

# SUSTAINABLE DEVELOPMENT LAW & POLICY



EXPLORING HOW TODAY'S DEVELOPMENT AFFECTS FUTURE GENERATIONS AROUND THE GLOBE

## IN THIS ISSUE: OCEAN AND FISHERIES LAW

- 1 | EDITORS' NOTE *by Kelly Rain and Maria Vanko*
- 2 | PROTECTING OUR OCEANS: NEW CHALLENGES, NEW SOLUTIONS *by David Freestone*
- 5 | REVIEWING THE UNITED NATIONS FISH STOCKS TREATY *by David A. Balton and Holly R. Koehler*
- 10 | UNSUSTAINABLE MARINE FISHERIES *by Daniel Pauly*
- 14 | CCAMLR AND ANTARCTIC KRILL: ECOSYSTEM MANAGEMENT AROUND THE GREAT WHITE CONTINENT *by Virginia Gascón and Rodolfo Werner*
- 17 | THE CONVENTION ON BIOLOGICAL DIVERSITY: MOVING FROM POLICY TO IMPLEMENTATION *by Marjo Vierros*
- 22 | THE LEGAL IMPLICATIONS OF CARBON CAPTURE AND STORAGE UNDER THE SEA *by Ray Purdy*
- 27 | ARE MARINE NATIONAL MONUMENTS BETTER THAN NATIONAL MARINE SANCTUARIES? U.S. OCEAN POLICY, MARINE PROTECTED AREAS, AND THE NORTHWEST HAWAIIAN ISLANDS *by Robin Kundis Craig*
- 32 | HOW TO PROTECT A CORAL REEF: THE PUBLIC TRUST DOCTRINE AND THE LAW OF THE SEA *by J.C. Sylvan*
- 38 | PORT STATE MEASURES TO COMBAT IUU FISHING: INTERNATIONAL AND REGIONAL DEVELOPMENTS *by Judith Swan*
- 45 | COASTAL AND PORT ENVIRONMENTS: INTERNATIONAL LEGAL AND POLICY RESPONSES TO REDUCE BALLAST WATER INTRODUCTIONS OF POTENTIALLY INVASIVE SPECIES *by Jeremy Firestone & James J. Corbett*
- 50 | OCEANS AND CLIMATE CHANGE: GLOBAL AND ARCTIC PERSPECTIVES *by Magdalena A.K. Muir*
- 56 | CASTING THE NET BROADLY: ECOSYSTEM-BASED MANAGEMENT BEYOND NATIONAL JURISDICTION *by Arlo H. Hemphill and George Shillinger*
- 60 | GLOBAL AQUACULTURE ALLIANCE ON BEST AQUACULTURE PRACTICES: AN INDUSTRY PREPARES FOR SUSTAINABLE GROWTH *by Daniel Lee and John Connelly*
- 64 | CASE STUDY: THE SUCCESS OF REGIONAL SOLUTIONS IN THE BALTIC *by Anne Christine Brusendorff*
- 67 | CONSERVING MARINE HABITATS *by Eric A. Bilsky*

<http://www.wcl.american.edu/org/sustainabledevelopment>

# EDITORS' NOTE

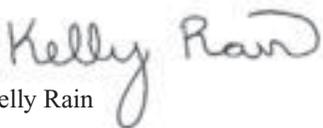
Recently, scientists predicted that if fishing continues at its current rate there could be a global collapse of all species currently fished by the middle of the century.<sup>1</sup> This dire prediction was coupled with a glimmer of hope—the current trend is still reversible.<sup>2</sup>

Disregarding the steady stream of new science demonstrating that our oceans are in trouble appears to be the trend of many governments and policy makers. However, ignorance is no longer an excuse and time is running out to repair our marine resources. While we can argue about what percent of fish stocks are being overfished and when the collapse of global fisheries may actually occur, the bottom-line is that marine resources are at risk and require intervention.

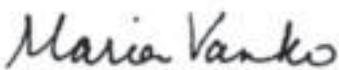
To reverse this catastrophic trend a number of legal and policy solutions must be implemented. Specifically, illegal fishing needs to be curtailed, marine pollution needs to be reduced, destructive fishing practices must be stopped, protection should be afforded to deep sea living resources, the high seas must cease being a global commons, and an effective regime for the conservation and management of international fish stocks needs to be created. Of utmost importance, compliance and enforcement must take center stage when exploring mechanisms to protect marine resources.

Countries have recognized these responsibilities through the creation of domestic regulations, as well as numerous regional and multinational agreements. The impact and effectiveness of these agreements has varied. For example, not enough has been done to protect straddling fish stocks. It is clear that developing new solutions for the gaps within the regulation of our oceans is required, and the utilization of international law is vital to meeting these challenges.

Education to prevent a catastrophic future of our marine resources is essential. Countries must make ocean conservation a priority and the public must understand the potential consequences if this does not properly occur. We hope that this issue of *Sustainable Development Law & Policy* contributes to this effort.



Kelly Rain



Maria Vanko  
EDITORS-IN-CHIEF

<sup>1</sup> Boris Worm, et al., *Impacts of Biodiversity Loss on Ocean Ecosystem Services*, *Science*, Nov. 3, 2006, at 787–790, available at <http://www.sciencemag.org/cgi/content/abstract/314/5800/787> (last visited Nov. 5, 2006).

<sup>2</sup> Worm, *id.*

## FEATURES:

- 13| INTERNATIONAL WHALING COMMISSION INDICATES POTENTIAL REVERSAL OF POLICY  
*by Athena Kennedy and Jon Feldon*
- 21| DRILLING DEEPER, DRILLING MORE  
*by Chris Stefan*
- 36| OIL AND WATER DON'T MIX: LEGAL REMEDIES FOR ENVIRONMENTAL WARTIME DESTRUCTION ON LEBANON'S MEDITERRANEAN COAST  
*by Abigail Okrent*
- 44| CHANGING TIDES: THE NEED FOR NEW LEGISLATION TO PREVENT ALGAE BLOOMS  
*by Marcel De Armas*
- 55| FISH FRIENDLY VINEYARDS: IS COOPERATIVE CONSERVATION ENOUGH?  
*by Christine Erickson*
- 63| ISLANDS OF GARBAGE CONTINUE TO GROW IN PACIFIC  
*by Ursula Kazarian*
- 71| LITIGATION UPDATE  
*by Michael K. Lee*
- 74| BOOK REVIEW  
*by Julie Yeagle*
- 76| WORLD NEWS  
*by Scott Johnson, Cari Shiffman, Daniel Winokur*
- 78| BIBLIOGRAPHY  
*Compiled by Catherine Verdier*

# PROTECTING OUR OCEANS: NEW CHALLENGES, NEW SOLUTIONS

## AN OVERVIEW OF THIS ISSUE

by David Freestone\*

### INTRODUCTION

Next year it will be a quarter of a century since the conclusion of the Third UN Conference on the Law of the Sea and the signing of the final text of the Convention (“LOSC”) in Montego Bay in December of 1982. These twenty-five years have not been plain sailing. Before the Convention could even come into force in 1994 a major “implementation” agreement had to be signed adjusting key provisions on the seabed régime and in 1995 a further implementation agreement, prompted by the 1992 UN Conference on Environment and Development, was concluded, relating to regulation of straddling and highly migratory fish stocks. Two major formal changes in

such a short time is not an auspicious record, especially to a Convention that had been hailed as the new “Constitution of the oceans.” Both changes however serve to show how quickly the ocean governance agenda has moved on in the intervening years.

For example, in the 1970s the mining of deep seabed manganese nodules was seen as an important new economic opportunity, hence the LOSC contains a complex governance structure under the International Seabed Authority. In 2006 however such mining seems unlikely to be commercially viable, while the more recent discovery of new deep-sea resources both living and non-living, present issues never envisaged by the LOSC drafters. Similarly, the seemingly insatiable demand for fish as well as for fossil fuels have pressed exploration and exploitation into distant and dangerous waters, posing threats to the integrity of ocean ecosystems and biodiversity and unprecedented challenges to the legal regime of the oceans. Innovative provisions in the LOSC recognize that states acting multilaterally or through “competent international organizations” can develop the LOSC regime further. Nevertheless, new solutions for the problems of regulation of our ocean space still need to be devised within the broader system of international law, which will allow us to meet these new challenges.

### CURRENT THREATS TO OUR OCEANS

Twenty-five years ago marine pollution was seen as the main threat to the oceans. Today pollution is still an important concern, but it is the future of the world’s fisheries resources which is center stage as a major concern for the international community. This concern is no longer simply an issue of the economic impact of the decrease of these resources but rising disquiet in scientific circles over the potential long-term significance of such depletion for marine ecosystems and biodiversity generally.

Modern industrial fishing practices often involve a high level of wastage including by-catch of non-commercial species. Despite unequivocal evidence of over-fishing and declining fish stocks, many coastal States continue to tolerate inefficient and destructive fishing practices. Even more disturbing is the level of illegal, unreported, and unregulated (“IUU”) fishing. IUU fishing can undermine even the best-intentioned management regime. Thus, serious efforts are being directed at curtailing IUU fishing, including improved enforcement mechanisms.

Sustainable Development Law & Policy (“SDLP”) is a publication of American University’s Washington College of Law (“WCL”). No portion of this publication may be reprinted without the express written permission of SDLP. The views expressed in SDLP are those of the authors and do not necessarily reflect those of the SDLP staff or WCL. All correspondence, reprinting, and article submissions may be sent to: SDLP, Washington College of Law, American University, 4801 Massachusetts Avenue, NW Suite 631, Washington, DC 20016. E-mail: [sdlp@wcl.american.edu](mailto:sdlp@wcl.american.edu). Phone: 202.274.4057. Current and back issues are available on our website, at <http://www.wcl.american.edu/org/sustainabledevelopment>. Please see the inside back cover for submissions and subscription information.

American University is an equal opportunity, affirmative action university.

#### EDITORIAL STAFF:

##### Editors-in-Chief

Kelly Rain, Maria Vankó

##### Managing Editor

Cari Shiffman

##### Senior Editorial Board

Athena Kennedy, Meryl Eschen Mills, Frank Pigott, Jennifer Rohleder, Ayako Sato, Matt Trumbull

##### Staff

Stephanie Atkinson, Daniel Brindis, John Cossa, Marcel De Armas, Andrew Elligers, Christy Erickson, Jon Feldon, Kevin Gallagher, Jane Garrido, Ernesto Gonzalez, Jessica Gordon, Salah Hussein, Scott Johnson, Ursula Kazarian, Blase Kornacki, Pierre Lancelin, Michael Lee, Chris McChesney, Abigail Okrent, Chiara Rocha, Rahul Saksena, JC Sylvan, Chris Stefan, Bridget Van Buren, Catherine Verdier, Lucy Wiggins, Mark Wilson, Daniel Winokur, Julie Yeagle

##### Advisory Board:

Daniel Bradlow, David Hunter, Kenneth Markowitz, David Newman, Marcos Orellana, William L. Thomas, Glenn Wiser, Durwood Zaelke

© Copyright Sustainable Development Law & Policy, 2006. All rights reserved.



\* David Freestone is the Deputy General Counsel, Advisory Services at The World Bank. The views expressed in this paper are the author’s and should not be taken to represent the views of the World Bank. He is most grateful to Kelly Rain without whose excellent help this paper would not have seen the light of day.

## ILLEGAL, UNREPORTED, AND UNREGULATED FISHING

The Food and Agriculture Organization (“FAO”) has recognized that its declared goal of sustainable utilization of world fishery resources is unobtainable under existing “open access” fishery regimes. Many international and regional fishery management organizations (“RFMOs”) lack the capability to monitor their stocks effectively, the structure to make strong science-based decisions on allowable catches, the powers to police the decisions that they make, or to enforce them against non-parties. However, such management decisions that RFMOs do take are consistently undermined by rogue vessels flagged to states that are not party to the treaty regimes or which simply disobey the rules. In June 2001, the FAO Council endorsed an International Plan of Action against IUU Fishing. It contains an extensive “toolkit” of actions that states can take against such vessels — but progress has been slow. In March this year the OECD Ministerially-led Task Force on IUU Fishing on the High Seas proposed a new action plan to address this “serious global problem” which undermines sustainable fishery efforts and robs the poorest states of more than \$1 billion worth of fish a year. The Action Plan aims to galvanize the political will in the international community necessary to take effective deterrent actions, many of which have already been agreed.

