department of Environment 2011). In areas where coastal erosion and sea level rise do pose problems for human activities – much of Prince Edward Island, the Gulf of St. Lawrence coasts of New Brunswick and Nova Scotia, and parts of the Bay of Fundy and Atlantic coast of Nova Scotia – adaptation measures must be put in place (Ibid.). Measures such as cliff setbacks, zoning, sea walls, beach renourishment, and protection of salt marshes are already under consideration (Ibid.) Projects and assessments include a three-year federally funded project to help Atlantic Canadians better prepare for, and adapt to, climate change and a growing number of ad-hoc public and private efforts in the region (Ibid.; Atlantic Climate Adaptation Solutions).

OHI performance and opportunities for improvement

While the marine sector is not a major part of the economy nationwide, it is of major economic, as well as cultural, importance for Atlantic Canada. Coastal livelihoods and economies in Atlantic Canada suffered with the collapse of the cod fisheries, but have diversified in return years, bringing needed jobs and income to coastal communities. The development of new fisheries, aquaculture, marine tourism, and offshore oil and gas resources have helped grow and sustain marine-based employment and GDP in the region. Continued commitment to implementing integrated management frameworks can help Canada to balance conflicting interests and new industries, while protecting coastal resources and promoting sustainability.

Canada currently holds a high score for the OHI goal of coastal protection, yet may face major challenges in continuing to hold this position in the future. Sea ice, which provides coastal protection and is one of the scored components behind the OHI goal, is rapidly melting due to climate change. The loss of this protection threatens coastal areas, which face erosion, sea level rise, and increased storm events and severity. While Canada can improve its mitigation commitments, the problem of climate change remains outside of its direct control and loss of sea ice is largely unstoppable. However, beyond further reducing greenhouse gases, adaptation measures can be taken to help protect coastal communities, including promoting the growth of natural salt marshes (an underlying OHI goal component).

Table 2. Canada OHI scores

OHI Goal	Score	Trend
Coastal protection	93	+0.47%
Coastal livelihoods and economies	60	+0.03%

Source: OHI 2014. Canada. <http://www.oceanhealthindex.org/Countries/Canada>.

Note: Trend is the average percent change in the present status for the most recent five years of data.

4.2. Guatemala

The Republic of Guatemala is a lower middle income country in Central America with a surface area of 108,890 km² (World Bank 2014b). Over half of Guatemala's 15.08 million population lives within 100 km of the coast (UNEP 2009), although this is references the country's 400 km of both Pacific and Atlantic coastlines (World Bank 2014c; UNEP 2007; FAO 2005a). On the Atlantic side is the Gulf of Honduras, whose waters are shared with neighbours Belize to the north and Honduras to the south. Guatemala's Atlantic territory includes the 1,000 km long Mesoamerican Barrier Reef System (MBRS), the second largest barrier ecosystem in the Atlantic Ocean and the largest continuous stretch of reef in the western hemisphere (ICRAN-MAR 2007). The country has a long-standing dispute with Belize regarding territorial land and maritime claims in Belize and the Caribbean Sea. It was agreed in April 2012 to hold simultaneous referenda in October 2013, to decide whether to refer the dispute to the International Court of Justice. This was however postponed and another date for the referenda has yet to be set. Guatemala is a member of the Central American Integration System (CACM) promoting integration, peace, freedom, democracy, and development in the region. Since 2006, the country has also been party to the Dominican Republic-Central American Free Trade Agreement (DR-CAFTA). Guatemala's most important trade partner is the United States, accounting for around 40% of domestic imports and exports (WTO 2014).

About 53% of Guatemala's 15.08 million population lives in poverty, with 25.9% living in multi-dimensional poverty (World Bank 2014c; UNWFP 2014).⁷ With a United Nations Human Development Index (HDI) value of 0.581 Guatemala ranks 133 out of 187 countries, well below the Latin American and the Caribbean regional average of 0.741. Even within a historically unequal region, Guatemala stands out with a Gini index⁸ of 56 as one of the most unequal countries in the world (Ortiz and Cummins 2011). In addition to its poverty rate the rate of malnutrition is also high: the chronic under-nutrition rate for children under 5 in Guatemala is 49.8%, the highest in the Latin America and Caribbean region and fourth highest globally (UNWFP 2014).

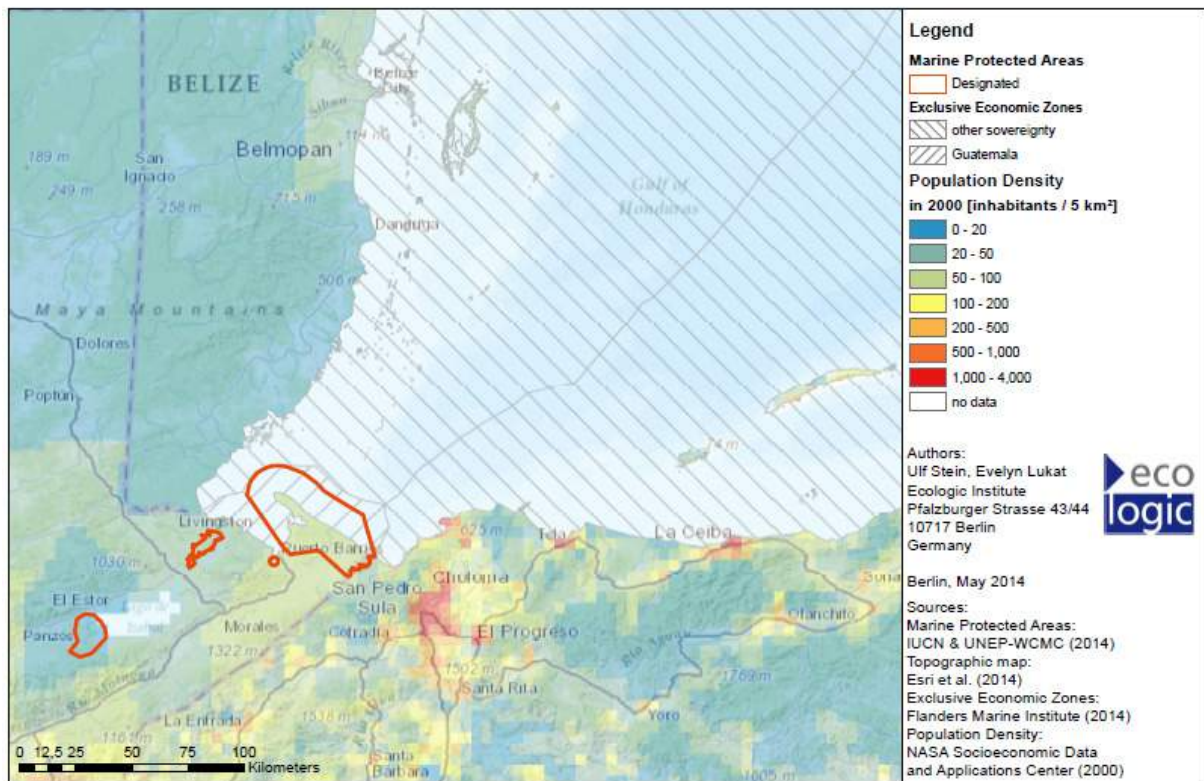
⁷ The Multidimensional Poverty Index (MPI) identifies multiple deprivations in the same households in education, health, and standard of living.

⁸ The Gini index measures the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution. A Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.

The severe and widespread level of malnutrition is exacerbated by the country's vulnerability to environmental factors such as droughts, floods, deforestation, and soil erosion combined with a heavy reliance on agriculture for economic and food security (FAO 2010a; World Bank 2014e). For the parts of the population who have access to coastal areas and fisheries, fisheries and aquaculture act as an important safety net, providing food security and income where agricultural production fails (FAO 2005a). Yet, despite the potential that fisheries have to contribute to the national diet as an important source of protein, Guatemala is not traditionally a fishing nation and has a very low domestic consumption of fish and shellfish (around 3 kg per capita per year compared to over 10 kg per year in other countries in the region) (Méndez 2010). This equates to a share of just 1% of fish protein in citizens' total protein intake (FAO 2012). Instead, Guatemalans meet nearly 90% of their energy requirements through cereals, sugars, and beans, leading to a diet that is deficient in total fats, proteins of animal origin, and micronutrients (FAO 2010b).

Figure 6. Marine Protected Areas and Population Density in Guatemala

Marine Protected Areas and Population Density in Guatemala



Socioeconomic uses of marine and coastal resources

Sugar cane, banana, palm, prawn, artisanal fisheries, tourism, livestock, artisanal crafts, and generation of electricity are all important activities in the Guatemalan coastal zone (MARN 2009). It is estimated that coastal goods and services currently provide the country with between 216 million and 314 million USD in annual revenue (Yon Bosque 2011). The MBRS has been identified as a unique and globally important coral reef ecosystem on which people in adjoining countries (Mexico, Belize, Guatemala, and Honduras) rely on for much of their food and livelihoods (ICRAN-MAR 2007). The MBRS is also rich in biodiversity, hosting species such as spiny lobsters, queen conch, green hawksbill and loggerhead turtles, crocodiles, dolphins, whale

sharks, and more than 60 coral species (López-Gálvez 2007). This marine flora and fauna is not only important for the supporting, regulating, and provisioning of services it provides; it also supports important cultural services such as tourism and recreation. Coastal and marine tourism alone account for 2% of GDP and tourist visits are steadily increasing (International Atomic Energy Agency 2011). Recreational fishing in particular has grown in international renown and is an activity from which coastal communities are expected to benefit through the need for secondary services in the hospitality and tourism sectors (FAO 2005a). Although not primarily responsible for contamination of the coastal zone, these activities are believed to contribute to leachate from solid waste, industrial effluent discharges, agrochemical runoffs, and domestic sewage (International Atomic Energy Agency 2011).

As mentioned above, Guatemala has a low domestic consumption of fish and fish products, and fisheries have a very low contribution to GDP (0.03%) (FAO 2005a). Industrial fisheries are focused on the Pacific coast, where medium- and large-scale fisheries of tuna, shrimp, langoustine, and sardine take place. On the Atlantic side, industrial activity is banned within the Amatique Bay area and so fisheries are focused on small-scale catch of shrimp, *manjúa* (anchovy), lobster, as well as other fish species (Ibid.). Small-scale fisheries are almost exclusively for domestic consumption, although some groups have begun to export their products to neighbouring countries such as Mexico and El Salvador (Censo Agropecuario 2003). Small-scale and subsistence fishers from four different cultures are active in the Atlantic area, all employing different gear types and targeting various species of different sizes (Andrade 2011). Some conflicts have arisen among these groups due to their targeting of different species (Andrade 2011). One example is the hook and line fishery used by the Garifuna people that targets adult lane snapper *Lutjanus synagris*. At the same time, shrimp trawlers run by Ladino people discard juvenile snapper as unwanted by-catch, meaning these are unable to reach a commercial size and thus benefit the Garifuna fishery (Andrade 2011). In another case, the species targeted by entire K'ekch'í and Ladino families for the labour intensive *manjúa* fishery is the main source of prey for bigger species, thus affecting Garifuna and Ladino gillnet fisheries of Scombrids (Ibid.).

Conflicts between fishing groups extend beyond national boundaries with evidence that illegal fishing activity is taking place throughout the Gulf of Honduras. In particular, there is evidence that many Guatemalan and Honduran fishermen go out towards Belizean territories towards the Sapodillas to fish. The area was historically a part of Guatemala, and is now part of Belize and an area of some political tension. Offences include fishing for undersized conch and lobster, having no fishing or boat license, fishing during closed season, fishing in a restricted area, and fishing with restricted gear (Perez 2009). Reports also refer to the illegal smuggling of undesired lobsters into Guatemala where prices fetched were lower than in Belize, but where size and seasonal restrictions did not exist (Heyman and Granados-Dieseldorff 2012).

Governance and management of marine and coastal areas

With regards to the environment, most management and development in Guatemala has been focused on the terrestrial zone, leading to a lack of attention to the development, sustainable or otherwise, of marine resources (MARN 2009). Due to the aforementioned low value of fisheries in the Guatemalan economy, successive governments have given the sector only marginal importance and appear to have had difficulties in understanding and administrating its activities (FAO 2005a). Guatemala is a member of several international fisheries organizations including the International Commission for the Conservation of Atlantic Tunas (ICCAT), the Western Central Atlantic Fishery Commission (WECAFC), the Central America Fisheries and

Aquaculture Organization (OSPESCA), and the International Whaling Commission (IWC). However, at a national level, Guatemalan fisheries in the Caribbean/Atlantic are semi-open access, with fishing activity only partially regulated and poorly controlled, often coupled with a lack of legitimacy and local support for management regulations (Andrade 2011). This lack of controls may unintentionally provide an environment that is susceptible to overfishing and resource degradation. For many of those engaged in the small-scale artisanal fisheries that characterise the Guatemalan Atlantic, the need to generate economic income has often been stronger than the need to protect the environment, meaning the continuation of unsustainable fishing practices such as the mosquito net-based capture of *manjúa* (Heyman and Granados-Dieseldorff 2011). Although closed fishing seasons are not an essential measure in fisheries management, they can be useful where stocks gather for certain periods of the year and as a market tool for tackling seasonal price differences. Across the Gulf of Honduras, there are almost no closed fishing seasons and where these do exist, they do not overlap, leading to inefficient regional management and the perpetuation of the aforementioned transborder, illegal fishing activities (Perez 2009).