### THREATS TO BIODIVERSITY

Unsustainable bycatches of non-commercial species still pose a major threat to biodiversity, despite technological advances such as turtle excluder devices in shrimping nets and developments in longline-setting to avoid seabird catches. Nevertheless scientists are now warning that the sheer scale of fishing efforts as well as the targeting of high value, mostly pelagic, species is resulting in a reduction in the average size of many commercial species as well as fishing down the trophic levels — targeting smaller and less valuable species. A number of marine species may be close to commercial extinction. The unique litigation brought in 1999 by Australia and New Zealand against Japan over the valuable Southern Bluefin Tuna stocks highlights the important economic as well as ecological interests involved. Such case studies have led to the growing awareness in the international community that ocean fisheries will need to be managed as part of the larger ecosystem rather than, as at present, simply species-by-species.

These developments were not really envisaged by the LOSC. While Article 116 accepts certain limitations on the rights of all states for their nationals to fish on the high seas — they are not clearly articulated. It was the 1995 UN Fish Stocks Agreement that first proclaimed a general norm of ecosystem-based management of highly migratory and straddling fish

stocks accompanied by a requirement (in Article 6) that states take a precautionary approach — a concept that is an established tool of international environmental policy. There is still widespread confusion regarding what the precautionary approach actually entails. Often it involves the reverse of the normal burden of proof. Typically, the burden of proof would fall on those arguing for conservation to prove definitively that stocks are being threatened before conservation measures are put into place. However, with the precautionary approach, a number of stock management parameters are established *ab initio* and if these are exceeded, then conservation measures will automatically become applicable. Despite the well known opposition of the U.S. to the precautionary *principle* in international forums, many U.S. fisheries, such as the Alaskan Pollock Fishery, are in fact already using rigorous precautionary methodologies.

### EXPLOITING DEEP SEA FISHERIES

All these concerns come together when we look at the exploitation of deep sea living resources. Another lacuna in the LOSC is its inability to date to be able to regulate deep sea trawl fishing over deep ocean floor habitats designed to exploit species such as orange roughy and tooth fish. Orange roughy (*hoplostethus atlanticus*), for example, was originally named “Slimehead.” Discovered in the deep waters off New Zealand in the 1970s, it was quickly renamed “orange roughy” to become more commercially appealing. This species was heavily fished before it became known that it has characteristics that make it innately vulnerable to overexploitation: it does not reach sexual maturity until about

30 years old, it can live to 150, and does not breed every year. Scientists know little about them except that catches have dropped vertiginously after sustained exploitation, raising fears that they face extinction without some form of strict regulatory regime.

Another example of the dangers of overexploiting the deep seas can be found in the unique ecosystems surrounding deep-sea hydrothermal vents, known as black smokers. Black smokers support extraordinary ecosystems that are the only communities currently known on earth whose immediate energy source is not sunlight. These vents teem with a fascinating array of life that can withstand extremely high temperatures. Studying the biodiversity of these vents has other promising technological applications, such as improving heat resistant clothing for firefighters. These unique ecosystems exist outside national waters, and to date there is no agreement on ways in which they and other important high seas ocean areas, such as seamounts on which deep-sea species often spawn, can be legally protected. Without some form of effective international legal protection we face the possibility that these unique ecosystems could be destroyed before we have had the chance to study them.

---

Many coastal States  
continue to tolerate  
inefficient and destructive  
fishing practices.

---

## EXOTIC SPECIES: THE BALLAST WATER CONVENTION

Invasive aquatic species can have devastating economic, environmental, and public health impacts. Although all the world oceans are linked, many species function in localized ecosystems that have evolved natural controls. The transfer of species to a different marine environment can have disastrous outcomes. A vivid example can be found in the Black Sea where the accumulated biomass of a jellyfish-like species (*mnemiopsis leidyi*), introduced from North America through tanker ballast water, was in 2000 reported to be ten times the world's annual global fish catch. This form of impact of shipping was never envisaged in 1982, and has required a customized response through the 2004 International Convention for the Control and Management of Ships' Ballast Water and Sediments. Yet to enter into force, it envisages the introduction of mandatory ballast water management from 2009, but no later than 2016, in order to eliminate the common practice of vessels loading and discharging untreated ballast water.

### NEW SOLUTIONS: A CALL FOR A HOLISTIC MARINE AGREEMENT

The current need is for the international community to develop an *effective* regime for the conservation and management of international fish stocks, particularly in areas beyond national jurisdiction. The 1995 UN Fish Stocks Agreement, which introduced important new concepts into the Law of the Sea regime, was the result of a two year negotiating process stimulated by the 1992 UN Conference on Environment and Development. It is styled as an "Implementation Agreement."

Members of the international community are now proposing a new Implementation Agreement. In July 2006, Joe Borg, the European Commissioner for Fisheries and Maritime Affairs, addressing the 30th Virginia Law of the Sea Conference in Dublin, outlined the aim of the June 2006 EU Green Paper. The publication of the Green Paper launched a one-year consultation on the European Union's relations with the oceans and seas. The underlying idea is to develop a comprehensive maritime policy aimed at enhancing Europe's maritime economy in a sustainable manner. However, as Mr. Borg stressed, the EU will press in the UN for a new "implementation agreement . . . regarding the protection of marine biodiversity in areas beyond national jurisdiction."

One issue directly related to a holistic approach to the conservation of marine diversity is the specific issue of compliance and enforcement. Under LOSC mechanisms, enforcement of obligations is predicated on two fundamental forms of jurisdic-

tion—flag State and coastal State jurisdiction. However the LOSC does in certain situations recognize the jurisdiction of port states. Another approach to improved compliance and enforcement of fishery and other natural resource regimes is to harness more centrally the potential of port State control ("PSC"). PSC is the logical choice for verifying whether visiting ships comply with certain types of international or national standards, or if they have engaged in certain types of behavior in the port State's own maritime zones and in the maritime zones of other States or in the high seas. Although it is a sensitive issue, we are witnessing a gradual broadening of the scope and rights of port State jurisdiction: initially to further the interests of the international community by ensuring safety at sea, but increasingly for wider environmental and natural resource conservation and management issues.

### CONCLUSION: OVERVIEW OF THIS ISSUE

Many of the current controversies raised above are addressed in more detail in this issue of *Sustainable Development Law & Policy*. David Balton and Holly Koehler explore the

impacts and effectiveness of the UN Fish Stocks Agreement particularly in relation to the need to impose increasingly strict obligations on States to prevent damage to sea areas outside national jurisdiction. Recognizing the importance of ecosystem-based management is vital as many aquatic species near extinction: Virginia Gascón and Rodolfo Werner explain the status of the ecosystem-based management of Antarctic krill under the Commission for the Conservation of Antarctic Marine Living Resources. The absence of

coherent regulations to steward fishery resources and the intensified global attention to the pivotal role of the port State in combating IUU fishing is explored by Judith Swan. Ray Purdy discusses the legal implications of carbon capture and storage under the seas. Magdalena Muir discusses oceans and climate change science and policy issues at a global and Arctic level. A criticism of aquaculture as an answer to resources management is presented by Daniel Pauly, who argues that fishing subsidies need to be cut and that we must essentially withdraw from the ocean to rebuild overexploited ecosystems. Eric Bilsky looks to the Magnuson-Stevens Act as a means to direct regional fishery management councils to protect essential fish habitat. Jeremy Firestone and James Corbett present ecological and economic problems related to ballast water's introduction of non-native invasive species into ecosystems. Industry-driven sustainability initiatives are explored by John Connelly and Daniel Lee, who present an overview of sustainable fisheries management guidelines and certification practices. Additionally, various other pressing topics are explored within this issue.

---

Many international and regional fishery management organization lack the capability to monitor their stocks effectively.

---

# REVIEWING THE UNITED NATIONS FISH STOCKS TREATY

By David A. Balton and Holly R. Koehler\*

## INTRODUCTION

Like a number of key stocks of fish in the world's oceans, good news on the subject of international fisheries has become less plentiful. The international community has grappled for years with growing concern over the state of the marine environment, particularly the health of living marine resources and their habitats. The conservation and management of fish stocks whose ranges extend across the lines that separate ocean areas under national jurisdiction and the high seas pose particular challenges. Without cooperation among nations, there can be no effective regulation of such resources, including for so-called "straddling fish stocks" and "highly migratory fish stocks."<sup>1</sup>

In an effort to address these concerns, the United Nations adopted the UN Fish Stocks Agreement ("UNFSA") in 1995.<sup>2</sup> Together with the United Nations Food and Agriculture Organization's ("FAO") Code of Conduct for Responsible Fisheries<sup>3</sup> and the High Seas Fishing Compliance Agreement,<sup>4</sup> the UNFSA has established robust international principles and standards at the global level for the regulation of ocean fisheries. The UNFSA entered into force in 2001 and now has 61 States Parties. But how well is it working? How much impact is it having? What more can be done to strengthen its implementation?

The States Parties to the UNFSA and other interested participants met recently at the United Nations to answer these questions. This article will summarize the outcomes of the UNFSA Review Conference and will consider the prospects for this vital treaty in dealing with marine fisheries.

## THE REVIEW CONFERENCE PROCESS

Article 36 of the UNFSA provides that within four years of the entry into force of the Agreement a conference would be convened to review and assess the adequacy of the Agreement in securing the conservation and management of straddling fish stocks and highly migratory fish stocks, and to propose means of strengthening its implementation.<sup>5</sup> This Review Conference took place at the United Nations in New York from May 22–26, 2006. In preparation for the Conference, a fifth round of informal consultations of States Parties to the Agreement ("ICSPs") was held.<sup>6</sup> During this fifth ICSP, two major and inter-related sentiments emerged that would shape the tenor and structure of the upcoming Review Conference: (1) that the review should be robust, balanced, and result in outcomes based on a rigorous assessment; and (2) that the Review Conference should consider and try to address certain persistent concerns expressed by non-parties regarding particular aspects of the Agreement.<sup>7</sup>

On the first point, many participants in the fifth ICSP, partic-

ularly States Parties to the Agreement, insisted that the Review Conference proceed in a structured and focused manner. These Parties were concerned that a haphazard review of the Agreement would be counterproductive, yielding overly negative results that unfairly blame the continued problems facing international fisheries on deficiencies in an agreement that had entered into force only four years earlier. Participants also worried that an unstructured or unbalanced review would open the door to premature proposals to amend the Agreement.<sup>8</sup> As a result, the fifth ICSP developed a program of work for the Conference that laid out how the review and assessment component of the meeting would be organized.<sup>9</sup> To facilitate that process, it also identified a series of framework questions and elements.<sup>10</sup>

The second issue — the concerns of non-parties — emerged several months earlier during the negotiation of the annual UN General Assembly resolution on sustainable fisheries.<sup>11</sup> There, several non-parties to the UNFSA argued that they should be able to participate in the Review Conference process on an equal footing with States Parties. A debate on this point took center stage in the fifth ICSP, which had the mandate to prepare the rules of procedure for the Review Conference. Views on this issue quickly became polarized. Many non-parties considered the Review Conference to be a United Nations meeting in which all UN members had equal standing.<sup>12</sup> Virtually all States Parties, by contrast, saw the Review Conference as a meeting of Parties to the Agreement: where others may also be invited, but in which only States Parties had the ultimate say on matters involving the implementation of a treaty to which only States Parties are legally bound. States Parties were also concerned with the public calls by some non-parties to either amend or reinterpret certain provisions of the Agreement in order to satisfy their specific concerns.<sup>13</sup> These competing concerns shaped the discussions at the Review Conference, the work of its drafting committee, and the subsequent Conference results.

The United States played a leadership role in the Review Conference, providing a positive and constructive mediating presence. The United States chaired the Conference, as well as the fifth ICSP and several other small informal working groups during the preparatory phase. The United States also led efforts

---

\* David A. Balton is the Deputy Assistant Secretary for Oceans and Fisheries at the U.S. Department of State. He also served as President of the UN Fish Stocks Agreement Review Conference. Holly R. Koehler is a Foreign Affairs Officer in the Office of Marine Conservation at the U.S. Department of State. She also served on the U.S. Delegation to the Review Conference. The views expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Department of State or of the U.S. Government generally.

to craft compromises on a number of difficult issues, such as the rules of procedure and further reviews of the UNFSA.

As a result of the discussions at the fifth ICSP, the Review Conference adopted a process to review and assess the adequacy of the provisions of the Agreement and to propose means to strengthen their implementation. To facilitate this process, the fifth ICSP organized the assessment into four general cluster areas, each based on the parts of the UNFSA: (1) Conservation and management of stocks; (2) Mechanisms for international cooperation; (3) Monitoring, control and surveillance, compliance and enforcement; and (4) Developing states parties and non-parties.

The following section will examine the major themes that emerged from the review and assessment of each cluster area, and will highlight recommendations made to strengthen the implementation of the Agreement.<sup>14</sup>

### RESULTS OF THE REVIEW CONFERENCE<sup>15</sup>

The Conference first reviewed progress made by States and regional fisheries management organizations and arrangements (“RFMOs”) in conserving and managing highly migratory stocks and straddling fish stocks. While progress has been made in this area since the adoption of UNFSA, more must be done to strengthen and reinforce conservation and management measures. According to the FAO, nearly 30 percent of the stocks of highly migratory tuna and tuna-like species and nearly two-thirds of the straddling fish stocks and the stocks of other high-seas fishery resources are overexploited or depleted. In light of this information, the Conference called for greater reliance on the precautionary approach to manage fisheries in accordance with the best available scientific information.<sup>16</sup> The Conference found that timely and accurate data collection remains a challenge and that the lack of good data undermines scientific advice and sound management decisions. The Conference called for the elimination of fishing subsidies that result in over-fishing and illegal, unreported, and unregulated (“IUU”) fishing activities.<sup>17</sup> The Conference also acknowledged that two new RFMOs had been developed since the adoption of the UNFSA, with negotiations underway for a third in the South Pacific. However, a number of developing States reported that the costs associated with participating in RFMOs can be prohibitively high.<sup>18</sup>

Second, in the area of international cooperation, the Conference emphasized the importance of RFMOs in the conservation and management of highly migratory and straddling fish stocks. While progress has been made to strengthen the mandates of RFMOs, particularly with respect to compliance and enforcement, member States of these regional management organiza-

tions must do much more to modernize the functions of the RFMOs and to enhance their performance. RFMOs are adopting a range of measures to cooperate in the conservation and management of stocks under their purview, particularly in dealing with IUU fishing. These measures include the establishment of positive and negative vessel lists, market-related measures, catch and trade documentation schemes, port control measures, satellite vessel monitoring systems, and regulations for transshipment.<sup>19</sup> However gaps in RFMO coverage remain, both geographically and with respect to the fisheries covered.<sup>20</sup>

Third, in the monitoring, control and surveillance, and compliance and enforcement cluster area, the Conference noted that both States and RFMOs have taken significant strides but, once again, more work needs to be done by RFMOs and States that

either authorize vessels to fish on the high seas or provide ports and markets for fish and fish products. The Conference further recognized that significant levels of IUU fishing continue to occur due to ineffective control over vessels, inadequate investigations of violations and levels of penalties imposed, a lack of enforcement capacity in developing countries, the porous nature of some port State control systems, and insufficient cooperation and coordination among States and RFMOs.

Finally, with regard to developing States and non-parties, the Conference underscored the importance of the Agreement in achieving sustainable fisheries, but also emphasized the need to encourage additional States to adhere to the Agreement. The Conference further recognized that developing States require assistance to fulfill their obligations under the Agreement. To participate effectively in RFMOs and implement conservation and management measures domestically, developing States need assistance in the areas of human resource development, training, technology transfer, scientific stock assessment and research, and implementing compliance and enforcement measures. In addition, with respect to broadening participation in the Agreement, several non-parties identified certain concerns they have with provisions of the Agreement itself, specifically Articles 7, 21, 22, and 23, that they view as obstacles to their becoming a party.

The Review Conference agreed on a comprehensive set of recommendations in each cluster area that called upon States, RFMOs, and technical bodies of the United Nations to undertake certain actions and initiatives to strengthen the substance and methods of implementation of the Agreement. The recommendations in each area serve to focus attention on particular implementation needs, such as the enhanced use of science in decision-making, increased cooperation among States and

---

*The UNFSA has established robust international principles and standards at the global level for the regulation of ocean fisheries.*

---



Sebastes in Alaska waters.

organizations, the incorporation of ecosystem considerations into fisheries management, strengthened control over vessels, companies, and nationals that engage in IUU fishing activities, better and more timely collection and sharing of fisheries data, the modernization of RFMOs to include new principles and practices of international fisheries conservation and management, and further provision of assistance to developing countries.

Many of the Conference recommendations built upon other recent calls to action, such as by the UN General Assembly and FAO. However, there are several distinct recommendations from the Conference that define this meeting as taking a step forward to address ongoing problems with international fisheries management. These recommendations include commitments to:

- establish new RFMOs where none exist and to agree on interim management measures until such organizations are established;
- urgently reduce the capacity of the world's fishing fleets to sustainable levels by establishing targets and plans for ongoing assessments;
- strengthen data collection and reporting, including through regular audits of compliance with such obligations;
- initiate negotiations through the FAO to develop a legally binding instrument on port State measures;
- undertake performance reviews of RFMOs based on transparent criteria, which would include some element of independent evaluation, and make these reviews publicly available;
- adopt stringent measures to regulate transshipment, particularly at sea; and
- develop processes to assess the performance of States in implementing their obligations regarding their fishing vessels (*i.e.*, flag State duties).

## PROSPECTS FOR THE UNFSA

Perhaps most significantly, the Review Conference revealed widespread support for the UNFSA as the preeminent instrument in the field of international fisheries management. This reflects a considerable improvement in overall attitudes toward the treaty. At the time of its adoption in 1995, and even as it entered into force in 2001, a number of influential governments continued to express doubts about the UNFSA. Their concerns focused particularly on several of its innovative provisions, such as the precautionary approach to fisheries management, the requirement that management measures be compatible throughout the range of a fish stock, and certain enforcement rules. By contrast, virtually all governments represented at the Review Conference — even those not yet party to the UNFSA — indicated their acceptance of the treaty as an expression of basic standards for the management of ocean fisheries.

One telling example of these changing attitudes toward the UNFSA was the general willingness of the Parties to expand its scope for use in the management of fisheries for other categories of stocks. The UNFSA, by its terms, applies only to the conservation and management of two select categories of fisheries, namely, fisheries for “straddling fish stocks” and for “highly migratory fish stocks.” The participants in the Review Conference nevertheless “encouraged States, as appropriate, to recognize that the general principles of the Agreement should also apply to fisheries for discrete fish stocks on the high seas,” — *i.e.*, those stocks of fish that occur solely on the high seas.

The growing number of States Parties to the UNFSA provides further evidence of increasing support for this treaty. At the time of the Review Conference in May 2006, the UNFSA had 57 States Parties, including most States with significant interests in international fisheries.<sup>21</sup> Some 14 non-Parties also announced or reaffirmed their intention to adhere to the treaty in the near future. Four of those (Trinidad and Tobago, Slovenia, Estonia, and Japan) have become States Parties in the few months since the end of the Review Conference.<sup>22</sup>

Additionally, many States — both parties and non-parties to the UNFSA — have begun to incorporate its provisions into their domestic laws and regulations. Many States are now requiring fishing vessels to observe all relevant fishing rules before authorizing them to fish on the high seas. Some nations have also begun to contribute funds and other resources to assist developing countries in the implementation of the UNFSA, with the goals of improving fisheries management within the vast areas under the jurisdiction of developing States and of monitoring the high seas fishing operations of vessels that fly the flags of developing States.

Similarly, most of the RFMOs created to regulate fisheries for straddling or highly migratory fish stocks have incorporated key provisions of the UNFSA into their charters or regulatory schemes. Some other long-standing RFMOs, including the Inter-

American Tropical Tuna Commission and the General Fisheries Commission for the Mediterranean, have revised their charters to incorporate provisions of the UNFSA. Other RFMOs may soon follow this trend. For example, the Northwest Atlantic Fisheries Organization embarked on an ambitious reassessment of its founding treaty and may incorporate elements of UNFSA. Finally, the UNFSA has become the point of departure for negotiations to establish new RFMOs, including the Western and Central Pacific Fisheries Commission, the Southeast Atlantic Fisheries Organization, and the South West Indian Ocean Fisheries Commission.

However, daunting challenges to full implementation of the UNFSA certainly remain. The treaty still does not enjoy universal — or even near-universal — adherence. Several nations with major fishing fleets, including the People’s Republic of China, the Republic of Korea, Indonesia, and many Latin American and African countries, remain outside the circle of States Parties. The recent ratification by Japan may prompt some of those nations to adhere, but this is not certain by any means. Both parties and non-parties struggle to collect and analyze the scientific and fisheries data necessary to support sound management decisions, and to secure the resources necessary to monitor fishing activities.

As noted above, some non-parties took the occasion of the Review Conference to reiterate long-held concerns about particular aspects of the UNFSA that, in their view, remain obstacles to their adherence. For some non-parties, the principal issue arises from Articles 21 and 22 of the treaty. These provisions authorize fisheries enforcement personnel from States Parties under limited circumstances to board and inspect high seas fishing vessels of other States Parties to monitor for compliance with regionally agreed fishing rules. Some non-parties voiced concern that these provisions unduly undermine the basic rule of exclusive flag State jurisdiction over fishing vessels on the high seas. Other non-parties feared that the authority to board and inspect high seas fishing vessels could be abused; *e.g.*, to interfere with the legitimate fishing activities of a competing fishing fleet.

Some non-parties are also concerned about preserving the privileges of coastal States. These non-parties called for assurances that Article 7 of the UNFSA, which requires that measures for a fish stock be compatible throughout the range of that stock, be implemented in ways that preserve the exclusive jurisdiction of coastal States to manage fisheries within waters under their jurisdiction. Despite the lack of evidence that implementation of Article 7 has undermined coastal State prerogatives, the issue remains a sensitive point for some nations.

The problems confronting the UNFSA and its supporters unfortunately go much deeper than the concerns voiced by some non-parties. Four major challenges confront effective management of ocean fisheries; each obstacle is discussed below.

## OVERFISHING AND OVERCAPACITY

Too many ocean fisheries suffer from overfishing and excess fishing capacity, despite requirements in the UNFSA and other international instruments to deal with these phenomena. The FAO statistics on the poor status of marine fish stocks, including many straddling stocks and highly migratory stocks, cannot be ignored. Efforts to cap and reduce excess fishing capacity and to eliminate subsidies that contribute to overcapacity and overfishing have met with limited success. Though many governments (and industry representatives) recognize the general need to end overcapacity, few have been willing to make the sacrifices necessary to achieve it.

## IUU FISHING

Despite sustained efforts on many levels to combat IUU fishing, such activities persist, and may even be growing in some regions and fisheries. As key stocks dwindle, the potential profits available to cheaters can increase. The difficulty of monitoring fishing operations far from shore, particularly in high seas areas and areas under the jurisdiction of developing countries, exacerbates the situation. Governments, individually and collectively, are trying to deal with this classic “free rider” problem by improving monitoring, control and surveillance of fishing operations at sea and in port (during landing and transshipment), by reducing market access to illegally caught fish, and by stiffening penalties imposed on violators. However, as the Review Conference acknowledged, much more needs to be done.