The Voices of the Fishermen study carried out in the Gulf of Honduras between 1998 - 1999 found that most artisanal fishers in the area had no explicit knowledge of fishing laws. Artisanal fishers were also disappointed with their lack of access to participate in fisheries management despite representing a significant proportion of the region's overall commercial production. Fishers participating in the study made various recommendations for improving management of these resources including the need for greater protection of particular species, harmonization of fisheries policies, and greater control of fishing zones, gear types, and seasons within the Gulf. Furthermore, fishers recommended co-management of marine reserves by fishing authorities, NGOs, and local fishers; promotion of sustainable fishing practices and possibilities for economic diversification such as ecotourism and sport fishing; the promotion of legal import/export seafood markets catering to differing national demands, e.g., shrimp in Belize and salt fish, and conch in Guatemala (Heyman and Granados-Dieseldorff 2012).

In the interim decade, a number of the suggested actions have been taken up. This includes the creation of a network of MPAs in the Gulf of Honduras, which addresses many of fishers' main concerns (Heyman and Granados-Dieseldorff 2012). The relationships built between fishers and managers in the region have been key in supporting national and regional agreements and legislation for the protection of lobster, conch, and manatee. Above all, there appears to be a move towards a more community-based management approach (Andrade 2011), incorporating traditional knowledge and social concerns of fishing communities to empower them within the institutions that manage access and use of marine resources in the Gulf (Andrade 2011). National fisheries legislation was radically amended with inputs from the Voices of the Fishermen documents being used in the development of specific laws for the Atlantic Coast (Heyman and Graham 2000a). Furthermore, artisanal fishing groups have received support from the central government and the Spanish international development agency (AECI). This support includes the development of associations to promote rational and sustainable use of coastal and marine resources under the umbrella of the National Federation of Artisanal Fishers of Guatemala (FENAPESCA) (FAO 2005a). It also includes technical support and training assistance to process catches in newly installed warehouses close to docking areas under sanitary conditions, providing added value to products and benefiting fishers and their communities (FAO 2005a).

The Guatemalan Law of Protected Areas establishes biodiversity as a component of natural heritage which must be conserved through effectively managed protected

areas. Guatemala has a system of protected areas known as SIGAP, which covers around 32% of the national territory and is governed by the National Council of Protected Areas (CONAP). However, as noted above, the tendency to focus on terrestrial protection has left Guatemalan marine ecosystems very much exposed. Only 12.5% of Guatemala's territorial waters are protected (World Bank 2014a) and of the 322 SIGAP sites⁹, a mere six (5.5% of the total protected areas) are MPAs (Punta de Manabique). Only one MPA with a strictly marine portion is located in the Caribbean/Atlantic region, representing less than 0.5% of the total marine area of the country (Ibid; Global Environment Fund 2012).

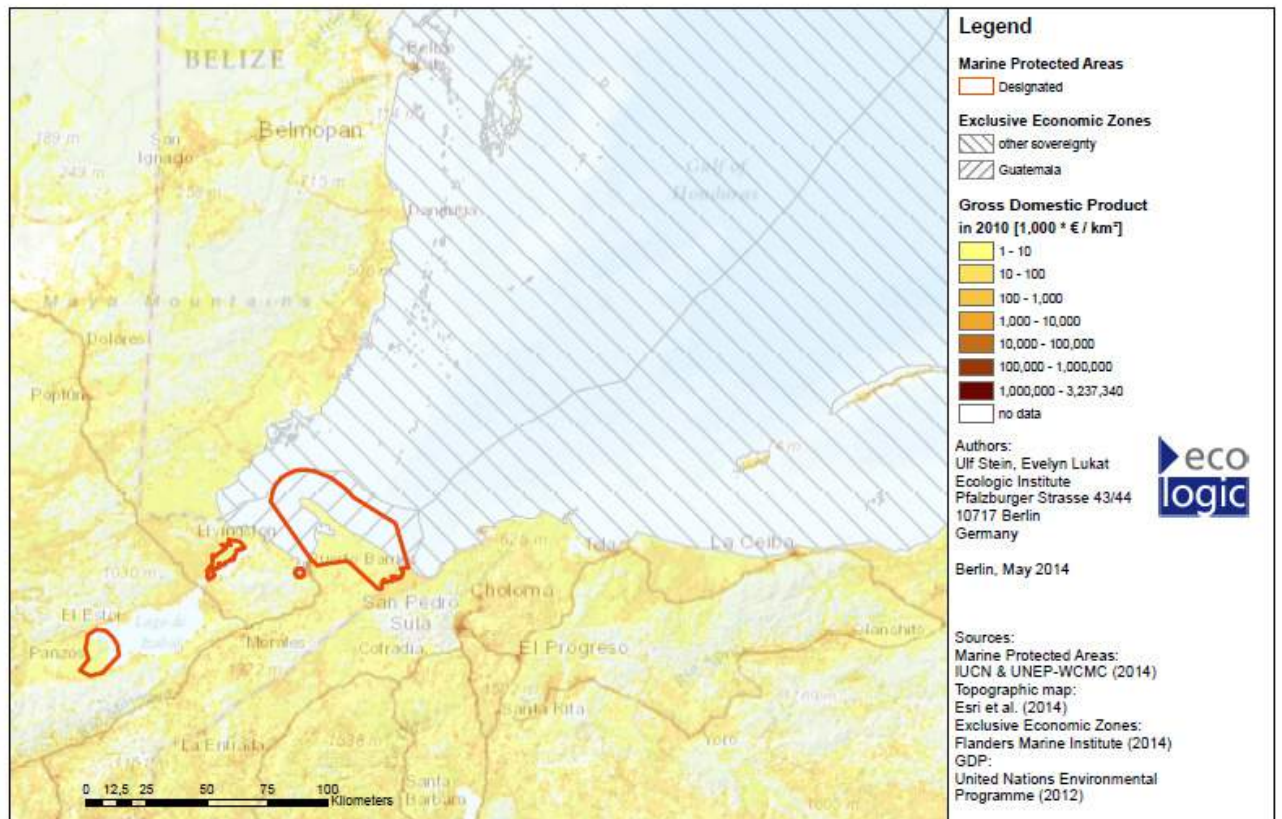
Financial resources for the management of protected areas are scarce in Guatemala: In recent years around 18 – 23 million USD (0.4% – 0.6% of the national budget) was allocated to the different agencies responsible for their management, barely covering minimum salary and running costs. Estimates indicate that for adequate management the financial gap lies between 50 and 90 million USD annually (GODOY 2010). Furthermore, in coastal and marine areas there is a lack of legal clarity regarding authority over protection and management as well as a need for an adequate legal and institutional framework to facilitate coordination of conservation efforts among the various State agencies, e.g., the Ministry of Environment and Natural Resources (MARN), the Ministry of Agriculture, Livestock and Food (MAGA), the National Council of Protected Areas (CONAP), Municipal Governments and the productive sectors (e.g., fishing, energy, and maritime ports/transportation) (Yon Bosque 2011). A recent evaluation of the SIGAP showed that none of the areas were managed to a satisfactory level, with management in over half assessed as being barely acceptable or unacceptable (Godoy and Utrera 2012). Despite these shortcomings, in the face of recent development proposals, CONAP has asserted its authority over the protection of MPAs: CONAP has twice rejected the environmental impact assessments carried out by Grupo Tomza for a proposed 27.7 million USD investment in the construction of a liquefied gas plant in the Punta de Manabique protected area, citing the need to protect endangered species in the area (CentralAmericaData.com 2012).

Guatemala participates in regional initiatives to protect the MBRS and, jointly with Belize, Honduras, and Mexico, was given a GEF grant from 2001-2007 for the Conservation and Sustainable Use of the Mesoamerican Barrier Reef System. The goal of this project was to enhance protection of the unique and vulnerable marine ecosystems and to strengthen and coordinate national policies, regulations, and institutional arrangements for the conservation and sustainable use of this global public good (Alderman et al. 2007). However, the extensive Mesoamerican Reef Ecoregional (MAR) Assessment carried out by The Nature Conservancy in 2008 highlighted the continuing existence of threats to the MBRS and the continued need for regional action. These threats include: global climate change, inadequate aquatic tourism practices, urban development and tourism infrastructure development, sewage and ballast water discharge (contamination source of exotic species and diseases), and solid waste accumulation. Additional threats include sedimentation and agrochemical discharges, overfishing, and the use of inadequate fishing practices (use of spear gun, trawling, and scuba fishing) (Arrivillaga and Windevoxhel 2008).

⁹ Figures accurate up to December 2013. Listado de áreas protegidas. Sistema guatemalteco de áreas protegidas. Departamento de Unidades de Conservación Consejo Nacional de Áreas Protegidas. Actualizado al 5 de diciembre del 2013.

Figure 7. Marine Protected Areas and Gross Domestic Product in Guatemala

Marine Protected Areas and Gross Domestic Product in Guatemala



Key challenges

The Guatemalan Atlantic is an area that is particularly rich in biodiversity, especially in the MBRS. However, a historic lack of attention to coastal and marine regions and their resources have meant that both ecosystems and livelihoods are at best undermanaged and at worst under threat. The extremely small surface of marine protected areas, coupled with financial and institutional restrictions are key challenges that impede full and effective protection of marine and coastal zones. Without the capacity to act, management bodies such as CONAP will only continue to face difficulties in monitoring and controlling protected areas.

Guatemala's fisheries sector is small compared to the overall economy, however this has led to the misnomer that it has a low impact on marine resources. The lack of effective fisheries management has led to overfishing, destruction of marine habitat, and tensions between fishing groups who are impacting the sustainability of each others' activity. Malnutrition and poverty must also be addressed as these broader challenges are also driving forces behind the economic realities that lead to such exploitation of resources. Tourism opportunities such as recreational fishing can provide alternative incomes. This industry must, however, also be managed in a way that does not lead to further overfishing, respects protected areas, and does not place undue pressure on coastal resources, e.g., through polluting discharges or anchoring in coral reef areas.

Smuggling and illegal activity in the Gulf of Honduras shows that local and national management plans need to be linked to regional plans to remove perverse incentives and the existence of new or increased tensions between users. Indeed, the greatest

challenge is to integrate all socioeconomic uses of marine and coastal resources with marine ecosystem protection. For this to be effective in an area as small and enclosed as the Guatemalan Atlantic requires strong regional cooperation. Furthermore, budgetary limitations at a national level may be eased through such cooperation. At the same time, differences in laws, regulations, economic reliance on marine protein sources, historical/cultural practices, and political tensions may present challenges to such cooperation. One important barrier that persists is the Guatemalan territorial dispute with Belize. This is an issue that it will be necessary to resolve in order to lessen conflict and confusion among the Belizean, Honduran, and Guatemalan military and fishermen and the Belize Protected Areas in the south (Perez 2009).

OHI performance and opportunities for improvement

Guatemala's OHI rankings for coastal protection and coastal livelihoods and economies are both above the global average; however, it is difficult to say to what extent this number is influenced by the considerably larger Pacific sector, as the OHI only provides information at country level. Despite relatively high scores, the information above implies that there is considerable room for improvement. In relation to coastal protection, the OHI measures protection offered by key habitats. However, if effective governance measures to protect these ecosystems are not implemented in the near future, this score has the potential to drop dramatically. Indeed, an examination of the breakdown of this score shows that while Guatemala scores highly in relation to the state of its ecosystems (94), but rather low in relation to the pressures (36) placed thereon. In this way, appropriate management strategies should be fully developed to ensure that the good status of these marine resources is not compromised in the future. While the OHI score for coastal protection appears high considering many of the country's challenges, this score is based on the protection offered by extant marine ecosystems (e.g., condition of seagrasses and mangroves) rather than by any governance measures put in place. Guatemala's very low score for pressures indicates serious underlying problems and a need to act on these pressures to avoid degradation of the status of the marine resources.