## ECOSYSTEM CONCERNS

Overfishing can deplete both the stocks that are the target of the fisheries as well as populations of species that are associated with, or dependent on, the target stocks. Some tuna fisheries, for example, result in significant accidental catch of seabirds and sea turtles, although States and RFMOs are introducing measures to mitigate such “bycatch.” The catch of many sharks, either as targets of fisheries or as bycatch, is poorly regulated. Some fishing methods can also harm sensitive areas of the ocean floor, for example where sponge fields or corals live, or in the vicinity of some seamounts. The UNFSA sparked a concerted effort to implement an “ecosystem approach to fisheries management.” Because implementing this approach requires considerable scientific research necessary to understand the marine environment,

---

*The Conference emphasized the importance of RFMOs in the conservation and management of highly migratory and straddling fish stocks.*

---

which is difficult and costly for nations with even the most sophisticated fisheries management systems, this approach remains far from being fully realized.<sup>23</sup>

### LACK OF CAPACITY AMONG DEVELOPING STATES

The majority of nations that lack sophisticated fisheries management systems — including most developing States — cannot yet implement the UNFSA completely. They lack not only financial resources, but also the technical know-how, human resources, and infrastructure necessary to conduct proper stock assessments, develop and implement management measures, monitor fisheries for compliance, and impose penalties on violators. In the pursuit of economic development, a number of developing States (and some developed States) allow high seas fishing vessels to fly their flags without any meaningful ability or intention to control the operations of those vessels.

### POLICY RECOMMENDATIONS FROM THE REVIEW CONFERENCE

Although these challenges are daunting, the Review Conference reaffirmed the commitment of nations to tackle them, including through some of the specific undertakings described below.

One recommendation to emerge from the Review Conference starts from the recognition that the best vehicles for regulating fisheries for straddling fish stocks and highly migratory fish stocks are the RFMOs. Unfortunately, the performance of the various RFMOs in fulfilling the responsibilities set forth in both their own charters and in other instruments, such as the UNFSA, has been uneven. The Review Conference recommended that RFMOs be subject to a systematic performance review. If such reviews were thorough and candid, they could, for example, create a “report card” revealing those areas in which each RFMO

needed to improve its effectiveness.

The Review Conference also developed some stronger commitments to redress the overcapacity problem and to crack down on IUU fishing. In particular, the Review Conference called for greater coordination of measures across ocean regions and among two or more RFMOs. One opportunity to make progress on this front will occur in January 2007, when Japan will host the first-ever meeting of the five RFMOs that regulate fisheries for highly migratory stocks.<sup>24</sup>

Finally, the Review Conference gave rise to new commitments to assist developing States Parties in the implementation of the UNFSA. A number of vehicles for transmitting such assistance exist, including a trust fund established by the States Parties pursuant to Part VII of the treaty, which is jointly administered by the United Nations and the FAO. The FAO also maintains other assistance programs in this field, as does the World Bank and other international financial institutions,

and some of the RFMOs. A number of developed States provide additional assistance for fisheries management directly to developing States.

### CONCLUSION

The Review Conference brought the UNFSA to the attention of governments, international organizations, and a large number of non-governmental stakeholders that participated in the process. The very attention the treaty received during the preparatory meetings and at the Review Conference has catalyzed action to improve its implementation. In that regard, a notable outcome of the Review Conference was to keep the treaty under review, through both annual informal consultations at the United Nations and a resumption of the formal Review Conference no later than 2011.



---

*Too many ocean fisheries suffer from overfishing and excess fishing capacity, despite requirements in the UNFSA.*

---

## Endnotes: Fish Stocks Treaty Law

<sup>1</sup> Though not clearly defined in international law, a “straddling fish stock” is commonly understood to mean a stock of fish referred to in Article 63(2) of the 1982 United Nations Convention on the Law of the Sea (“UNLOS”), namely, a “stock or stocks of associated species [that] occur both within the exclusive economic zone (“EEZ”) and in an area beyond and adjacent to the zone.” Examples include cod and other demersal fish stocks in the Northwest Atlantic Ocean. “Highly migratory fish stocks” also occur both within and beyond the EEZ, but are distinguished from straddling stocks by the vast distances they typically migrate. Annex I to the 1982 Convention lists highly migratory species, both fish (such as tunas and swordfish) and certain non-fish (such as whales and other cetaceans). See United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397.

<sup>2</sup> United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks, July 24–Aug. 4, 1995, *Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10*

*December Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks*, U.N. DOCA/Conf. 164/37 [hereinafter UNFSA].

<sup>3</sup> Food and Agriculture Organization of the United Nations, Code of Conduct for Responsible Fisheries, available at <http://www.fao.org/DOCREP/005/v9878e/v9878e00.htm> (last visited Sept. 11, 2006).

<sup>4</sup> Food and Agriculture Organization of the United Nations, Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, available at [www.fao.org/DOCREP/MEETING/003/X3130m/X3130E00.HTM](http://www.fao.org/DOCREP/MEETING/003/X3130m/X3130E00.HTM) (last visited Sept. 11, 2006).

<sup>5</sup> UNFSA, *supra* note 2.

<sup>6</sup> These informal consultations have met annually since 2002 to discuss issues related to the implementation of the Agreement. See Overview, Conventions

# UNSUSTAINABLE MARINE FISHERIES

by Daniel Pauly\*

## INTRODUCTION

Many have long assumed that the expanse and mysterious depths of the world's oceans contain vast living resources, ready to be exploited in the ways that its more familiar coastal fringes have. This assumption is very wrong. Of the 362 million square kilometers of ocean on this planet, only 7.5 percent — the continental shelves — are shallower than 200 meters (“m”), and some of this shelf area is covered by ice. Shelves and the adjacent slopes, reaching down to 500 m, generate the bulk of the biological production supporting global fish catches, the rest consisting of tuna and other oceanic organisms, which gather their food from the vast, desert-like expanse of the open oceans.<sup>1</sup>

As a result of legislation in the 1980s, continental shelves are contained mostly within the exclusive economic zones (“EEZ”) of maritime countries.

According to the United Nations Law of the Sea, any country that cannot fully use the fish resources within its economic zone must make this surplus available to the fleets of other countries.<sup>2</sup> This, along with eagerness for foreign exchange, political pressure, and illegal fishing, has led to the trawling of all the world's continental shelves for bottom fish, the use of purse-seines for open-water fishes, and the illumination of the shelves to attract and catch squids.<sup>3</sup>

Perhaps the strongest factor behind these overgrown and often destructive fisheries, and their tacit support by the public at large, is the notion that, somehow, the oceans will yield what we need, simply because we need it. Indeed, demand projections for fish generated by national and international agencies largely reflect present consumption patterns, which the oceans ought to help us maintain, even as the global human population — and our taste for seafood — keeps growing. While much of the deep ocean is unexplored and mysterious, we know enough about ocean processes to realize that its productive capacity cannot keep up with an ever-increasing demand for fish.<sup>4</sup>

Global fish catches began to decline in the late 1980s,<sup>5</sup> and extrapolation of present trends suggests that large-scale fisheries throughout the world will collapse in a few decades, inducing losses that aquaculture cannot be expected to compensate.<sup>6</sup>

## HISTORIC ANTECEDENT

While fisheries<sup>7</sup> and localized overexploitation have occurred for millennia,<sup>8</sup> the massive impact of fishing on ocean ecosystems began only in the early nineteenth century, when English steam trawlers began to land their catches.<sup>9</sup> These trawlers were soon rendered more effective by power winches and, following World War I, diesel engines. The aftermath of World War II added other peacetime dividends to the industrialization of fishing: freezer trawlers, radar, and acoustic fish finders. The fleets of the Northern hemisphere were ready to take on the world, and they did, with help from American, Russian, and Japanese distant-water fleets.

Fisheries science had progressed as well: the two world wars showed that exploited fish populations (e.g., those of the heavily

mined North Sea) would bounce back when released from fishing pressure.<sup>10</sup> This prompted models of single-species fish populations whose size is affected only by fishing pressure.<sup>11</sup> The main point of these models, still very much in use (though in strongly modified forms), is that adjusting fishing efforts to some optimum level leads to a “maximum sustainable” yield, a notion that the fishing industry and the regulatory agencies eagerly adopted — if only in theory.<sup>12</sup>

In practice, the fishing industry rarely implemented optimum effort levels. Rather, fisheries simply moved once a stock was over-fished, gradually fishing in deeper waters and remote seamounts.<sup>13</sup> Fisheries were even moved to the then-untapped resources of West Africa, Southeast Asia, as well as other low-latitude and southern hemispheric regions.<sup>14</sup>

---

*Perhaps the strongest factor behind these overgrown and often destructive fisheries is the notion that, somehow, the oceans will yield what we need, simply because we need it.*

---

\* Dr. Daniel Pauly is a Professor of Fisheries and Director of the Fisheries Centre at the University of British Columbia, Vancouver, Canada. Since 1999, he has been the Principal Investigator of the Sea Around Us Project, funded by the Pew Charitable Trusts, located in Philadelphia and devoted to studying the impact of fisheries on the world's marine ecosystems ([www.seaaroundus.org](http://www.seaaroundus.org)). The concepts, methods and software he co-developed have been documented in over 500 publications, and are used throughout the world. Especially widely-applied is the Ecopath modeling approach and software ([www.ecopath.org](http://www.ecopath.org)) and FishBase, the online encyclopedia of fishes ([www.fishbase.org](http://www.fishbase.org)). This article is adapted from Daniel Pauly et al., *Towards Sustainability in World Fisheries*, 418 NATURE 689 (2002).

Throughout the 1950s and 1960s, this massive increase of global fishing efforts led to increases in catches, which masked local stock collapses, and which was so rapid that the catches exceeded the world population growth, causing an entire generation of managers and politicians to believe that launching more boats would automatically lead to higher catches.<sup>15</sup>

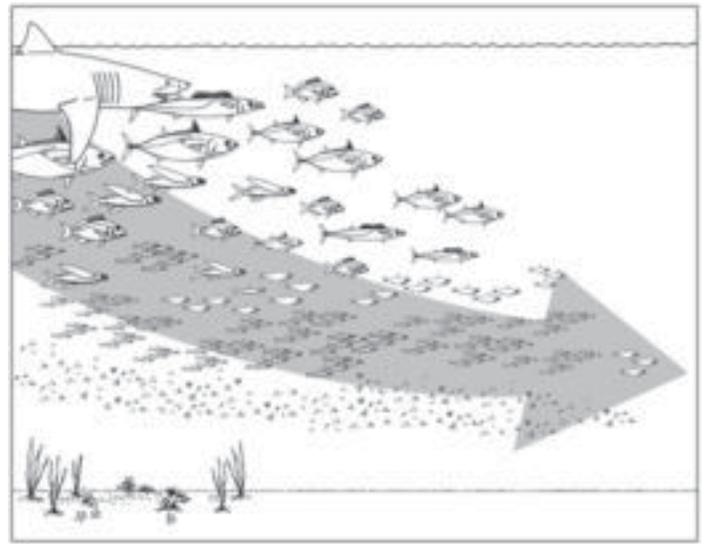
The Peruvian anchovy collapse, from 1971 through 1972, was the first fishery collapse with global repercussions. Though the El Niño event is often perceived as causing the collapse, much of the available evidence, such as the actual catches (about 18 million metric tons,<sup>16</sup> exceeding the officially reported catch by six million tons), suggests that overfishing should be implicated as well. Attributing the collapse of the Peruvian anchovy entirely to environmental effects allowed business as usual to continue, and in the mid-1970s, this led to the beginning of a decline in total catches from the North Atlantic.<sup>17</sup> This declining trend accelerated in the late 1980s and early 1990s when most of the cod stocks off New England and Eastern Canada collapsed,<sup>18</sup> ending fishing traditions reaching back for centuries. In 1996, the United Nations Food and Agriculture Organization published a chronicle of global fisheries<sup>19</sup> that showed that a rapidly increasing fraction of world catches originate from stocks that are over-fished, *i.e.*, that the collapse of the New England and eastern Canadian cod stock was only one of a multitude of other, smaller, and little-noticed collapses.

### EFFECTS ON MARINE SPECIES DIVERSITY

The major, direct environmental impact of fishing is that it reduces the abundance of the species it targets. It is a frequent assumption that fishing does not impose any direct threat of species extinction since marine fish generally are very fecund and the ocean expanse is wide. However, recent decades have witnessed a growing awareness that fish cannot only be severely over-fished, but could also be threatened with extinction through overexploitation.<sup>20</sup> Fisheries may also change the evolutionary characteristics of populations by selectively removing the larger, fast-growing individuals. It is not yet known whether these changes in the genetic constitution of species are reversible.<sup>21</sup>

Also worrisome is a phenomenon known as “fishing down marine food webs.”<sup>22</sup> Most food fishes are high on the food chain — whether sardines feeding on zooplankton, cod feeding on bottom invertebrates, including shrimps, or tuna feeding on small oceanic fishes. When the top predators are fished out, we turn to their prey. For example, herring and shrimps in place of cod. Studies have indicated that there is a steady, global decline in the trophic level, or position on the food chain, of global fishery catches.<sup>23</sup> This implies the gradual extirpation of large, long-lived fishes from the ecosystems of the world’s oceans, and, as well, the destruction of many animal communities of the sea floor (see Figure 1).

Many argue that fishing down marine food webs is both good and unavoidable, given a growing demand for fish.<sup>24</sup> Also, the initial ecosystem response to “fishing down” may be a release of predation and lead to increased catches of low trophic level fishes. Indeed, the Japanese whaling industry insists that removing whales from marine ecosystems would make large



**Figure 1.** Schematic representation of the process now widely known as ‘fishing marine food webs,’ wherein a fishery, at the onset, targets the larger fish at the top of marine food webs, then, as these get scarce, targets the smaller species that often are the food of larger fishes. In the process, ground trawling eliminates the animal communities at the bottom of the sea, which feed on suspended organisms. Hence, in the last stage of ‘fishing down,’ the waters are dominated by microbial processes, toxic algal blooms and jellyfish.

amount of prey species available to fisheries.<sup>25</sup> In the author’s opinion, this would not be the case. Such effects are rarely observed in marine ecosystems, mainly because they do not function as would a number of unconnected food chains. Rather, these ecosystems consist of reticulated food webs, where a predator may have a direct negative impact on a prey and a positive effect by also consuming other predators and competitors of the prey.<sup>26</sup> Removing predators does not necessarily lead to an increased availability of prey for humans. Rather it leads to increases or outbursts of previously suppressed species, often invertebrates (*e.g.*, jellyfish).<sup>27</sup> Some of these species are exploitable, some are not, and some are outright noxious.<sup>28</sup>

Even more devastating impacts result from fishing technologies that fail to account for ecosystem processes.<sup>29</sup> Though odd in retrospect, bottom trawling, a process of dragging heavy, chain-studded gear through the animal communities on the sea floor, was once believed to have little, or even beneficial, impacts on the sea bottom that it “ploughed.” Recent research shows that the plowing analogy is inappropriate, and that if an analogy is required, it should be that of clear-cutting forests.<sup>30</sup> The productivity of the sea floor organisms, many of which are at the base of marine food webs, is seriously impacted by bottom trawling, as is the survival of juvenile fish who feed on them.<sup>31</sup> Due to the extensive coverage of the shelf ecosystems of the world by this form of fishing, bottom fish throughout the world have tended to decline faster than open-water fishes.<sup>32</sup>

### AQUACULTURE IS NOT AN ALTERNATIVE TO MANAGING FISHERIES

The biological constraints to fisheries expansion and declining catches have led to suggestions that aquaculture should be able to pick up the slack. The impressive reported expansion of aquaculture is often cited as evidence of the potential of that sec-

tor to meet the growing demand for fish, or even to “feed the world.”<sup>33</sup>

However, modern aquaculture practices are largely unsustainable: they consume natural resources at a very high rate (fresh water, coastal mangrove forests, fish meal) and, due to their intensity, these practices are extremely vulnerable to the pollution and disease outbreaks they induce.<sup>34</sup> Thus, shrimp farms are in many cases fly-by-night operations, leaving devastated coastal habitats and human communities in their wake.<sup>35</sup>

Additionally, much of what is meant by aquaculture, at least in Europe, North America, and other parts of the developed world, consists of feedlot operations in which carnivorous fish (mainly salmon, but also various sea bass and other species) are fattened on a diet rich in fish meal and oil. The idea makes commercial sense, as the farmed fish fetch a much higher market price than the fish ground up for fish meal (even though they may consist of species that are consumed by humans, such as herring, sardine or mackerels). The point is that operations of this type consume much more fish flesh than they produce, and hence cannot replace fisheries. Indeed, this form of aquaculture represents another source of pressure on wild fish populations.<sup>36</sup>

#### MITIGATION AND RESTORATION

It is clear that a real and drastic reduction in fishing rates must occur if fisheries are to acquire some semblance of sustainability. The required reductions will have to be strong enough to reduce fishing efforts (e.g., number of fishing vessels) by a factor of three or more in most areas. This can be best

achieved by phasing out subsidies to the fishing sector, recently re-estimated at about U.S. \$32 billion globally,<sup>37</sup> twice the value of the U.S. \$14 to \$20 billion estimated by the World Bank<sup>38</sup> and used in World Trade Organization negotiations. The idea of phasing out subsidies applies particularly to fuel subsidies, which make up 25 percent of global subsidies, and have, to date, enabled energy inefficient industrial fleets to remain afloat.<sup>39</sup>

Also, the global community must take account of the incessant technological innovations in fisheries, which now relies on Global Positioning Systems (GPS), and detailed bottom maps to zoom in on residual fish concentrations previously protected by rough terrain. This technological race, which allows some fishers to maintain their catches even when the underlying resource base is depleted, is also, jointly with shifting baselines,<sup>40</sup> the reason why fishers often remain unaware of their impact on the resources they exploit and object so strongly to scientists’ claims of scarcity.<sup>41</sup>

Vessel decommissioning subsidies, which governments pay fishers to retire their boats, will not be sufficient to reduce the overcapacity of global fishing fleets.<sup>42</sup> Indeed, these subsidies

can have negative effects. Decommissioning subsidies usually end up providing the collateral that banks require to underwrite fleet modernizations rather than achieving the intended fleet size reductions. And, in most cases, it is not the actual vessel that is retired, but its license. Hence “retired” vessels can still be used to catch species without quota, i.e., “underutilized resources” (often the prey of species for which there is a quota), or deployed along the coast of some developing country.

#### CONCLUSION

Whatever resemblance of sustainability fisheries might have had in the past can be contributed to the fisheries not being able to cover the entire range inhabited by the wildlife species that were exploited, which thus had natural reserves.<sup>43</sup> Re-establishing sustainability in the face of our vast technical capabilities requires, conversely, that we withdraw from part of the ocean. There is now strong evidence that such withdrawal, combined with a strongly limited effort in the remaining fishable areas, would enable fisheries to rebuild.<sup>44</sup> The appropriate size and location of marine reserves and their combination into networks

may indeed represent the most profitable venue for fisheries research in the future — research that would contribute to the rebuilding of the ecosystem in which the fisheries are embedded, rather than slowing down the decline of an ultimately failed enterprise.

Practical restoration ecology for the oceans should take place alongside the extraction of marine resources for human consumption.<sup>45</sup> Reconciling these apparently dissonant goals provides a major challenge for fish-

eries ecologists, for the public, for management agencies, and for the fishing industry. There is no reason to expect marine resources to keep pace with the demand that will result from growing populations and, hopefully, growing incomes in now impoverished parts of the world. However, fisheries designed to be sustainable in a world of scarcity may be quite profitable. If we act soon, there is still time for restoration to get underway, while remaining fisheries continue to provide seafood and wealth for humans.



---

*It is clear that a real and drastic reduction in fishing rates must occur if fisheries are to acquire some semblance of sustainability.*

---

#### Endnotes: Unsustainable Marine Fisheries

<sup>1</sup> See generally, Daniel Pauly et al., *Towards Sustainability in World Fisheries*, 418 NATURE 689 (2002) [hereinafter *Towards Sustainability*].

<sup>2</sup> United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397.

<sup>3</sup> See generally, *Towards Sustainability*, supra note 1.

<sup>4</sup> See generally, *Towards Sustainability*, supra note 1.

<sup>5</sup> Reg Watson & Daniel Pauly, *Systematic Distortions in World Fisheries Catch*

# INTERNATIONAL WHALING COMMISSION INDICATES POTENTIAL REVERSAL OF POLICY

by Athena Kennedy and Jon Feldon\*

In June, the International Whaling Commission (“IWC”) held its 58th Annual Meeting in St. Kitts and Nevis and, for the first time since its inception in 1946, declared that it intends to reintroduce “controlled and sustainable” whaling of certain whale species.<sup>1</sup>

The 33-32 vote is purely declaratory and does not effect a change in the IWC’s ban on whaling, which would take a 75 percent vote to overturn.<sup>2</sup> However, organizations across the globe call the vote an indication of a dramatic policy shift demonstrating an “abdication of responsibility by the global community” and a sign of IWC evolution from a conservational force to a “whaling club.”<sup>3</sup> The members of the IWC voting to lift the ban describe the declaration as a normalization in keeping with the Commission’s original declared purpose.<sup>4</sup>

The International Convention for the Regulation of Whaling created the IWC for the underlying purpose of allowing for the “orderly development of the whaling industry.”<sup>5</sup> Recognizing an international interest in preserving whale stocks, the IWC decided to take an active role in preventing the over-fishing of the dwindling populations of the majority of whale species.<sup>6</sup> Starting in 1986, this mission took the form of a worldwide moratorium on commercial whaling, although loopholes allowed certain numbers of whales to be hunted for cultural purposes by certain indigenous groups, and unlimited whaling for scientific research.<sup>7</sup>

Now, for the first time, a majority vote, with one abstention (China), has put the IWC in favor of declaring an end to the moratorium.<sup>8</sup> This vote is significant because it marks the first time in twenty years that more than half of the members of the IWC have indicated they are in favor of lifting the ban on commercial whaling.<sup>9</sup> The reasons cited by the IWC include the expected rationales that the IWC’s mission statement has always been to maintain whale levels suitable for sustainable whaling practices, and the claim that certain species of whale have reached populations at which whaling may safely resume. However, the majority also cited new concerns that the recovered whale populations’ overconsumption of certain types of commercial fish stocks have resulted in a threat to the economies of ocean states.<sup>10</sup>

The World Wildlife Fund (“WWF”) is one of many organizations criticizing the IWC’s new stance. WWF alleges that the IWC makes unwarranted claims against non-governmental organizations, exaggerates the recovery of whale species, and that the scientific basis for claiming that whales significantly affect commercial fisheries is invalid.<sup>11</sup> Other anti-whaling groups believe that the shift in voting patterns is related to pro-

whaling “vote-buying” (*i.e.*, offering poorer countries financial aid in return for both joining the IWC and voting to lift the whaling ban).<sup>12</sup> Recent polling showing that citizens from small island nations overwhelmingly disapprove of their country’s decision to vote to lift the ban on whaling further supports this allegation.<sup>13</sup>

Only time will reveal the significance of the IWC’s new majority position. The vote may act as a wake-up call for the IWC, encouraging a reevaluation of its values and a shift back towards favoring whaling bans. Alternatively, this kind of outcome could be the first in a series strengthening the coalition to end the commercial whaling moratorium. 

## Endnotes:

<sup>1</sup> International Whaling Commission, *Chair’s Summary Report for the 58th Annual Meeting, St. Kitts and Nevis*, June 2006, available at [http://www.iwcoffice.org/\\_documents/meetings/ChairSummaryReportIWC58.pdf](http://www.iwcoffice.org/_documents/meetings/ChairSummaryReportIWC58.pdf) (last visited Sept. 29, 2006) [hereinafter IWC Chair’s Summary].

<sup>2</sup> Robert Booth, *Whalers Secure Crucial Vote Win in Bid to Overturn Ban*, GUARDIAN, June 19, 2006, available at <http://environment.guardian.co.uk/conservation/story/0,,1846871,00.html> (last visited Nov. 1, 2006).