In Guatemala, a historical inland focus and wider social issues of malnutrition and poverty has taken priority over protection and investment in the marine environment. This has led to a lack of fisheries management at a national level which has spilled over to produce illegal activity in the region. Joint commitments to MPA networks and improved cooperation on marine management within the region may allow this to be brought under control. However, while the ongoing conflict with neighbouring Belize remains unresolved, the potential for successful marine protection and sustainable fisheries management may be limited.

It is clear from the evidence above that Guatemalan Atlantic fisheries involves practices that are often unsustainable and can lead to conflict. To ensure strong future performance, strategic fisheries management and regional cooperation are essential. Tourism is also an important area of growth. By focusing on attracting greater numbers of tourists, Guatemala could increase opportunities for sustainable livelihoods and coastal economies on the Atlantic coast and improve coastal livelihoods and economies. If mangroves and coral reef status can be managed in a way that preserves their status, these have the potential to develop the tourism economy as a source of income and employment, in addition to offering coastal protection.

Table 3. Guatemala OHI scores

OHI Goal	Score	Trend
Coastal protection	88	-0.3%
Coastal livelihoods and economies	92	0.21%

Source: OHI 2014. Guatemala. <http://www.oceanhealthindex.org/Countries/Guatemala>

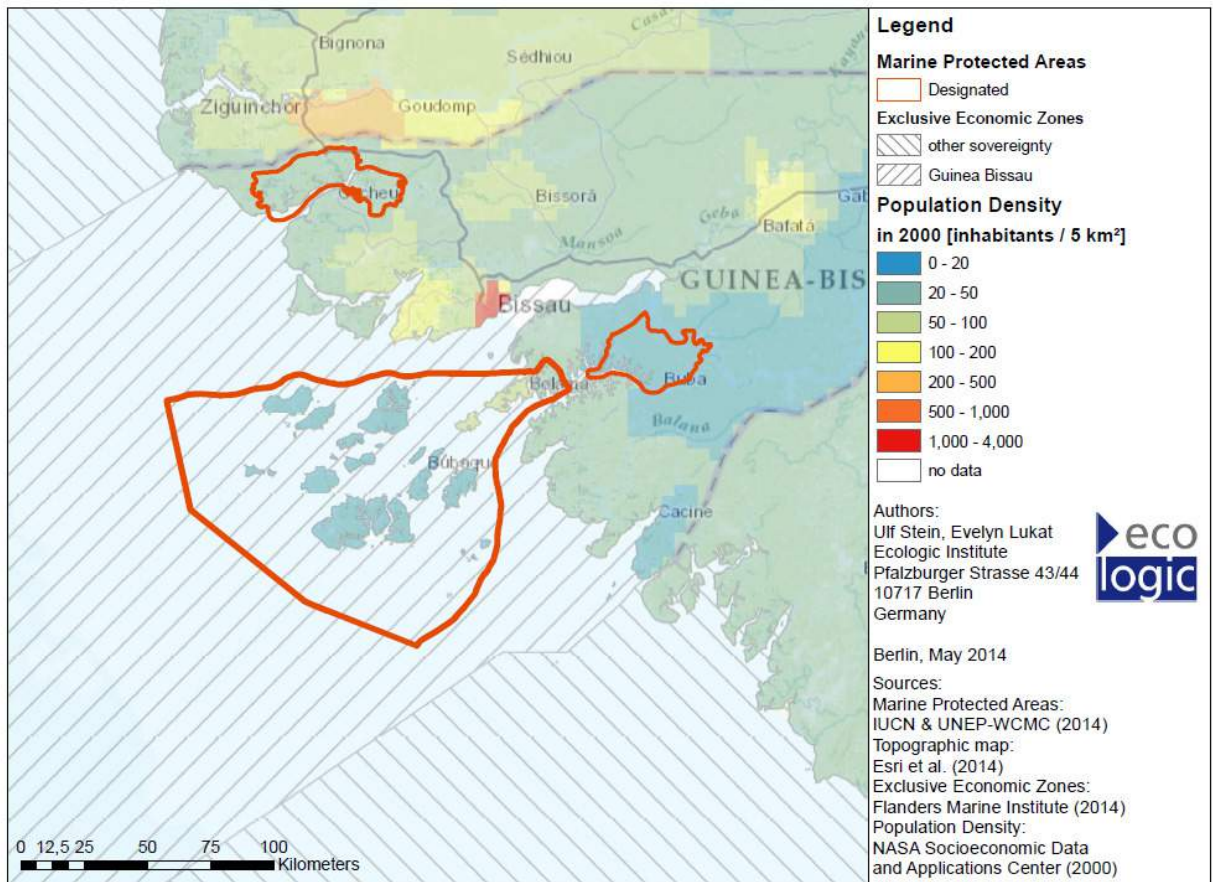
Note: Trend is the average percent change in the present status for the most recent five years of data.

4.3. Guinea-Bissau

The Republic of Guinea-Bissau (hereafter Guinea-Bissau) is located on the west coast of Africa, bordered to the north by the Republic of Senegal, to the east and south by the Republic of Guinea, and to the west by the Atlantic Ocean. It covers an area of 36,125 km² and has a population of 1,693,398 (2009) (CIA World Factbook 2014). A large percent of the population (80%) is concentrated along the coast, though this can easily be attributed to size of the country (Global Partnership for Oceans 2014). Figure 8 shows marine protected areas in relation to population density in Guinea-Bissau.

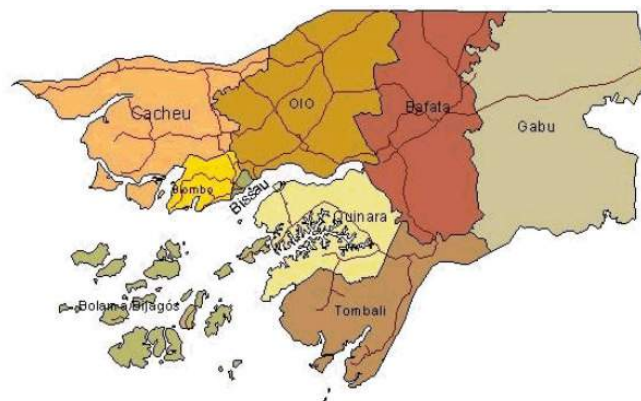
Guinea-Bissau suffers from significant infrastructural problems (e.g., roads, port facilities), and the country is still feeling the effects of the civil war between 1998 and 1999 (Kyle 2009). Ranking around 176 out of 186 on the UN's human development index, Guinea-Bissau is one of the least developed countries in the world (Global Partnership for Oceans 2014). Following a military coup in 2012, Guinea-Bissau held general elections in April 2014. Because no candidate received a majority in the April elections, a second election for president is scheduled for May 2014 (Voice of America 2014).

Figure 8. Marine Protected Areas and Population Density in Guinea-Bissau



Guinea-Bissau is divided into eight administrative regions and one independent sector, namely the regions of Bafatá, Screen Partition, Bolama/Bijagós Cacheu, Gabu, Oyo, Quinara, Tombali, and the autonomous sector of Bissau, the capital (see Figure 9). The regions are further divided into sectors (36 in total). Regions and sectors are run by state committees and headed by a chairman (Republic of Guinea Bissau National Statistics Office 2014).

Figure 9. Administrative regions of Guinea-Bissau



Source: Republic of Guinea Bissau National Statistics Office 2014.

Marine and coastal areas in Guinea-Bissau are important in terms of productivity. The coastal biotopes are considered to be some of the richest in West Africa regarding

diversity, productivity, and food potential. The coastal zone includes extensive terrestrial and aquatic environments such as large estuaries and a large archipelago rising from the continental platform (World Institute for Conservation and Environment 2014). Coastal habitats are highly significant to local livelihoods, food security, and the national economy. Mangroves cover more than 338,000 hectares or close to 33% of the coastline and 9.4 percent of the national territory (Global Partnership for Oceans 2014). The continental shelf and contour of the coastline give rise to strong currents and tides, as well as high concentrations of sediment and suspended organic matter creating high water turbidity (Campredon and Cuq 2001).

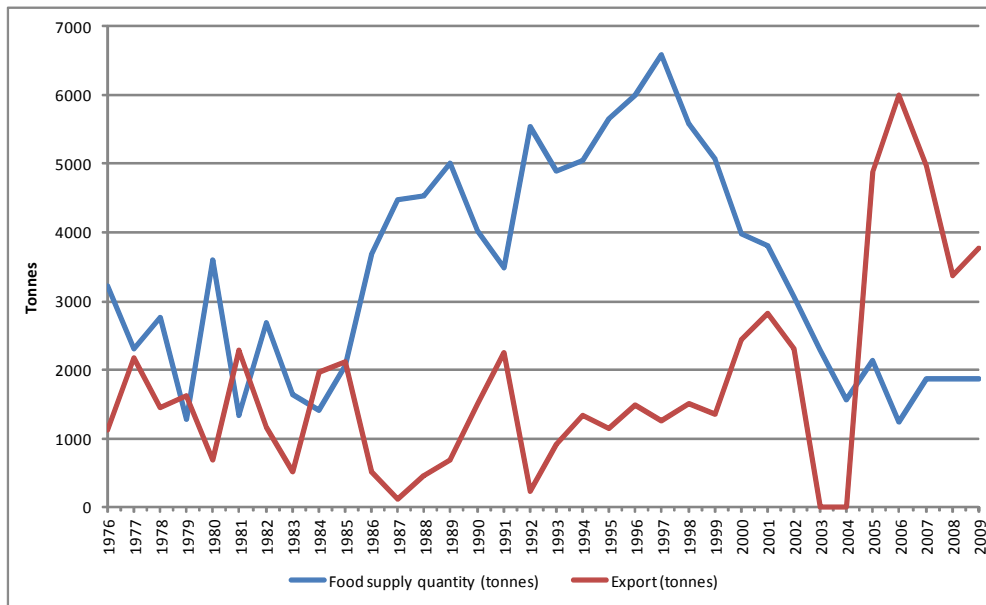
Socioeconomic uses of marine and coastal resources

Guinea-Bissau's primary trading partners are India, Singapore, Portugal, Spain, and the Gambia regarding exports, and China, Portugal, Senegal, India, and the Gambia regarding imports (Republic of Guinea Bissau National Statistics Office 2014). The country is highly dependent on the export of cashews, which cover an estimated 5% of the total land area, and account for 98% of export revenues and 17% of government revenues. At the same time, it is highly dependent on its staple food, rice, for which significant imports are needed to supplement local production (Kyle 2009). About 82% of the population is employed in agriculture (CIA World Factbook 2014).

Fish exports are a major source of government revenue, ca. 50%, as the government licenses foreign flagged vessels in Guinea-Bissau waters (although catches are landed in other countries) (Kyle 2009). Guinea-Bissau's coastal population does not, however, have a strong fishing tradition. Fishing is mainly an activity of farmers in the off season, and fish are often caught from foot using cast nets or from dugout canoes close to the shore (Campredon and Cuq 2001). In Guinea-Bissau, fish protein makes up 0.8% of total protein in diets (FAO 2012). Fish catches have reportedly declined both in quantity and fish size over recent decades according to local reports (World Institute for Conservation and Environment 2014). Traditionally, during the dry season, the Nhominka people from Saloun migrate to the Bijagos islands to fish and return to Saloun in the wet season to grow rice. Over the last fifteen years the camps established by the Nhominka have transitioned to more permanent settlements, many converting to fishermen and targeting rays and sharks, solely for their fins. The use of shark nets has led to significant accidental catches of sea turtles and manatees (Campredon and Cuq 2001). In addition, it is also common for fishermen from other countries, mostly Senegal to also migrate to the waters of Guinea-Bissau during the dry season when they cannot farm. Declines in agricultural activities during the 1990s has meant that over time these fishermen have started staying longer and often permanently in Guinea-Bissau (Njock and Westlund 2010).

Figure 10 shows historical trends of food supply and exports for fish and seafood products between 1976 and 2009. The two trends vary considerably over the time period, with exports remaining below food supply until 2004, when exports grew significantly surpassing food supply trend, which had been decreasing since 1997.

Figure 10. Guinea-Bissau food supply from marine resources and export of fish and seafood (1976 – 2009)



Source: FAO fishstat.

In areas rich in mangroves, such as the Bijagos Islands, mollusks are very important for the local diet. These are usually collected by women and mainly include wild oysters (*Crassostrea gasar*), arks (*Anadara senilis*), and murex shells (*Murex spp.*) (Campredon and Cuq 2001). Local mangroves trees are often put under substantial stress during oyster harvesting, as the roots, on which oysters grow in clusters, are cut, instead of harvesting oysters one by one (Ibid.). Mangroves are also a source of firewood.