<sup>3</sup> Joanna Benn, *Sad Day for the Whales*, Panda.org, June 19, 2006, [http://www.panda.org/about\\_wwf/what\\_we\\_do/species/our\\_solutions/policy/iwc/index.cfm?uNewsID=72780](http://www.panda.org/about_wwf/what_we_do/species/our_solutions/policy/iwc/index.cfm?uNewsID=72780) (last visited Sept. 29, 2006).

<sup>4</sup> IWC Chair’s Summary, *supra* note 1.

<sup>5</sup> IWCOffice.org, IWC Information, <http://www.iwcoffice.org/commission/iwcmain.htm#history> (last visited Sept. 29, 2006).

<sup>6</sup> IWCOffice.org, The Convention, <http://www.iwcoffice.org/commission/convention.htm#convention> (last visited Sept. 29, 2006).

<sup>7</sup> William C. Burns, *The International Whaling Commission and the Future of Cetaceans: Problems and Prospects*, 8 COLO. J. INT’L ENVTL. L. & POL’Y 31 (1997).

<sup>8</sup> Benn, *supra* note 3.

<sup>9</sup> See IWCOffice.org, *supra* note 5 (follow “here” hyperlink under “membership” for a listing of current IWC members as of 2006).

<sup>10</sup> IWC Chair’s Summary, *supra* note 1.

<sup>11</sup> Benn, *supra* note 3.

<sup>12</sup> Jennifer Macey, *Fears Vote Buying Will Spoil Whale Ban*, Abc.net.au, June 13, 2006, available at <http://www.abc.net.au/pm/content/2006/s1662194.htm> (last visited Nov. 19, 2006).

<sup>13</sup> Panda.org, Joanna Benn, *Citizens from Pro-Whaling Countries Say ‘No’ to Whaling*, June 15, 2006, [http://www.panda.org/about\\_wwf/what\\_we\\_do/species/our\\_solutions/policy/iwc/index.cfm?uNewsID=72060](http://www.panda.org/about_wwf/what_we_do/species/our_solutions/policy/iwc/index.cfm?uNewsID=72060) (last visited Nov. 19, 2006).

\*Athena Kennedy and Jon Feldon are JD candidates, May 2007, at American University, Washington College of Law.

# CCAMLR AND ANTARCTIC KRILL:

## ECOSYSTEM MANAGEMENT AROUND THE GREAT WHITE CONTINENT

By Virginia Gascón and Rodolfo Werner\*

### INTRODUCTION

Generally regarded as a model for regional cooperation in the area of fisheries, the Commission for the Conservation of Antarctic Marine Living Resources (“CCAMLR”) celebrates its twenty-fifth anniversary this year. Negotiated by Consultative Parties of the Antarctic Treaty to regulate harvesting of most marine species in the Southern Ocean, CCAMLR implements laws based on conservation principles. One of the central and continuing tasks of CCAMLR is the ecosystem management of Antarctic krill.

This article introduces the reader to the importance of Antarctic krill and the structure of the ecosystem approach as formulated by CCAMLR. It also explains reasons behind the need of CCAMLR’s management of Antarctic krill resulting from a steady increase in krill harvesting, and its potential for becoming one of the world’s largest fisheries. It also further delineates the conservation challenges that must be tackled to ensure the long-lasting health of the Antarctic marine environment.

### ANTARCTIC KRILL AND THE KRILL FISHERY

#### ABOUT ANTARCTIC KRILL

“Krill” is a term applied to describe over 80 species of open-ocean crustaceans known as Euphausiids. *Euphausia superba* is the species commonly referred to as “Antarctic krill,” which are shrimp-like crustaceans subject to significant commercial fishing. Adult krill aggregate into huge schools or swarms, that may extend for kilometers with thousands of krill packed into each cubic meter. This swarming behavior is what makes krill attractive to commercial harvesting.<sup>1</sup>

Antarctic krill are central to the Antarctic marine food web, as most organisms are either direct predators of krill or are just one trophic level removed from it. For many marine mammals and sea birds, krill are the most abundant food source. Areas of highest krill concentration are often close to the land-based breeding colonies of krill-eating birds and seals. These predators depend on krill being within reach of their colonies in order to feed and rear their offspring during the Antarctic summer.<sup>2</sup>

Acoustic surveys have estimated the circumpolar biomass of Antarctic krill to be from 60 to 155 million tonnes.<sup>3</sup> The distribution of Antarctic krill coincides almost entirely with the ecological boundaries of the so-called “Southern Ocean,” extending from the High Antarctic Continental Shelf north as far as the Antarctic Polar Front Zone. The extended distribution of the species—approximately 36 million square kilometers—was behind the designation of the management area for CCAMLR.<sup>4</sup>

### THE ANTARCTIC KRILL FISHERY

Krill is fished mainly as feed for aquaculture. Interest in krill fisheries was sparked in the 1960s.<sup>5</sup> The highest catches occurred in the early 1980s, reaching over half a million tonnes. In the early nineties, catches dropped dramatically due to the break-up of the Soviet Union, which forced this heavily subsidized fleet to cease operations.<sup>6</sup> The Antarctic krill fishery has been relatively stable for the last decade with catches around 100,000 tonnes, but observers note a trend towards expanded fishing operations.<sup>7</sup>

The Antarctic krill fishery may become the largest global fishery. Its size gives it the potential to significantly affect the trophic structure of the Antarctic marine ecosystem.<sup>8</sup> Operating in the South West Atlantic, this fishery is located almost entirely within the CCAMLR Area.

### THE ECOSYSTEM APPROACH AND CCAMLR

The “ecosystem approach” to fisheries management, and analogous formulations such as “ecosystem-based management,” are subject to increased attention in the literature,<sup>9</sup> programs, and conferences dealing with the use of marine living resources.<sup>10</sup> In spite of the generalized international acceptance of the need to adopt an ecosystem approach to fisheries management, there remains a lack of widely agreed-upon guidelines for implementation.<sup>11</sup>

CCAMLR<sup>12</sup> is the first international agreement to incorporate ecosystem and precautionary approaches as basic principles for the management of marine living resources. Subsequent treaties have followed the example set by CCAMLR; for example, the UN Fish Stocks Agreement (“UNFSA”) requires the assessment of the impact of fishing on non-target and associated or dependent species and their environment. These are essential elements of the ecosystem approach. UNFSA also mandates application of the precautionary approach, which has been identified as an integral element of the ecosystem approach.<sup>13</sup>

The key role of krill in the Antarctic ecosystem influenced the conservation principles embraced by CCAMLR in Article II.

---

\* Virginia Gascón, LL.M., is Policy Advisor, and Rodolfo Werner, Ph.D., is Science Advisor of the Antarctic Krill Conservation Project. The authors would like to thank The Lighthouse Foundation, and especially its Director, Jens Ambsdorf, for its support during the research for this paper. They also thank Gerry Leape and Mark Stevens at the National Environmental Trust, for their constant support and encouragement, and Cynthia Fernández, for her research and assistance. Special thanks also to Steve Nicol, Andrew Constable, and So Kawaguchi at the Australian Antarctic Division; John P. Croxall at the British Antarctic Survey; and Alistair Graham at the Tasmanian Conservation Trust, for their time and interest in this work.

Specifically, the ecosystem approach stated in Article II, (3)(b) of the Convention delineates the need to maintain the ecological relationships between harvested, dependent and related populations of Antarctic marine living resources, and to restore depleted populations.

The formulation of the precautionary principle is not explicitly reflected in the text of CCAMLR. However, Article II, (3)(c) embodies a clear requirement for the application of precautionary approaches to management. This provision requires that harvesting is conducted in a way that minimizes the “risk of changes in the marine ecosystem which are not potentially reversible over two or three decades, taking into account the state of available knowledge of the direct and indirect impact of harvesting, the effect of the introduction of alien species, the effects of associated activities on the marine ecosystem and of the effects of environmental changes, with the aim of making possible the sustained conservation of Antarctic marine living resources.”

CCAMLR is recognized as the only regional fisheries body that routinely carries out a comprehensive application of the ecosystem approach to fisheries management.<sup>14</sup> Overall, the specific achievements of CCAMLR’s ecosystem approach are: (1) the development of a precautionary approach to the management of target species; (2) the collection of data on by-catch and ecosystem impacts through the CCAMLR Scheme of International Observation; (3) the adoption of effective seabird by-catch mitigation rules and other gear restrictions to minimize the ecosystem impacts of fishing;<sup>15</sup> (4) the development of specific policies to manage new and exploratory fisheries;<sup>16</sup> (5) the establishment of an ecosystem monitoring program; and (6) the development of a management regime for Antarctic krill that takes into account the impact of fishing on dependent species.

### **REGULATORY GAPS: CCAMLR’S MANAGEMENT OF ANTARCTIC KRILL**

Soon after its entry into force in 1982, CCAMLR faced the task of translating its conservation principles into specific rules that could be effectively implemented. The ecosystem approach has imperative implications for krill management; thus, there is a need to consider not only krill as target species but also a subset of dependent species, including seabirds and seals, which are monitored by the CCAMLR Ecosystem Monitoring Program (“CEMP”).<sup>17</sup> The Working Group on Ecosystem Monitoring and Management (“WG-EMM”), a subsidiary body of the Scientific Committee, takes on all relevant technical work in relation to krill, and is in charge of developing ecosystem-based management procedures.<sup>18</sup>

While developing models to estimate appropriate levels of krill harvesting, CCAMLR soon recognized that the Maximum

Sustainable Yield model (“MSY”), commonly used in traditional fisheries management, was clearly not an appropriate basis for determining catch levels of krill. The MSY failed to incorporate interactions between exploited stocks and other species, a crucial element to address the objectives of Article II. Thus, to take into account the needs of krill-dependent species, CCAMLR adopted more conservative reference points than the ones commonly applied in a single-species fisheries management. These were integrated into a new Krill Yield Model.<sup>19</sup>

### **CATCH LIMITS TO KRILL FISHING**

Since 1991, krill catch limits have been adopted in the Atlantic and Indian Ocean sectors of the Southern Ocean, covering just over 51 percent of the CCAMLR Area. The current catch limit for krill in the Atlantic sector of the Southern Ocean, where the fishery currently operates, is established at four million tonnes, divided across several subsections.<sup>20</sup> These catch limits are complemented by the provision that, if the total catch in the Atlantic sector in any fishing season exceeds a “trigger level” of 620,000 tonnes, the limits would be subdivided into smaller management units following the advice of the Scientific Com-

mittee. The trigger-level is designed to allow proper management of krill stocks in anticipation of a rapid expansion of the fishery.<sup>21</sup>

In 2002, endorsing advice from the Scientific Committee, the Commission subdivided the South West Atlantic into fifteen small units for the management of the krill fishery known as Small-Scale Management Units (“SSMUs”). The Commission also directed the Scientific Committee to consider how the krill

catch limit could be allocated among these SSMUs.<sup>22</sup>

The majority of krill is harvested in shelf or shelf break areas. These areas coincide with the foraging grounds used by land-based predators, like penguins, to obtain food to rear their offspring. Therefore, until catch limits at the SSMU level are in place, concern remains about the localized impact within these subareas on krill populations and, particularly, on land-breeding predators.

### **OTHER CCAMLR MEASURES APPLICABLE TO KRILL FISHING**

Krill fishing is exempt from most monitoring, control, and surveillance measures that are applicable to other CCAMLR fisheries despite the central role that krill plays in the ecosystem. For example, scientific observers are required on board all fishing vessels in the Convention Area, except for krill vessels, despite calls by CCAMLR’s Scientific Committee to collect data necessary to develop proper management advice.<sup>23</sup>

An important regulatory gap with respect to the Antarctic krill fishery is the absence of required vessel monitoring devices.