Significant hydrocarbon resources were recently discovered in Guinea-Bissau's waters (FAR Limited 2013). Hydrocarbon licensing has been granted for three blocks. The area covers approximately 5,832 km² and lies in water depths from 10 metres to more than 1000 metres, located around 180 km off the coast of Guinea-Bissau, west of the Bissau River estuary (see Figure 11) (Ibid.). It is estimated that the three blocks hold about 954 million barrels of oil (FAR Limited 2014). Several foreign oil companies have entered the oil sector, teaming up in joint ventures with local firm Petroquim. Although test bores have been conducted, the commercial viability of the offshore oil sector is not determined (African Outlook 2014).

Figure 11. Hydrocarbon locations in Guinea-Bissau



Source: FAR Limited 2013.

Governance and management

Guinea-Bissau uses several management measures to protect and preserve marine and coastal resources. These include establishing national parks, creating protected areas, and developing specific plans to manage fisheries resources. Guinea-Bissau also receives financial support from international efforts (e.g., World Bank, European Commission) in an effort to support management of marine areas. Guinea-Bissau attributes a significant portion of its territorial waters to marine protected areas (45.82%) or 8,977 km² (World Bank 2014).

The Bijagos Archipelago was deemed a Biosphere Reserve in 1996 and core areas were established as national parks. Orango Islands National Park was created in 1999 and João Viera / Poilão National Park was created in 2001 (Campredon and Cuq 2001). The national parks offer some of the most intact mangrove forests in the region. These are important as they act as vital nurseries and development habitats for important species of fish, crustaceans, and shellfish (WWF 2005).

The Global Environment Facility (GEF), World Bank, and European Commission initiated the Coastal and Biodiversity Management Project (CBMP) in March 2005. The project, together with local communities, helped to establish national parks, protected areas, and a network of areas to protect 480,000 hectares of the country's coastal zone (about 13% of the national territory). The Institute for Biodiversity and Protected Areas (IBAP), legally established in 2004, was given the mandate and management responsibility for protected areas. The project also established a Fund for Local Environmental Initiatives (FIAL) which provides block grants for environmentally friendly development in communities in and around the parks. The IBAP developed a long-term strategy for protected areas and biodiversity conservation, and worked to expand already established national parks. In addition, a community marine protected area at Urok was established and a community reserved fishing zone was established on the Buba River (GEF 2014). The networks are important to local economies and coastal livelihoods. They support jobs in saline water rice production, bee keeping, and horticulture. It is estimated that the protected area networks cover 15% of the country

and provide 70,000 people with food, jobs, and livelihoods (Global Partnership for Oceans 2014).

The West African Marine Eco-Region (WAMER) is located along the 3,700 km coastline of Western Africa. It is a rich fishing area, providing important revenues to local economies as well as an important protein source to the population's diets. The WAMER region includes Mauritania, Senegal, the Gambia, Cape Verde, Guinea Bissau, Guinea, and Sierra Leone. It is estimated that the fishing sector in the region employs around 1.5 million people and represents on average 15 to 17% of GDP for these countries. Many years of commercial fishing and poor management have had significant effects on fish stocks, negatively affecting economies and people dependent on the resource. The United Nations Development Programme (UNDP) and World Wide Fund for Nature (WWF) developed a project to improve governance and adopt best practices for sustainable resource management in the WAMER region. The 10.5 million Euro project is co-funded by the EU. By the end of 2015, it seeks to: design and implement a sub-regional action plan for the improvement of governance modalities and policies for the management of marine and coastal resources in the region; develop and adopt innovative tools and initiatives for the management of resources in all seven countries; increase capacity of civil society (non-governmental organizations, professional bodies, journalist networks) and local elected Parliamentarians in fisheries environmental issues; and improve living conditions of selected coastal communities through the provision of support to income-generating activities and environment-friendly activities (UNDP 2012a).

The Guinea Current Live Marine Ecosystem (GCLME) is a GEF project including 16 countries, from Guinea-Bissau in the Northwest of Africa to Angola in the southwest (see Figure 12). Officially starting in 2004 when funding was provided to all participating countries, several previous projects in the region paved the way for the GCLME project. The GCLME participating countries establishes a network of scientists and marine resource specialists responsible for operationalizing national and regional activities within a five-module ecosystem-based framework focused on productivity, fish and fisheries, pollution and ecosystem health, socioeconomic conditions, and governance. A Regional Coordination Unit was established in Accra, Ghana to support implementation of the project and coordinate transboundary actions. Its activities aim to help recover depleted fish stocks, improve the health of the ecosystem through the restoration of degraded habitats (e.g., seagrasses and mangroves), control coastal pollution and nutrient over-enrichment, conserve biodiversity, and support participating countries to mitigate and adapt to climate change (UNDP et al. 2013).

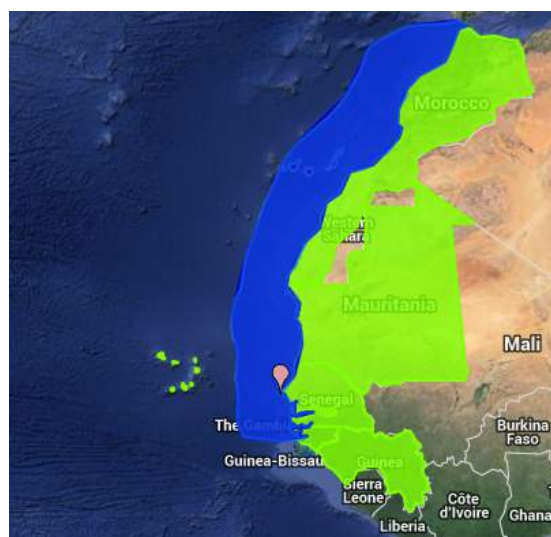
Figure 12. GCLME Area



Source: UNDP et al. 2013.

Similar to the GCLME, Guinea-Bissau also participates in the Canary Current Large Marine Ecosystem (CCLME). This GEF project extends from Guinea-Bissau to Morocco in northern Africa and includes seven countries (see Figure 13). The project aims to reverse the depletion of fisheries and conserve important habitats for reproduction and nurseries. It seeks to achieve this through regional collaboration and transboundary management, following an ecosystem-based approach. CCLME also aims to target and control pollution in coastal areas. The project is implemented by the FAO and the United Nations Environment Programme (UNEP). The current phase runs from 2007 to mid-2014 (IW LEARN 2014).

Figure 13. CCLME Area



Source: IW Learn 2014.

Guinea-Bissau is also a participant in the project, Adaptation to Climate Change in Coastal Zones of West Africa (ACCC). ACCC is driven by the shared, anticipated impacts from climate change in the common marine ecosystem of the five West African

countries.¹⁰ ACCC seeks to use regional cooperation to increase adaptive capacity and address shared challenges to coastal ecosystems. The project seeks to implement country-driven strategies to adapt to climate-induced coastline erosion. Focusing on the concept of integrated coastal area management, the project's programme is designed to address climate change impacts through implementing measures to increase the resilience of vulnerable communities through a combination of community-based demonstration projects and development of national policy measures. The project includes both actual adaptation actions (e.g., mangrove restoration) as well as capacity-building (e.g., raising awareness, trainings) (UNESCO-IOC 2012). ACCC is funded by the GEF and primarily implemented by UNESCO and UNDP, along with partnering organizations the New Partnership for Africa's Development (NEPAD), International Union for Conservation of Nature (IUCN) and Japan International Cooperation Agency (JICA) (UNDP 2012b).

Guinea-Bissau has developed several fisheries management plans since 1995, with the most recent plan developed in 2010. The fisheries management plans are used to establish limits to fishing intensity and conservation measures - including restrictions on gear and bycatch to ensure sustainable fishing. Evaluations of the plans, which are not publically available, suggest that problems exist, such as determining reliable estimates of fish biomass as well as the way in which independent scientific advice is interpreted (Transparentsea 2014). The government institutions handling fisheries in Guinea-Bissau include the Ministry of Fisheries and Maritime Economy, comprised of the General Directorate for Fisheries, the Centre for Applied fisheries research and the Commission on Fisheries Surveillance. In addition, the Institute for Biodiversity and Protected Areas, which is under the Ministry of Agriculture, is working on fisheries (Ibid.). Guinea-Bissau is also a member of several regional fishing organizations. Along with six other West African countries, it is a part of the Commission Sous-Régionale des Pêches (CSRPF) is a Sub-Regional Fisheries Commission linked to the FAO. Guinea-Bissau is a member of the Ministerial Conference of Fisheries Cooperation among African States Bordering the Atlantic Ocean (COMHAFAT), established in 1991 to support coordination amongst African states along the Atlantic Ocean (Transparentsea 2014), the Fishery Committee for the Eastern Central Atlantic (CECAF), and the International Whaling Commission (IWC) (FAO 2014; International Whaling Commission 2014).

The EU is in negotiations with several West African countries,¹¹ including Guinea-Bissau, regarding fisheries agreements. These countries represent important trading partners for the EU. The EU exports mostly industrial goods, machinery, vehicles and transport equipment, and chemicals to the West African countries. It primarily imports basic commodities such as agricultural products, processed fish products and to a lesser extent metals (copper, gold) and diamonds (European Commission 2013a). The trade agreements focus on creating a free trade area between the African states and the EU. Members of the Economic Community of West African States (ECOWAS) met with the EU in March 2014 to discuss the trade deal, as well as regional security and upcoming elections in Guinea-Bissau (Clottey 2014). Some West Africans are expressing concerns about the partnership, saying it will be to the disadvantage of African countries and will not improve the lives of the people there. This is believed because the West African countries will be mostly exporting raw materials, while importing expensive goods and services from Europe (Ibid.).

¹⁰ Cape Verde, the Gambia, Guinea-Bissau, Mauritania, and Senegal

¹¹ Benin, Burkina Faso, Cape Verde, Ivory Coast, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Senegal, Sierra Leone, Togo, and Mauritania.

The EU is one of Guinea-Bissau's main fisheries partners. The EU and Guinea Bissau signed their first fishing agreement in 1980 and there have been 12 multi-year agreements since. The current fishing agreement was signed in February 2012. The multi-year agreements include compensation to the Guinea-Bissau government for the right to fish, which is the majority of the payment made to the Government. An additional payment is made to Guinea-Bissau for fisheries development. According to reports in 2011, Portugal, Spain, France, and Italy are fishing in Guinea-Bissau's EEZ are fishing under the EU agreement (Macauhub 2011). Compliance issues with the fishing agreements were identified in the EU's evaluation of the agreements. These issues include EU vessels failing to radio entry and exit into Guinea-Bissau's EEZ and the failure to submit timely catch data to authorities, sending it first instead to their flag states where it is aggregated to fleet data. By-catch limits are also thought to be routinely exceeded by vessels (Transparentsea 2014). The EU is also working to support Guinea-Bissau to combat illegal fishing and launched a monitoring and cooperation programme as part of its regional efforts. The programme provides 5 million Euros for countries in the region, aiming at conserving fish resources, combating illegal fishing, and protecting artisanal fishing practices. This includes surveillance operations in Guinea-Bissau's territorial waters, modernisation of equipment, and providing training (Macauhub 2013).

Guinea-Bissau also has bilateral fishing agreements with Senegal, China, and previously with the Italian organization FEDERPESCA. It is also believed the country entered into an agreement with Russia in 2011 for industrial trawlers that fish small-pelagic species (Transparentsea 2014).

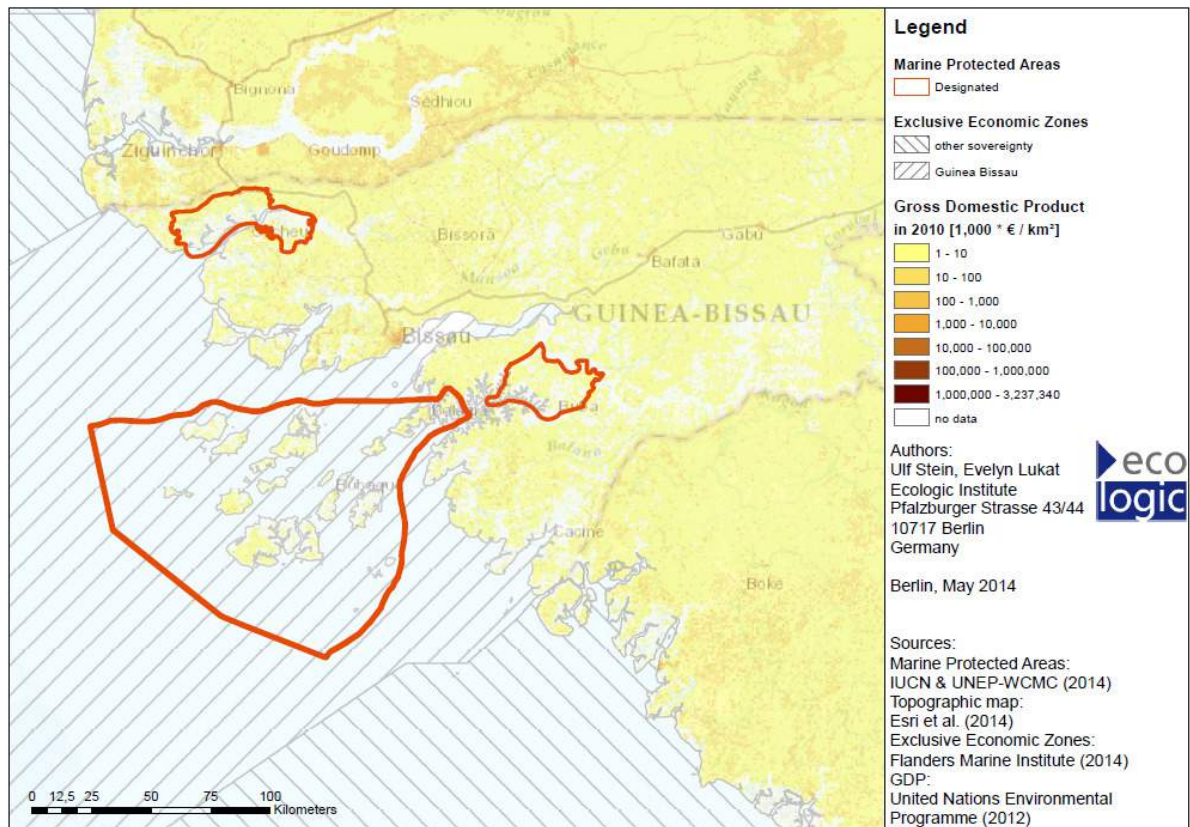
Table 4. Value of fishing agreements with the EU (Million Euros)

1995 – 1997	1997 – 2001	2001 – 2006	2007 – 2011	2011 – 2012	2012 - 2015
11.5	36	52	30	7.5	27.6

Source: Transparentsea 2014.

Guinea-Bissau also has a joint development zone (JDZ) with its neighbour Senegal. The JDZ is a bilateral agreement concerning marine resources, both non-living and living, used to address a disputed area in which no agreement on maritime boundaries was reached. The zone was initiated in 1993, with a protocol in 1995, and provides for an Authority consisting of the Heads of State or of Governments or of persons delegated by them, an International Agency, an enterprise and a Board of Directors. The agreement establishes the amount of resources of the continental shelf to be shared between the neighbours. It sets that Senegal receives 85% and Guinea-Bissau 15% of resources from the continental shelf, while resources from fisheries are to be shared evenly between the countries. These agreements were signed for a period of 20 years and can be modified in 2015 (Hanling 2011). The agreement means that recently discovered oil in the area will provide a greater profit to Senegal (MBendi 2014).

Figure 14. Marine Protected Areas and Gross Domestic Product in Guinea-Bissau



Key challenges

In Guinea-Bissau, coastal and marine areas and the resources they provide are under growing pressure from human activities. The main threats to these ecosystems stem from unsustainable exploitation of resources, climate change factors, and, potentially, significant impacts from proposed mining and petroleum exploration. Several endangered or threatened species such as the West African manatee, swordfish, a variety of marine turtles, the black tailed godwit, terns as well as many other coastal birds inhabit the coastal areas (World Institute for Conservation and Environment 2014). Another major issue is the conversion of mangroves to other purposes, mainly agriculture (Shumway 1999).

At the same time, compared to other West African countries, coastal and marine environments in Guinea-Bissau are relatively healthy (World Institute for Conservation and Environment 2014). However, those active in commercial fishing and fish trade (i.e., fishermen, salesmen) are challenged due to the high amount of government taxes and poor infrastructure in Guinea-Bissau. Many local fishermen would like to export their fish, but because there are no proper local processing facilities in Guinea-Bissau, this is not possible, so fishermen must sell on the local market. Trading on the local fish market does not equate to much return to the fishermen nor the fish traders, and at times they do not make back their overhead costs (Al Jazeera 2014).

The more pressing issue facing the fishing community is unregulated and illegal fishing happening in Guinea-Bissau's waters by foreign vessels. The large well-equipped vessels threaten the local fish stocks with overfishing, potentially making the challenge

for local fishermen, who are not as well equipped, even greater. The UN warns that fish stocks in Guinea-Bissau's waters will be depleted if action is not taken (Ibid).

A significant number of foreign fishing vessels operate in the waters of Guinea-Bissau. Industrial fishing is permitted outside the 12 nm limit, while inside the limit is reserved for artisanal fisheries. Anecdotal evidence suggests that many industrial fishing vessels break this rule and fish inside the limit. Catches are mostly shipped, by land or sea, directly to Senegal and Las Palmas (Spain) where they are processed. Very little is processed within Guinea-Bissau. Guinea-Bissau provides fishing access to foreign vessels through four different arrangements: nationally-based fishing companies, firms fishing via charter arrangements and joint ventures, motherships or 'ramasseurs', and bilateral fishing agreements (Transparentsea 2014).

Foreign vessels which register as locally-based companies and fly the Guinea-Bissau flag will count as nationally-based fishing companies. However, it is estimated that the number of these vessels is rather low (about 4 or 5 in 2012). More common are fishing vessels which operate in joint ventures, where local venture partners or companies charter or operate foreign vessels. Motherships or 'rammaseurs' are vessels which are not licensed to fish, but instead collect fish from other vessels. Typically, these ships operate next to a fleet of 40 to 50 smaller, artisanal boats and are licensed in Senegal.

Adding to the problem, government revenue from fishing licenses is extremely important to Guinea-Bissau. In 2006, it was estimated that total revenue from the fishing sector was about 19 million USD, though this dropped to 14 million in 2009. Total state income, excluding foreign aid grants and loans for 2006 was 47 million USD (Ibid.). At the same time, the World Bank estimates that well managed commercial fisheries in Guinea-Bissau's could provide fish catches with an annual gross value of production of 191 million USD, yielding potential annual public revenues of almost 30 million USD.

OHI performance and opportunities for improvement

While Guinea-Bissau faces major challenges to improve its management of marine resources, exist opportunities for improvement also exist. The OHI can be used to help identify where these lie. Guinea-Bissau received an overall score of 41 on the OHI, placing it 220 on the global rank. It dropped by 1% compared to 2013, and its expected future trend is expected to drop by 27%. The individual scores for coastal protection and coastal livelihoods and economies of Guinea-Bissau are shown in the table below.

Table 5. Guinea-Bissau OHI scores

OHI Goal	Score	Trend
Coastal protection	6	-1%
Coastal livelihoods and economies	60	+0.03%

Source: OHI 2014.

Note: Trend is the average percent change in the present status for the most recent five years of data.

Guinea-Bissau received a score of 6 for the goal of coastal protection out of a possible 100 on the OHI, while the global average score is 69. For the goal of coastal livelihoods and economies, Guinea-Bissau received 60 out of a possible 100. The main

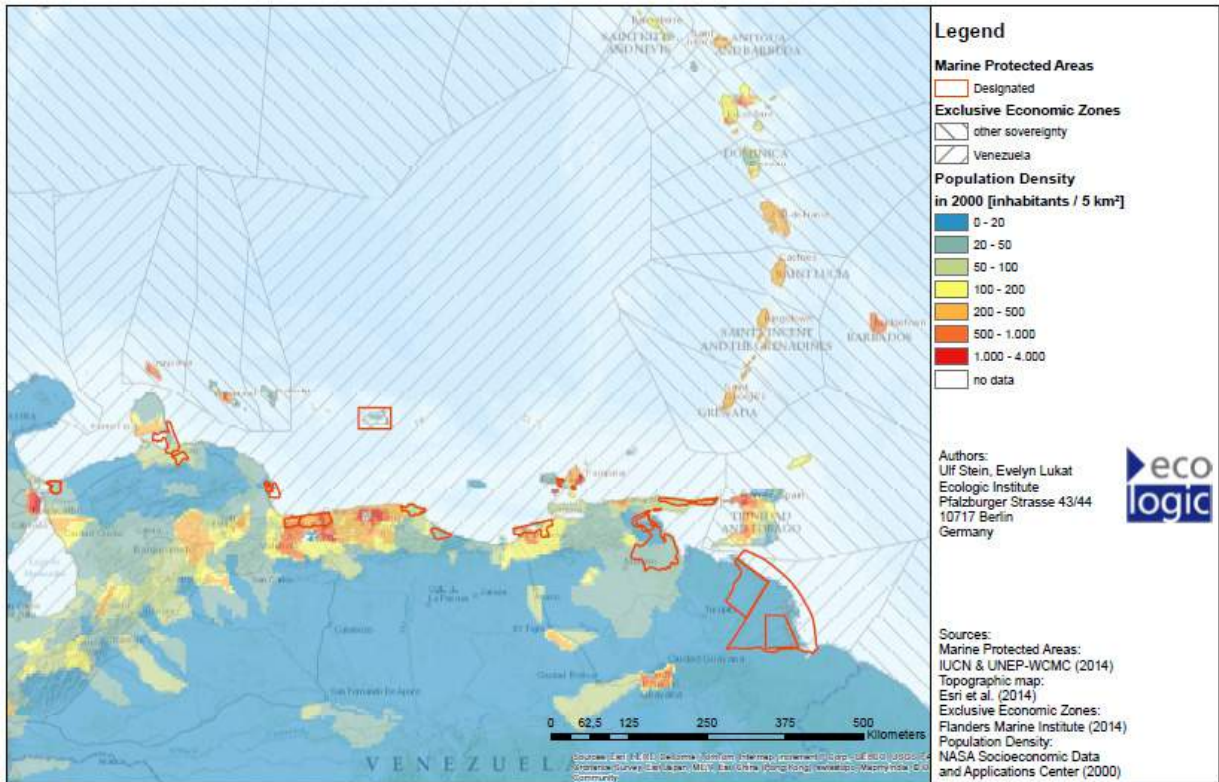
opportunities to increase performance for Guinea-Bissau include increasing protection of mangroves, ensuring sustainable fishing practices, and taking measures to support marine and coastal economic activities. A higher OHI score in coastal protection could potentially be achieved with increases in number of mangroves through protected areas or capacity building (e.g., providing local communities with knowledge about sustainable harvesting (e.g., oyster) practices. Mangroves have been depleted over recent decades to convert land for agricultural use. Though protected areas and measures do exist, evidence suggests that further action is still needed. In regard to biodiversity, reducing the number of threatened marine species by actions such as reducing fisheries by-catch and ensuring habitat protection for threatened species could also lead to improvement. This would also support local socioeconomic activities (e.g., commercial fishing, aquaculture) and help to improve coastal livelihoods and economies. Another method would be to lower taxes to fishermen (who often struggle to make a profit), and provide support (e.g., financial incentives) to build a local fish processing industry.

4.4. Venezuela

The Bolivarian Republic of Venezuela (hereafter Venezuela) is an upper middle income country at the northern tip of South America with a population of nearly 30 million (World Bank 2012; World Bank 2014d). It shares terrestrial borders with Guyana, Brazil, and Colombia and maritime borders with over a dozen countries in the Caribbean Atlantic, where its coastline is 2,800 km in length (CIA World Factbook 2014). Venezuela is considered to be one of the ten most mega-diverse countries in the world and is an important reservoir of Caribbean marine biodiversity hosting marine ecosystems such as coral reefs, seagrass beds, and mangrove forests that provide sources of food, medicinal goods, and tourism (Klein et al. 2007). Of the country's 29.95 million population, 70% live on Venezuela's coasts, the largest population concentration in a coastal area in the Caribbean (see Figure 15; UNEP 2009) (World Bank 2014e). Local economies are dominated by tourism, fisheries, and hydrocarbon extraction (Klein et al 2007). Venezuela also has the greatest volume of shipping traffic, and one of the largest annual fish catches in the Caribbean region with an export value of US \$153 million and employment of 44,302 people (Klein et al 2007).