---

*Recent developments in the krill fishery and markets indicate that expansion of this industry might be about to occur.*

---

CCAMLR requires flag States to monitor the position of their fishing vessels licensed to fish in the Convention Area through an automated satellite-linked Vessel Monitoring System (“VMS”).<sup>24</sup> This requirement is applicable to all CCAMLR fishing vessels except for krill.<sup>25</sup> The fact that krill vessels are not subject to VMS makes this fishery poorly regulated and difficult to monitor.

## CONSERVATION CHALLENGES

### A FISHERY IN EXPANSION

Recent developments in the krill fishery and markets indicate that expansion of this industry might be about to occur.<sup>26</sup> The main driving factor of this expansion is the increasing demand for krill products, particularly for aquaculture feeds.<sup>27</sup> As “conventional” supplies of fishmeal and fish oil become scarce, alternatives need to be found. Krill demand as aquaculture feed, especially for farmed salmon, is likely to enlarge due to its excellent value as a nutrient source. Krill have outstanding properties as feed such as a desirable protein and energy content, essential amino acids, natural pigment, and palatability. In addition, an interest in developing pharmaceutical products from krill has been observed, which may contribute to the profitability of the fishery.<sup>28</sup>

New technology also creates an expectation of increased krill fishing. The Norwegian aquafeed and fishing industry is leading developments in relation to krill. The business strategy of Norwegian operators is based on the use of modern harvesting technologies, including the catching and simultaneous on-board processing of krill. This avoids rapid deterioration of krill, one of the main factors that has limited the economic feasibility of fishing operations in the past. With the use of this technology, catch projections are increased up to 120,000 tonnes per year per vessel.<sup>29</sup>

### ECOLOGICAL CONCERNS

CCAMLR Conservation Measures for Antarctic krill currently cannot ensure that krill fishing does not negatively affect the Antarctic marine food web. Although current krill fishing levels are still below established catch limits, these limits are set for large areas of the ocean and do not take into account the ecological relationships between krill, dependent species, and fishing operations, which occur at much smaller scales.<sup>30</sup>

The current fishery for krill coincides almost entirely within foraging ranges of land-based predators, causing potential direct competition for krill between fishing vessels and krill predators. CCAMLR scientists have acknowledged that the potential for localized effects of the krill fishery on predators is great unless harvest controls are established for smaller areas and not just for large harvesting units, as is currently the case.<sup>31</sup>

Additional concerns for management include long-term environmental factors like global warming, which could have

significant effects on krill stocks.<sup>32</sup> The Scientific Committee has acknowledged difficulties in determining whether changes in the ecosystem are caused by fishing operations or by environmental factors.<sup>33</sup>

Since the establishment of SSMUs in 2002, the WG-EMM has been considering how the current catch limit for the South West Atlantic should be further subdivided. Options currently being assessed take into account different factors such as historical catches, estimated biomass, estimated predator demand, and the relationship between the spatial distribution of krill and predator demand in the different areas.<sup>34</sup> The WG-EMM is in the process of developing performance measures for the various elements involved (krill, predators, and fishery), as well as simulation models, to determine how well these options would meet CCAMLR’s objectives.<sup>35</sup>

An important consideration is that all proposed procedures to establish localized catch limits under discussion are affected by uncertainties, which need to be adequately addressed on a precautionary basis. In addition, all decisions would have little impact on fishing operations as long as current catch levels remain constant. However, as the fishing effort increases, a trade-off will need to be found between options that are precautionary, but more likely to displace the fishery, and those that do

not displace the fishery, but are more likely to cause disruptions in the ecosystem.<sup>36</sup> For this reason, it is important that the adequate management procedures are in place before the fishery expands. The CCAMLR experience has shown that reaching consensus to make difficult adjustments only after the need becomes apparent presents a

major problem.<sup>37</sup> Overall, CCAMLR needs to ensure that the fishery does not grow faster than its capacity to manage it.<sup>38</sup>

## CONCLUSION

CCAMLR has been a pioneer in establishing an ecosystem-based approach to the use of marine resources. The development of the krill fishery will present CCAMLR’s ecosystem approach its real test, offering the Convention an opportunity to become a 21st century model for fisheries management. To meet this challenge, CCAMLR needs to translate its basic conservation principles into flexible, effective management procedures that ensure the long-lasting health of the Antarctic marine environment and the species that reside therein. It must establish a management procedure that: (1) follows criteria for catch limit allocations that account for the needs of krill-dependent predators in each SSMU; (2) incorporates uncertainties on the basis of precaution; and (3) allows for further revisions in the light of new information. In the meantime, the fishery needs to be properly monitored and controlled, especially through the collection of scientific observation data.



**Endnotes:** CCAMLR and Antarctic Krill *on page 80*

---

*The Antarctic krill fishery  
may become the largest  
global fishery.*

---

# THE CONVENTION ON BIOLOGICAL DIVERSITY: MOVING FROM POLICY TO IMPLEMENTATION

by Marjo Vierros\*

## INTRODUCTION

Marine and coastal biodiversity was an early priority for the work of the Convention on Biological Diversity (“CBD”). The 1995 Jakarta Mandate reflected this priority as a Ministerial Statement on the Implementation of the Convention on Biological Diversity referred to as a new global consensus on the importance of marine and coastal biodiversity. Further, in 1998, a program of work on marine and coastal biological diversity was adopted to assist the implementation of the Jakarta Mandate on national, regional, and global levels.

The adoption of the Jakarta Mandate and the CBD program of work on marine and coastal biological diversity represented a major development in international policy relating to oceans and coasts. The Mandate and the program of work both explicitly recognize the importance of biodiversity in marine and coastal areas. In addition, the program of work puts in place a number of agreed-upon priority actions towards conservation and sustainable use. In the years following the adoption of the program of work, the CBD Conference of the Parties (“COP”), the decision-making body of the Convention, made additional policy decisions relating to issues such as coral bleaching, mariculture, integrated marine and coastal area management, and biodiversity in marine areas both within and beyond the limits of national jurisdiction. The latter topic has been a focus of much work and controversy in the intersessional period between the seventh and eighth meetings of the COP.

Of particular note was the adoption at the seventh meeting of the COP of a marine and coastal biodiversity management framework that took into account both the ecosystem approach and the precautionary approach.<sup>1</sup> This framework incorporated, in the context of integrated marine and coastal area management, two types of marine and coastal protected areas. The first type is an area allowing sustainable uses, and the second is an area excluding extractive uses. The framework and associated policy language about the role of marine and coastal protected areas (“MCPAs”) as one of the essential tools and approaches in the conservation and sustainable use of marine and coastal biodiversity, cemented the role of MCPAs as a central instrument in the national implementation of the CBD.

While all of these developments add up to a substantial and forward-looking policy on the conservation and sustainable use of marine and coastal biodiversity resources, the CBD has been less successful in bridging the gap between policy and implementation. Programs and projects initiated either directly or indirectly as a result of the CBD and with the support of various funding agencies include numerous initiatives such as coastal management programs, MCPA development, and proposals



Courtesy of Athena Kennedy

Baby Sea Turtles are an Example of Marine Biodiversity.

relating to invasive species. However, such initiatives, though they may have resulted in local success stories, have not done enough to decrease biodiversity losses either globally or regionally.

This article looks at the incorporation of outcome-oriented targets into the CBD and its work programs as an attempt to move from policy to implementation. The article focuses on targets relevant to oceans and coasts, and in particular those targets pertaining to marine protected areas and associated measures. The history of target development, some of the controversies involved in the process, and how targets have been incorporated into national-level implementation of the CBD will be examined. Finally, whether the targets will be reached, and how much it matters if they are not reached, will be speculated.

## INCORPORATING TARGETS INTO THE CBD

### BACKGROUND

In a move to focus on real-world outcomes rather than ongoing policy development, in 2002, the CBD COP adopted a Strategic Plan for the Convention, containing an ambitious target “to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional, and national level as a contribution to poverty alleviation and to the benefit of all life on earth.”<sup>2</sup> This target, which became known as the “2010 target,” has become a central driving force behind many of the actions — national, regional and international — taken in recent years to

\* Marjo Vierros is a visiting professor at the United Nations University Institute of Advanced Studies in Yokohama, Japan. She formerly worked for the Secretariat of the Convention on Biological Diversity.

implement the CBD. The World Summit on Sustainable Development endorsed the target, further bolstering its international significance.<sup>3</sup>

In adopting the 2010 target, the CBD became part of a growing international trend of target-setting. Whether an indication of frustration over increasing worldwide environmental degradation, or a recognition that the policy-measures of old were simply not working, targets have increasingly found their way into international policy. Among the most important global environmental targets are those found in the Johannesburg Plan of Implementation<sup>4</sup> and the United Nations Millennium Development Goals.<sup>5</sup> In the context of these global targets, many regional conventions and programs have either adopted, or are in the process of developing their own targets.

In the years since 2002, the admittedly rather vague 2010 target produced a number of more specific sub-targets relating to given biomes and CBD work programs, including that on marine and coastal biodiversity. The proliferation of targets raised fears amongst many countries that no one would be able to keep up with all of them. To make the various biome-specific targets more manageable, the seventh meeting of the COP adopted a common framework with an aim “to enhance the evaluation of achievements and progress in the implementation of the Strategic Plan and its 2010 Biodiversity Target.”<sup>6</sup> The framework consists of seven focal areas under which goals and sub-targets would be developed, and which would collectively contribute to reaching the 2010 target.<sup>7</sup> For each of the seven focal areas, the COP identified goals, sub-targets, and indicators. Thus, the targets for all programs of work, including the one on marine and coastal biodiversity, now contain goals and sub-targets corresponding to this framework. The focal areas were as follows:

1. Reducing the rate of loss of the components of biodiversity, including: (i) biomes, habitats and ecosystems; (ii) species and populations; and (iii) genetic diversity;
2. Promoting sustainable use of biodiversity;
3. Addressing the major threats to biodiversity, including those arising from invasive alien species, climate change, pollution, and habitat change;
4. Maintaining ecosystem integrity and the provision of goods and services provided by biodiversity in ecosystems, in support of human well-being;
5. Protecting traditional knowledge, innovations and practices;
6. Ensuring the fair and equitable sharing of benefits arising out of the use of genetic resources; and
7. Mobilizing financial and technical resources, especially for developing countries, in particular the least developed countries and small island developing states among them,

and countries with economies in transition, for implementing the Convention and the Strategic Plan.<sup>8</sup>

## SOME ISSUES AND CONTROVERSIES

The COP 7 target-setting has resulted in controversies that highlight scientific and political problems relating to the adoption of common global targets. In the realm of marine and coastal biodiversity, the issues at the center of controversy include the appropriateness of defining specific percentage targets for area-based protection, the explicit mention of marine protected areas as tools for managing biodiversity and fisheries, and the need to protect biodiversity in marine areas beyond the limits of national jurisdiction.

The lengthy deliberations on targets for the program of work on marine and coastal biodiversity took place at the tenth meeting of the CBD Subsidiary Body on Scientific, Technical, and Technological Advice (“SBSTTA”) in Bangkok, Thailand, February 7–11, 2005. Prior to being put in front of SBSTTA, the proposed marine and coastal targets had gone through a process of development by an expert group and a scientific peer review process. At this point the proposed targets also contained short technical rationales that expanded on the aims and significance of the particular target, and priority actions that could be undertaken to reach it.<sup>9</sup>

Under the goal to promote the conservation of the biological diversity of ecosystems, habitats, and biomes, the most controversial target related to marine and coastal biodiversity was target 1.1. This target reads as follows: “at least ten percent of each of the world’s marine and coastal ecological regions

effectively conserved.” Two main issues arose: first, whether ten percent was the appropriate percentage for which to aim by the year 2010; and second, whether by including a percentage figure the target was advocating an inappropriate, one-size-fits all solution to marine conservation.

On the first point, involved countries saw the ten percent figure as a policy target rather than one grounded upon scientific information. Many countries also recognized that protecting ten percent of marine and coastal ecological regions worldwide might not, in all cases, be enough for achieving a significant reduction of the current rate of biodiversity loss. Much would depend on how the countries managed the other ninety percent of the marine and coastal environment and the life history characteristics of the species to be protected within the different ecological regions.