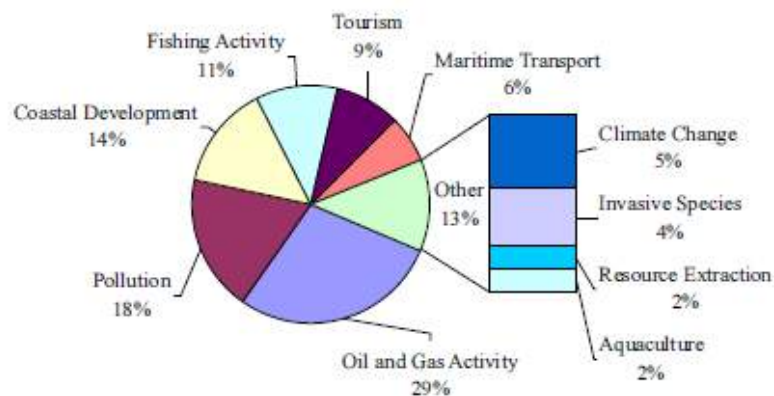
Figure 15. Marine Protected Areas and Population Density in Venezuela

Marine Protected Areas and Population Density in Venezuela



Venezuela is a founding member of the Organization of Petroleum Exporting Countries (OPEC) and contains some of the largest oil and natural gas reserves in the world. It has the largest crude oil reserves in the western hemisphere and consistently ranks as one of the top suppliers of oil to the United States (U.S Energy Information Administration 2012). Venezuela's main source of income comes via Petróleos de Venezuela, S.A. (PDVSA) the state-owned oil company. At the same time, oil and gas exploration have been identified as a key area for concern for marine ecosystems. An interdisciplinary team of experts asked to identify key threats to the coastal and marine environment in Venezuela named oil and gas activity as the primary threat, followed by pollution, coastal development, and fishing activity (see Figure 16) (Klein et al. 2007).

Figure 16. Key threats to Venezuela's coastal and marine biodiversity



Source: Klein et al. 2007.

Socioeconomic uses of marine and coastal areas and their resources

Venezuela has highly diverse and productive inland and marine waters and is the most important fishing nation of the Caribbean Atlantic, with an annual production of 500,000 tonnes, stabilising at around this level by the end of the 1990s (FAO 2005b). Aquaculture also plays an increasingly significant role, with a sustained level of growth that reached 29,710 tonnes per annum in 2004 focusing on marine shrimp and indigenous species such as cachama and pepitona.¹² The extractive fishing activity centres on the production of sardine (*Sardinella aurita*) (artisanal) and yellowfin tuna (*Thunnus albacares*) (industrial), which together represent 54% of national catch and generate important levels of employment (Ibid.). In contrast to other Latin American countries, artisanal activities make a significant contribution to national fisheries, accounting for 70% of catch from extractive fisheries (Ibid.). In terms of larger scale extractive fisheries, tuna production in Venezuela represents 29% of total fishery landings and is the first item in foreign income from exports (Cabello et al. 2003). Of these landings, 70% are used in industrial canning processes, 10% are frozen and exported, and the remaining 20% is consumed fresh (Ibid.).

Venezuela's coasts are host to 440 factories (6.51% of the national total) dedicated to the production of food and drink products, metal, machinery, equipment, chemical substances, derivatives of petrol, rubber, and plastics. Many other key marine-based activities take place in these same areas: The beaches and coastal zones are the main feature of attraction for the Venezuelan tourist industry, which is viewed by the government as a 'strategic factor in the socio-productive sustainable development of the country' (Dereto con Rango 2012). Equally important is shipping traffic passing through the Caribbean Atlantic zone, with 95% of Venezuela's imports arriving through maritime transport (UNCTAD 1999).

In 2009, the Energy and Petroleum Ministry announced plans to increase natural gas production and begin exporting by 2015, and is currently acting to increase production of non-associated gas, largely through the development of offshore reserves (U.S. Energy Information Administration 2012). PDVSA has awarded offshore exploration blocks off Venezuela's northeast coast and the Gulf of Venezuela to the northwest of the country to international oil companies (Ibid.).

Governance and management of marine and coastal areas

Venezuela has a constitutional obligation to protect environmental rights and the fifth objective of the Socialist Plan of the Nation for 2013-2019 is to "contribute to the preservation of life on the planet and the survival of the human species" (BioParques 2006; Chávez 2012). The country has a history of acting as a frontrunner in environmental protection, pioneering 'exemplary' environmental laws such as the Organic Environmental Act (1976), the Territorial Planning Act (1982), the Environmental Penal Code (1992), and more recently a ban on trawler fishing in amendment to the Law on Fisheries (2002) (ParksWatch 2006). Nevertheless, more pressing social problems such as tackling poverty and inequality have tended to take precedence over implementation of environmental laws (ParksWatch 2006). The large oil revenues collected by PDVSA have been used to fund wide-scale social reforms and programmes that include free health-care clinics, discounted food centres in poor areas, and secondary and tertiary education programs (Australian Government Department of Foreign Affairs and Trade 2014). These broad-based social

¹² Figures from 2004.

programmes known as *misiones* have led to an important decline in moderate poverty, from 50% in 1998 to approximately 30% in 2012 and in levels of inequality which has decreased from a Gini Index of 0.49 in 1998 to 0.39 in 2012, and is now among the lowest in the region (World Bank 2014e). Indeed, even the ban on trawler fishing, while of benefit to the marine environment, was in part carried out to support the incomes of small-scale fishing communities and to contribute to national food security (Venezuelaanalysis.com 2014).

Venezuela has an extensive network of protected areas with different levels of protection. National parks, natural monuments, and wildlife refuges are the strictest categories and make up 16% of Venezuela's territory. The other categories of protection, comprising about 32% of the national territory, allow for sustainable use of their natural resources and 19% of these territories are considered production areas (ParksWatch 2006). However, protection of natural marine areas is still far behind on-land protection. MPA coverage currently stands at 15,031 km², accounting for only 0.05% of territorial water (World Bank 2014a), compared to 73% of total surface area for terrestrial zones (Trading Economics 2014).

At a regional level, Venezuela is a party to the Protocol Concerning Specially Protected Areas and Wildlife in the Wider Caribbean Region (SPAW Protocol), the first international environmental agreement to take an ecosystem-based approach to the conservation of ecosystems and habitats and a regional tool for the implementation of the CBD (UNEP/CEP 2014). Venezuela is also signatory to the Convention for the Protection and Development of the Marine Environment in the Wider Caribbean Region (WCR). The so-called 'Cartagena Convention' is the only legally binding regional environmental treaty for the Caribbean region and constitutes a legal commitment by contracting parties to protect and manage their common coastal and marine resources individually, jointly, and in a sustainable manner (UNEP/CEP 2014). Further, from 2010–2014, the Ministry of the Environment is carrying out a project to strengthen the Venezuelan system of coastal and marine protected areas. The aims of the project are to consolidate the system of protected areas to improve and optimize management, administration, and operation in priority marine conservation areas and to contribute to the conservation of biodiversity (SimposiosAP 2011).

Venezuelan natural parks are managed by several institutions and offices within the Ministry of Environment (MINAMB). For the marine and coastal environment the 19 MPAs are governed by four main institutions (Trading Economics 2014). The overlap between institutional responsibilities can make the coordination of efforts difficult (ParksWatch 2006). Furthermore, there may be imbalances of power between bodies with 'institutional weaknesses' such as INPARQUES and other bodies with greater levels of budget and influence such as the Ministry of Energy and Oil, which have the ability to intervene in the planning and development of marine and coastal zones (BioParques 2006). Indeed, when faced with a conflict over the use of protected area, it has been suggested that, in the past, the Venezuelan government has erred towards favouring the needs and interests of the extractive industries rather than those of the environment (ParksWatch 2006).

Table 6. Division of governmental responsibilities for marine protection in Venezuela

Body	Responsibilities
Ministry of Environment (MINAMB)	Highest environmental authority. Environmental regulation and policy, supervision of environmental impact assessment processes, and coordination of territorial land use planning.
National Parks Institute (INPARQUES)	Autonomous institute supervised by MINAMB. Its mission is to manage Venezuela's national parks and natural monuments and to foster their sustainable use for research activities, recreation, environmental education, and ecotourism.
National Institute for Aquatic Spaces (INEA)	Dependency of the Ministry of Infrastructure, responsible for planning, organizing, and controlling shipping, waterborne transport, recreation, fishing and tourist fleets, and for promoting scientific and technological research in the aquatic sector.
National Institute of Fisheries (INAPESCA)	Responsible for fishery aquatic resources planning, sustainable use, and policy execution as dictated by the Ministry of Agriculture and Land.

Source: Klein et al. 2007.

In the case of Venezuela's coasts, the government has recognised that the process of exploiting these areas and their resources has in general had negative repercussions for the environment (República Bolivariana de Venezuela 2010). The Integrated Coastal Zone Management (ICZM) plan for Venezuela cites a number of issues that currently exist for the protection and sustainable development of coastal zones, including a similar lack of coordination as seen in MPAs (República Bolivariana de Venezuela 2010). The issues that the plan identifies and intends to rectify include:

- Conflicts and lack of integration and coordination between the capacities, decision-making, and responsibilities of different actors responsible for management of the coastal zone
- Management deficiencies in the protection of biotic, abiotic, and sociocultural components in the coastal zones adding to pollution, natural risks, progressive deterioration of natural, landscape, historical, archeological, and sociocultural resources.

These issues have, *inter alia*, led to:

- Deficiencies in land-use planning and administration, incorrect use of territory, heightened level of environmental risk to populations, deficiencies in environmental education, stakeholder engagement, environmental

assessments, environmental monitoring and control, and the progressive deterioration of the natural landscape.

The increased level of consideration for multiple uses of coastal and marine resources in Venezuela is beginning to find its way into planning activities. For example, in anticipation of the planned increase in extractive activity, PDVSA financed a study developed by Intecmar by the Universidad Simón Bolívar with the technical support of The Nature Conservancy (TNC) to identify priority areas for the conservation of marine biodiversity (Klein et al. 2007). Furthermore, the Environment Ministry has declared that from 2013 onwards, working groups with the participation of local communities will undertake various new actions in coastal regions in order to advance economic development and food security within a framework of environmental protection (Embassy of the Bolivarian Republic of Venezuela 2013a).

Venezuela is party to several regional fisheries management organizations, including the International Commission for the Conservation of Atlantic Tunas (ICCAT), the Western Central Atlantic Fishery Commission (WECAFC), and the Latin American Organization for Fisheries Development (OLDEPESCA). At the national level, fisheries legislation has provided benefits for wildlife species in MPAs. Los Roques, located about 128 km off the coast, has been identified as an important breeding ground and nursery for populations of several species of sharks, including the lemon shark and the Caribbean reef shark. In 2012, Venezuela set out measures to protect sharks and ban shark fishing and finning throughout the 3730 km² cayes and mangroves of Los Roques and Las Aves archipelagos, also known as haven for diving and fishing (The Pew Charitable Trusts 2014). The far-reaching nature of the protection measures were seen to be enabled through engagement with the local community and local fishers (Ibid.) and if fully implemented, should ensure the sustainability of (eco-) tourism services in the area relying on the attraction value provided by marine wildlife.

The Venezuelan Law for Fisheries and Aquaculture (Ley de Pesca y Acuicultura 2008) attempts to establish the social and economic value of the fisheries sector and understands this industry to be a public good. As mentioned above, artisanal fisheries contribute to a significant proportion of the extractive fishing sector. This is in large part due to measures taken by the government to reserve the catch of sardines exclusively for artisanal and subsistence fishers or their community associations under the Fisheries Law. Additional protection is offered to artisanal fishers over the age of 60 who are exempt from the payment of fees in “recognition of the[ir] value and ancestral customs.” Furthermore, those who work in fisheries at all scales are required by the Law to make social contributions from their gains to those living in poverty.

The Fisheries Law also provides for the ministry in charge of fisheries to fix the price of sale, transport, and distribution of fish and fish products, as well as fixing minimum quotas of products needed to satisfy the basic needs of the population. Despite these powers, Venezuelans have recently seen the price of canned fish such as tuna and sardines jump significantly, making what used to be a staple part of a low-income diet less than affordable (UltimasNoticias 2013). These increases are perhaps less connected to the activities of the fisheries sector than to a more general crisis of food scarcity connected to broader macroeconomic policy of the socialist government. Venezuela's central bank, which has been publishing a scarcity index since 2009, put the figure for 2013 at an average of 20%, which, according to economists in the country, is similar to countries undergoing civil strife or war-like conditions (Lopez 2013).

One of the most publicized components of the Fisheries Law was the world's first ban on the practice of trawler fishing. As noted, this measure was aimed as much at maximizing fishing's benefits to local communities as it was at minimizing its

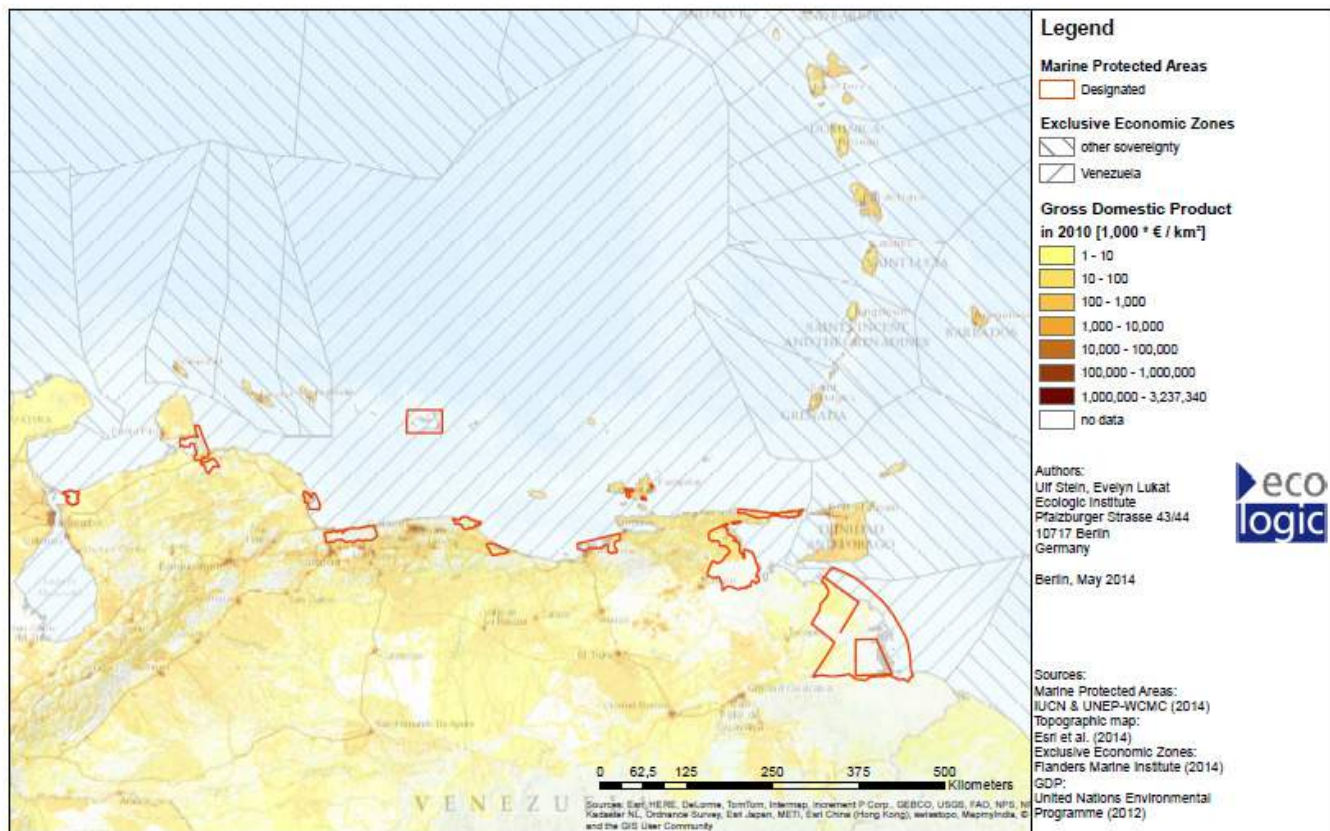
environmental impacts (FAO 2013). A four-year joint scientific research project (the Socio-economically and Environmentally Sustainable Fishing Program) was initiated in December 2013 between Venezuela's Vice Ministry for Fishing and Agriculture and the FAO. The project assesses the impact of the trawler ban on the recuperation of marine ecosystems and fish stocks, strengthens technical capacity of local government officials, and explores new measures to monitor, protect, and manage these resources in a way that takes biological, economic, and social variables into account (Embassy of the Bolivarian Republic of Venezuela 2013a). The \$7.8 million project will support more than 8,000 fishing families, exploring ways in which they could diversify their economic activity or use fishing methods with lesser environmental impact as well as contribute to a wider governmental strategy to strengthen national production and promote food security/sovereignty (FAO 2013; Embassy of the Bolivarian Republic of Venezuela 2013b). Regional fisheries cooperation may also contribute to this aim, such as the recently concluded agreement with Ecuador regarding tuna and shrimp production and processing. This includes Ecuador providing technology transfer and guidance to Venezuela for shrimp farms and tuna processing plants to strengthen and diversify for both domestic consumption and exports (UnderCurrentNews 2013).

Maritime trade is an essential part of the Venezuelan economy, acting as the primary form of transport for imports. Venezuela is party to most of the international conventions on maritime safety or maritime public law, including SOLAS, MARPOL, COLREG, STWC, and those on liability for oil pollution – the Civil Liability Convention (CLC) and the Fund Convention. It has not approved UNCLOS, however, nor so-called private maritime law conventions, such as those on collisions, bills of lading, salvage, limitation of liability and arrest of vessels (TheMaritimeAdvocate.com n.d.(a)). Still, Venezuela has some of the most modern and comprehensive marine legislation in Latin America, covering general law of the sea, administrative maritime matters, private maritime law, port legislation, maritime procedures, coastal legislation, and fishing (see *Ibid.*) At the same time, there are concerns over the lack of modernisation that has taken place in practice. Port infrastructure is extremely poor, with Venezuela ranking 141 out of 148 countries and maritime courts have yet to be established hindering law enforcement (Factfish 2014; TheMaritimeAdvocate.com n.d.(a)). This is particularly concerning due to the recent relaxation of Venezuela's ship registry to allow for more flexibility in the registration of ships and foreign investment in shipping activities (TheMaritimeAdvocate.com n.d.(b)). This has potential to greatly increase the number of vessels in the Venezuelan marine and coastal zones which, if uncontrolled, may have implications for the protection of surrounding ecosystems and other uses of the EEZ such as fisheries and offshore oil and gas exploration.

The touristic sector is run by the state-controlled *Venetur*, meaning that maintenance and development of hotels, resorts and infrastructure lie in the hands of the government (República Bolivariana de Venezuela 2010). The national network is supported with 16 Áreas Bajo Régimen de Administración Especial (ABRAE) categorized as 'Areas of Touristic Interest'. Although coastal and marine tourism is an area of great potential importance to the economy and for diversifying fisheries, the sector appears somewhat stagnant with infrastructure remaining 'vastly underdeveloped' (Villareal 2012).

Figure 17. Marine Protected Areas and Gross Domestic Product in Venezuela

Marine Protected Areas and Gross Domestic Product in Venezuela



Key challenges

A number of deficiencies have been identified within coastal zone management in Venezuela, which have led to the neglect and deterioration of natural resources and ecosystems as well as socio-cultural and historical resources. In some cases, these deficiencies may even place populations at increased risk from natural hazards due to inadequate land-use planning. The main cause appears to be a lack of integration and coordination between different administrative entities and government bodies responsible for various aspects of coastal zone management. The primary challenge is thus to address these shortcomings and improve cooperation and dialogue so as to increase the protection of resources and services in the Venezuelan EEZ.

Oil and gas extraction are of crucial importance to the Venezuelan economy. At the same time, these industries have been identified as a key threat to the coastal and marine environment. A balance must be found between extractive activity and the economic support it provides, ensuring that this sector does not negatively impact Venezuela's biodiverse natural environment and the ecosystem services it provides. The government appears to have understood this need and its latest initiatives towards ICZM offer the possibility of bringing the interests and uses of all stakeholders in the coastal zone together to define priorities and assess trade-offs. However, this is a complex process that involves the inclusion of many actors and sectors and it will be a test to find solutions that are sustainable and acceptable for the majority.

Venezuela has extensive legislation in place to protect and manage coastal and marine resources. However, implementation of this legislation and management of

environmental resources within a climate of reduced food availability and socio-political turmoil has been a challenge, particularly when maintaining extractive industries is key to financing both social and environmental programmes. One particular challenge is the implementation of legislation in shipping, a sector responsible for 90% of Venezuela's imports. Maritime law has recently seen a relaxation of controls on foreign vessels that may lead to greater levels of shipping traffic in the Venezuelan EEZ. Currently, however, the maritime courts foreseen in legislation are not yet operational. Managing shipping without a fully functioning maritime legal system may leave the door open to practices that are harmful to society, economy, and environment.

In the fishing sector, the government has sought to protect the interests of small-scale operations. The reservation of sardine fisheries solely for capture by artisanal operations, coupled with the banning of trawler fishing are intended to support the livelihoods of these groups. Nevertheless, maintaining the economic viability of livelihoods for the largest coastal population in the Caribbean is a challenge that means expanding economic opportunities beyond small-scale fisheries, for example by ensuring that production and processing are strengthened and diversified and providing other economic opportunities beyond fisheries capture such as eco-tourism to assist with sustainable diversification.

OHI performance and opportunities for improvement

Venezuela's rankings for the OHI goals of coastal protection and coastal livelihoods and economies are both considerably below the global average. Venezuela's relative level of economic development, coupled with these low scores, implies that there is considerable scope for increasing the country's ranking. Insights from this case study suggest that economic development in coastal areas and failure to properly implement legislation are some contributing factors towards a lack of natural habitats offering coastal protection. In this regard, more environmentally appropriate planning with full consideration of marine and coastal ecosystems may help improve coastal protection, as well as other goals such as biodiversity and carbon storage.

In Venezuela, management commitments are often ambitious and in some cases groundbreaking, as was the case with the country's ban on trawler fisheries. At the same time, a lack of inter-institutional coordination and implementation of this legislation has led to poor results. The government's overarching political aims have guided marine governance, leading to the prioritization of socially beneficial schemes (e.g., protection of artisanal fishing communities and their livelihoods) over schemes to protect marine fauna, flora, ecosystems, and historical assets which have been negatively affected by exploitation of resources.

Regarding coastal livelihoods and economies, sectors such as tourism and recreation could be expanded to increase their contribution. However, if these are to be expanded, it will need to be done in a way that is sensitive to marine and coastal ecosystems and biodiversity in order to ensure that other aspects of marine management are not negatively affected. Increasing MPA coverage, for example, could attract ecotourism while also promoting coastal protection and protection of biodiversity. Venezuela has traditionally focused on extractive activities such as oil and gas exploitation. Exploring opportunities for expanding renewable energy production could offer new stimulus to coastal economies. Finally, Venezuela could explore the level of pollution produced by the high volume of shipping activity. Enforcing greater controls in this area could contribute to clean waters, which in turn could help preserve or improve coastal ecosystem health.

Table 7. Venezuela OHI scores

OHI Goal	Score	Trend
Coastal protection	38	-0.48%
Coastal livelihoods and economies	69	-0.13%

Source: OHI 2014.

Note: Trend is the average percent change in the present status for the most recent five years of data.

5. Discussion

The four case studies highlight the importance of marine and coastal resources to Atlantic economies and coastal livelihoods. They also showcase a variety of approaches taken to manage marine resources and coastal protection and the many types of challenges countries face to ensure sustainability. In the following section, we highlight key insights from the case studies regarding different dependencies on marine resources, different management approaches, major challenges and tradeoffs, opportunities for improvement, and implications for the wider Atlantic.

Varying dependency on marine resources to support coastal livelihoods and economies

Marine and coastal ecosystems provide important goods and services to each of the Atlantic countries, though the level of dependence can vary even within countries. While coastal populations in each of countries receive both direct (e.g., employment, nutrition) and indirect (e.g., licensing fees and revenues) benefits from marine resources, the case studies demonstrate differing levels and types of dependencies. For instance, in Guinea-Bissau, marine resources play a relatively small role in the national economy, other than for government revenues, though fish and seafood are important sources of protein for certain local coastal communities. Venezuela also depends on marine resources to support food security. Guatemala and Canada, on the other hand, have relatively low domestic consumption of fish and fish products. At the same time, fishing is a primary source of employment in Atlantic Canada, if relatively small on a nationwide basis. For Guatemala and Guinea-Bissau, Atlantic fisheries make a comparatively small economic contribution, but are nonetheless important in supporting local livelihoods. Domestic fishing on the Atlantic coasts of Venezuela, Guatemala, and Guinea-Bissau is dominated by small-scale, artisanal fishing where the benefits of marine resources often carry greater weight for coastal communities. The significance of artisanal fisheries is visible in Venezuela and Guatemala, where measures have been taken to reduce or ban industrial activity in support of small-scale fishing communities and food security. Beyond fisheries, these Atlantic countries exhibit a variety of other marine-based economic activities. Guatemala, Canada, and Venezuela all have growing tourism industries, which could be further developed still to increase (sustainable) local employment and revenues. Both Canada and Venezuela receive significant income from offshore hydrocarbon exploitation. Guinea-Bissau is currently exploring exploitation of recently discovered hydrocarbon reserves.

Management of marine resources

The countries display wide variation in terms of the governance frameworks in place for protecting and preserving marine resources. In some cases there is forward-looking legislation, such as in Canada with the leading 1997 Oceans Act, and Venezuela, with the first trawling ban in the world in 2009. Integrated management of marine and coastal zones to improve planning of multiple uses of marine and coastal zones can be seen both at the national level (e.g., Venezuela, Canada) and regionally (Cartagena Convention in Caribbean – Venezuela and Guatemala). However, sustained political and economic support for these programmes remains crucial to the implementation of legislation (e.g., Guatemala, Venezuela, Canada). Lack of integration and coordination between different administrative entities and government bodies responsible for various aspects of coastal zone management (e.g., Venezuela, Guatemala) can be a major barrier to meeting policy objectives. For example, even though Canada is considered to have a leading policy framework in many respects, implementation has been lacking in some respects and aspects of decision-making are discretionary and subject to other pressures and funding constraints.

Overexploitation of marine resources for short-term economic gain can lead to extremely damaging socioeconomic consequences, as shown in Canada's cod collapse. Comparatively, Guatemala or Guinea-Bissau have much less developed fishing sectors than Canada, due to the value of marine and coastal resources (for the wider economy or for food security) having been overlooked or underestimated for historical or cultural reasons, as well as because of differing levels of economic development and political commitment. Despite the small scale of the fisheries sectors in these countries, the potential for damage exists. In Guatemala, the industry is only partially regulated and poorly controlled, tending towards overfishing and resource degradation. In both Guatemala and Guinea Bissau, economic needs drive overfishing, and perhaps also cause a blind eye to be turned towards more restrictive, sustainable management practices. Canada is learning from its past failures, which can serve as sobering lessons for others. In Guinea-Bissau, clear efforts to sustainably manage marine resources have been made through commitments to MPAs, supported by international efforts and other projects such as national parks and demonstrating positive impacts on local economies and livelihoods in protected areas. At the same time, it is clear that these efforts remain impeded by socioeconomic and political barriers.

MPAs have been created in each of the case study countries. In some cases, the protection that MPAs provide has been the solution for addressing concerns of sustainability raised by fishing communities, as seen in both Guatemala and in Canada, where lobster fishers initiated conservation research that led to development of a new MPA. New projects and measures to extend the number and coverage of MPAs are seen in Guatemala and Canada and measures to improve MPA management are underway Venezuela. MPA networks with neighbouring countries and other regional agreements can support protection of biodiversity and should be encouraged. However, foreign help, including economic resources and administrative support for marine protection projects such as MPAs, is essential for countries facing critical socioeconomic challenges, like Guinea-Bissau.

In addition to regional fishery commitments, Venezuela, Guatemala, and Guinea-Bissau are all participating members of the UNEP Regional Seas Programmes for the Wider Caribbean Region and West and Central African Region, respectively. Venezuela and Guatemala have both signed and ratified the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention) and its protocols on Co-operation in Combating Oil Spills and Specially Protected Area and Wildlife (SPAW) (UNEP 2014a). Guinea-

Bissau, though a contracting member, has yet to sign or ratify the Convention for Cooperation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region (Abidjan Convention) (UNEP 2014b). These agreements highlight the importance of managing and maintaining the health and productivity of marine and coastal environments from the perspective of regional ecosystems. Likewise, cooperation through RFMOs or other regional programmes (e.g. GCLME, CCLME in Guinea-Bissau) can more effectively address shared challenges.

Challenges and trade-offs

All of the case study countries face trade-offs between competing interests and industries when it comes to marine resources. Improving stagnant or declining industries (e.g., Venezuela, Canada, Guatemala) is often needed to better support coastal livelihoods; however, reviving these markets may also present challenges to ensure the continued sustainability and productivity of fish stocks. Industry-driven challenges such as overfishing, IUU fishing, and shipping activity can create potential for increased political tension as well as significant management and environmental challenges. Non-commercial uses of marine resources can conflict with protection as well; unsustainable collection and harvesting of resources (e.g., oysters in Guinea-Bissau) suggests that capacity building is needed in some cases to inform local populations about the importance of marine ecosystems and ways to sustainably harvest marine resources. Even where there might be some awareness, continued unsustainable practices have the potential to fuel conflict and tension between groups (e.g., competing fisheries within Guatemala and with neighbouring countries in the Gulf of Honduras). Managing trade-offs between social, environmental, and business interests, especially during times of crisis and social turmoil (e.g., Venezuela, Guinea Bissau), is critical for protecting and sustaining marine and coastal resources. Improved development and implementation of integrated coastal management can ultimately help to best manage competing uses.

For migratory and straddling fish stocks, like cod, fisheries management is not entirely within domestic control, as these stocks are fished outside of the country's EEZ (or illegally within). IUU fishing is a major concern throughout the Atlantic Basin, as it is not merely a national problem. However, IUU fishing is more critical in some areas - such as the west coast of Africa - than others. Illegal fishing can lead not only to impacts on coastal livelihoods and resources degradation, but also to conflict. This is the case in the Gulf of Honduras, where Guatemalan, Honduran, and Belizean fisherman conflict over catch practices, and in the case of Canada, where violations of catch restrictions led the country to undertake heightened enforcement measures.

Exogenous factors such as climate change also significantly impact the sustainability of marine ecosystems and associated economies and livelihoods. Climate change is a major challenge for marine ecosystems, with wide-ranging effects that may be sooner recognized in some countries than others (e.g., sea ice melt in Canada). Global climate change is out of the direct management control of coastal states, but that is not to say that measures cannot be taken. For instance, Canada is a significant emitter of greenhouse gas emissions and has withdrawn from the Kyoto Protocol.

These many challenges and trade-offs can be exasperated by financial constraints (e.g., Guinea-Bissau, Guatemala) or a lack of political will (e.g., Venezuela). Large financial constraints, political instability, corruption, more pressing socioeconomic needs, and historical focus on other (inland) areas are other factors seen to stand in the way of countries protecting and preserving marine and coastal ecosystems.

Opportunities for improved management

The case study countries also demonstrate opportunities to improve the management, and therefore health, of their marine resources. Direct support to socioeconomic activities (e.g., local fishing industry in Guinea-Bissau, Guatemala) can offer opportunities to increase the value of marine industries and improve sustainable management. Diversified economic growth in the marine sector can bring in new jobs and income to coastal economies. Explicit focus on integrating marine protection with economic activity in coastal areas (e.g., through ICZM) can improve coastal protection while also integrating management of rising interests and industries.

Stakeholder involvement and co-management regimes can also help manage multiple interests through helping to engage those who depend most on marine resources in sustainable management. Canada has taken strides to engage with a wide range of stakeholders in the development of integrated management plans and MPAs and has policies in place supporting Aboriginal co-management of marine resources. In Guatemala, fishers expressed an interest in participating further in fisheries management and supported developing co-management of marine reserves.

Where ecosystems are damaged or under threat, the extension of protected areas may improve coastal protection. At the national level, MPAs support the implementation of ecosystem based management and are in use throughout Atlantic countries. Regionally, networks of MPAs and increased coordination of regional management efforts could further support sustainability.

Countries with larger economies (Canada and Venezuela) have the financial capacity to invest programmes and measures to improve performance. Atlantic countries challenged by economic or political factors may have to rely on support from regional neighbours and from the international community. Where financial support is not forthcoming, technical assistance and experiences might be offered. Such support can include development and implementation of regulatory frameworks for resource management as well as knowledge sharing, training, and modernization of technologies (e.g., for monitoring).

Learning from past mistakes (e.g., cod collapse in Canada) and discovering new information (e.g., through monitoring of IUU fishing) is essential to create policy solutions, yet without successful policy implementation, even the most well-designed objectives will be redundant.

Pan-Atlantic connections

Marine resources play important roles in Atlantic coastal states in terms of economic and nutritional resources, as well as other ecosystem services, such as coastal protection. The countries surveyed have similarities in the challenges faced (e.g., competing environmental and economic interests, overfishing, IUU fishing, climate change impacts), yet also display stark differences from an environmental, socioeconomic, and political standpoint and in the resultant management of resources. These are representative of the diversity within the Atlantic Basin and illustrate that while a common ocean binds these coastal communities together, it cannot be viewed as homogenous.

At the same time, Atlantic coastal countries and resources are intrinsically linked and it is clear that strong regional cooperation, such as through the development of networks of MPAs or cooperation through RFMOs, bilateral agreements, or regional programmes

can help to promote more sustainable use of resources and benefits to coastal livelihoods and economies.

For challenges that are transboundary in nature, such as IUU fishing, cooperative action is needed. IUU fishing is a major concern of the entire Atlantic region and, as long as it remains a viable economic opportunity for fishing vessels, it will continue to be. Atlantic countries must work together to stop IUU fishing, through actions such as denying IUU vessels access to ports or other support, preventing the marketing of fish by IUU vessels, ensuring sanctions exist to deter nationals and others from engaging in IUU activities, improving traceability of products to prevent access of illegal products to markets, increasing regional cooperation (e.g., lists of IUU vessels), conducting joint controls to combat IUU fishing, and coordinating efforts to ensure compliance by countries that do not participate in regional organizations.

Economic and political ties between Atlantic countries can also impact coastal economies and the sustainable management of marine resources. Trade and other agreements also offer opportunities to improve management of marine and coastal resources. For example, the United States and EU are historically the largest importers of Canadian seafood (although China's share has rapidly risen in recent years). As Atlantic countries are also important trading partners or enter into agreements with one another (e.g., for fishing) considerations for protecting marine resources should be considered in relevant negotiations. This is demonstrated by the case of the EU and Guinea-Bissau, where the EU profits from fishing opportunities in Guinea-Bissau waters, and the EU provides support to Guinea-Bissau's efforts (e.g., monitoring, modernization, trainings) to improve marine management. While it is questionable as to whether such an approach is adequate or correct, it does demonstrate that the consideration of marine resources is not specifically the responsibility of individual countries, but of the broader Atlantic community which depends on these resources.

Cooperation between countries - such as exchange of knowledge and best practices, or support for specific activities such as monitoring illegal fishing activities - can improve marine management. The case studies show a number of examples of beneficial collaboration between Atlantic coastal nations such as bilateral exchange and technical support to educate regarding sustainable use of resources (e.g., Guatemala with support from Spain), improvement and expansion fishing sector such as through improving sanitary facilities for processing (e.g., Guatemala with support from Spain), or sharing technological expertise and equipment provided by other countries (e.g., Venezuela with support from Ecuador). In one noteworthy example of pan-Atlantic cooperation, in May 2013, the EU¹³, United States, and Canada signed the 'Galway Statement on Atlantic Ocean Cooperation', agreeing to launch an Atlantic Ocean research alliance, work together to align ocean observation efforts, and promote the sustainable management of resources (European Commission 2013b).

6. Conclusion

This paper examined management of marine resources and coastal livelihoods from the perspective of four Atlantic Basin countries. While the case studies enable only a limited view on the Atlantic Basin and the importance and management of its marine resources for coastal countries, a number of conclusions and recommendations can be drawn. This study shows the great diversity of the Atlantic Basin and its vast array of ecosystems, habitats, and species, as well as socioeconomic and political systems.

¹³ For the EU, this action built upon its Atlantic Action Plan, also launched in May 2013.

Indeed, there are significant differences between the countries which border the Atlantic such as their main activities exploiting marine and coastal resources or the governance approaches they take. At the same time, many commonalities between Atlantic Basin coastal countries exist. It is evident that marine and coastal spaces produce great value for local and national economies and livelihoods, even at different levels of income and development. Moreover, Atlantic basin countries face shared challenges such as competing environmental and economic interests and climate change. Ultimately, the management of the Atlantic Basin is the shared responsibility of all Atlantic countries, and only when it is recognized as a common and shared resource will it be effectively and sustainably governed.

The information detailed in this report is the result of considerable effort to research and assess the management of marine resources and coastal livelihoods in the Atlantic countries. Several limitations made its considerably in terms of available information. Limited data availability, such as economic values of maritime sectors, made a strictly quantitative assessment infeasible and necessitated reliance on other information (i.e., the OHI) and methods (i.e., case studies) to conduct the assessment. Future work on the marine resource management and coastal livelihoods should seek to deepen the understanding and characterization of Atlantic Basin countries, their management of marine resources, and the impacts these have on coastal livelihoods. Research should additionally focus on identifying best practices for management approaches and cooperation between Atlantic countries, either bilaterally or multilaterally, in an effort to understand and support improved management. In addition, future efforts should be made to improve the information base for marine resources (e.g. Gross Value Added from maritime activities or valuation of ecosystem services in the Atlantic Basin) to support policies based on sound knowledge and understanding of socioeconomic activities.

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