Involved parties also disagreed over the meaning of the words “effective conservation,” and to what areas of the ocean the target referred. Some countries wanted explicit reference in the target to marine areas beyond the limits of national jurisdiction. Others opposed any such reference and preferred to strictly limit the target’s scope to national waters. Some countries also

---

*The CBD has been less successful in bridging the gap between policy and implementation.*

---

avored explicit reference in the target to marine protected areas, including marine protected areas prohibiting extractive activities. Others favored the broader interpretation developed by the expert group, which defined effective conservation as “area-based measures, for example marine protected areas and other means of protection, for which management plans exist.” That definition recognized the role of measures such as integrated oceans and coastal management and fisheries management that do not necessarily include marine protected areas. The debate over definitions reflects the unease in some countries about the role of the CBD in the conservation and sustainable use of biodiversity in marine areas beyond the limits of national jurisdiction, as well as the role of marine protected areas as fisheries management tools.

On the second point, concerning the appropriateness of assigning a universally applied percentage figure for the target, a number of countries opposed including any percentage figure. These countries argued that adopting a universal flat percentage would be too simplistic. The figure would not be appropriate for all circumstances, and might conflict with the strong, scientifically-based approach of decisions VII/5 (on marine and coastal biological diversity) and VII/28 (on protected areas).<sup>10</sup> Some scientific literature brings up similar concerns, recommending the adaptive application of a mix of marine resource management tools depending on the conditions that warrant them.<sup>11</sup>

In the end, SBSTTA adopted target 1.1 with the ten percent figure included, but without explicit reference to marine protected areas, or to marine areas beyond the limits of national jurisdiction.<sup>12</sup> The eighth meeting of the COP subsequently adopted the target, unchanged, in March 2006.<sup>13</sup> Most countries originally opposed to the flat percentage target noted that it still allows sufficient flexibility to apply the targets according to national priorities and frameworks. After all, all COP decisions relating to the global 2010 target framework contained the following language:

*Emphasizes* that the goals and targets... should be viewed as a flexible framework within which national and/or regional targets may be developed, according to national priorities and capacities, and taking into account differences in diversity between countries.<sup>14</sup>

Additionally polarizing the debate were references to destructive practices such as bottom trawling as the main threat to seamounts and fragile, slow-growing, cold-water coral reefs in the technical rationales of targets 1.1 and 1.2.<sup>15</sup> Some delegates opposed any reference to bottom trawling, while others insisted that such references be included. Because the disagreement could not be solved in the time available, SBSTTA was unable to agree on specific technical rationales for the targets. In the end, the targets were adopted without the annexed rationales and the COP subsequently endorsed the integration of the targets into the work program on marine and coastal biodiversity.<sup>16</sup> This move avoided debate on the bottom trawling issue in the context of the 2010 targets, but the debate is sure to continue elsewhere, both within the CBD and other international fora, until a solution can be found that will prevent damage from this activity to sensitive seabed habitats, such as cold-water coral reefs.

Results of the CBD Third National Reports indicate that countries are taking the 2010 targets seriously. Of the 77 countries that submitted their Third National Reports by September 2006, 77 percent set specific national targets in response to target 1.1, while eighteen percent of the responding countries adopted the global target as is. Apparently, only a small minority of countries have not adopted any national targets relating to conservation of biomes and ecosystems. Important to note, however, is that these targets relate to all biomes, and are not exclusive to the marine environment.

The figures are somewhat lower in relation to marine and coastal environments, with 59 percent of coastal countries having adopted a national target in response to target 1.1. This figure is still quite high, considering that the COP only adopted the targets relating to the marine and coastal program of work in March 2006 (although, implicitly marine areas are included in the framework of targets adopted in 2004 as part of decision VII/30).

Only a handful of the national targets adopted by participating countries were quantitative in nature. Some targets refer to a specific percentage (ranging from over thirty percent to ten percent) of area to be protected, others use hectares or square kilometers as target figures, while yet others relate to the number of new marine protected areas to be established by 2010. Of special note is the Micronesia Challenge, announced at the eighth meeting of the COP, which aims to effectively conserve thirty percent of near shore marine resources and twenty percent of forest resources by 2020 in Micronesian countries (Palau, Federated States of Micronesia and Marshall Islands, and the U.S. territories of Guam and Northern Mariana Islands).<sup>17</sup> A majority of countries have set more qualitative targets in response to target 1.1, which include, for example, increasing protection for certain ecosystem types, putting in place a network of marine protected areas, or restoring good ecological quality in a given area.

Marine protective areas emerged as one of the major tools for implementing the CBD and for reaching the 2010 targets despite the controversy that surrounded discussions related to marine protected areas at various international fora. According to the CBD third National Reports, 93 percent of responding coastal countries have declared and gazetted marine and coastal protected areas. Thirty-eight percent of the responding coastal countries have implemented a system or network, and most of the others have a system or network under development.<sup>18</sup> Additionally, 95 percent of coastal countries' biodiversity strategies and action plans include developing new marine and coastal protected areas.<sup>19</sup>

Despite the efforts of coastal countries, there is still significant room for improvement. Only sixty percent of the responding coastal countries' MCPAs have established effective management, enforcement, and monitoring. Sustainable management practices over the wider marine and coastal environment surround the national system of MCPAs in only 43 percent of cases.

Nevertheless, all these activities have resulted in a global increase in marine protected areas. At the present time approxi-

mately 4600 MPAs operate to cover an estimated 2.2 million km<sup>2</sup>, or 0.6 percent of the world's oceans and six percent of territorial seas. Since the 1970s, MPA area has rapidly grown at an annual rate of growth in the order of 4.5 percent. However, the current rate of growth is not yet enough to reach the ten percent target for all areas under national jurisdiction globally.<sup>20</sup> The picture may look more optimistic if it included broader, area-based protection measures other than MPAs, in the calculations. Unfortunately, no data has been collected regarding the extent of other area-based measures.

Whether the target-adoption actions taken by participating countries will have the desired effect on biodiversity remains to be seen. At the present time, the seventh meeting of the COP has adopted a set of indicators to globally monitor the state of biodiversity,<sup>21</sup> in conjunction with periodic assessments such as the Global Environment Outlook. Currently, no comprehensive assessment focuses solely on the state of marine environment, although the planned regular process for the global reporting and assessment of the state of the marine environment, including socio-economic aspects originally called for by the General Assembly,<sup>22</sup> may one day fill this gap.

### CONCLUSION

With only four years to go, it seems likely that the 2010 targets may not be reached globally, though they may be achieved

in part in some locations. According to the Millennium Ecosystem Assessment, reaching the 2010 targets would require unprecedented efforts, as current trends show no slowdown of biodiversity loss, and experts expect direct drivers of biodiversity loss to either increase or stay constant. With appropriate response measures, however, it is possible to reduce the rate of biodiversity loss for certain components of biodiversity and in certain areas by the year 2010.<sup>23</sup>

Perhaps reaching the 2010 target may not matter so much if the target inspires efforts to put in place a program for change that includes specific actions that will carry on in the future. The 2010 target has already raised the level of scientific input to the CBD, particularly in the context of developing indicators to assess progress towards the target. The target has also served to focus attention on the importance of biodiversity to human well-being, and the increased use of tools such as marine protected areas that demonstrably reduce biodiversity loss.

Failing to reach the targets may have negative side effects as well and a large-scale failure to reach the targets may result in disillusionment and target fatigue. Regardless, it is almost certain that the CBD will adopt new targets following the 2010 target, and that the present targets have served at least some purpose in focusing attention on biodiversity, and in moving the focus of the CBD increasingly from policy to implementation.



## Endnotes: Convention on Biological Diversity

<sup>1</sup> 7th CBD COP, Decision VII/11 (Feb. 2004), available at <https://www.cbd.int/decisions/default.aspx?m=COP-07&id=7748&lg=0> (last visited Sept. 25, 2006).

<sup>2</sup> Sixth Ordinary Meeting of the Conference of the Parties to the Convention on Biological Diversity, Decision VI/26 (Apr. 2002), available at <https://www.cbd.int/decisions/default.aspx?m=COP-06&id=7200&lg=0> (last visited Sept. 25, 2006).

<sup>3</sup> Biodiv.org, 2010 Biodiversity Targets, <http://www.biodiv.org/2010-target/default.aspx> (last visited Sept. 25, 2006).

<sup>4</sup> World Summit on Sustainable Development, Aug. 26–Sept. 4, 2002, *Johannesburg Plan of Implementation*, available at [http://www.un.org/esa/sustdev/documents/WSSD\\_POI\\_PD/English/POIToc.htm](http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/POIToc.htm) (last visited Sept. 27, 2006).

<sup>5</sup> United Nations Millennium Development Goals, available at <http://www.un.org/millenniumgoals> (last visited Sept. 25, 2006).

<sup>6</sup> 7th CDB COP, Decision VII/30 (Feb. 2004), available at <https://www.cbd.int/decisions/default.aspx?m=COP-07&id=7767&lg=0> (last visited Sept. 25, 2006).

<sup>7</sup> 7th CDB COP, Decision VII/30, *id.*

<sup>8</sup> 7th CDB COP, Decision VII/30, *id.*

<sup>9</sup> Tenth Meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (“10th SBSTTA”) Feb. 2005, *Draft GLOBAL Outcome Oriented Targets for the Program of Work on Marine and Coastal Biological Diversity*, available at <http://www.biodiv.org/doc/meeting.asp?mtg=cop-08> (last visited Sept. 25, 2006).

<sup>10</sup> For a reflection of the debate, see 10th SBSTTA, *Report of the Subsidiary Body on Scientific, Technical and Technological Advice on the Work of Its Tenth Meeting*, UNEP/CBD/COP/8/2, available at <http://www.biodiv.org/doc/meeting.asp?mtg=cop-08> (last visited Sept. 25, 2006) [hereinafter 10th SBSTTA Report].

<sup>11</sup> T. Agardy et al., *Dangerous Targets? Unresolved Issues and Ideological Clashes Around Marine Protected Areas*, 13 AQUATIC CONSERVATION: MARINE AND FRESHWATER ECOSYSTEMS 353 (2003).

<sup>12</sup> 10th SBSTTA Report, *supra* note 10.

<sup>13</sup> Eight Meeting of the COP to the CBD, Mar. 2002, available at <http://www.biodiv.org/doc/meeting.asp?mtg=COP-08> (last visited Oct. 22, 2006)

<sup>14</sup> See, e.g., 7th CBD COP, Decision VII/30, *supra* note 6.

<sup>15</sup> 10th SBSTTA, Recommendation X/4, available at <http://www.biodiv.org/recommendations/default.aspx?m=SBSTTA-10&id=10683&lg=0> (last visited Sept. 25, 2006).

<sup>16</sup> 7th CBD COP, Item 26 of the Provisional Agenda (Feb. 2004) available at <http://www.biodiv.org/doc/meetings/cop/cop-07/official/cop-07-20-add5-en.pdf#search=%22COP%20endorse%20target%201.1%20target%201.2%22> (last visited Sep, 25 2006).

<sup>17</sup> Nature Conservancy, *Palau's Challenge to Micronesia and the World* (Dec. 22, 2005), <http://www.nature.org/success/art16924.html> (last visited Sept. 29, 2006).

<sup>18</sup> The Convention on Biological Diversity, List of Reports, <http://www.biodiv.org/Reports/list.aspx?type=nr-03> (last visited Sept. 29, 2006) [hereinafter List of Reports].

<sup>19</sup> List of Reports, *id.*

<sup>20</sup> 8th CBD COP, *Summary Report of the Current Status of the Global Marine Protected Area Network, and Of Progress Monitoring Capabilities*, UNEP/CBD/COP/8/INF/4, available at <http://www.biodiv.org/doc/meeting.asp?mtg=cop-08&tab=1> (last visited Sept. 29, 2006); L. Wood, Oral presentation at The First International Marine Protected Areas Congress at Geelong, Australia: A Global Review of MPAs (2005).

<sup>21</sup> 7th CBD COP, Decision VII/30, *supra* note 6.

<sup>22</sup> United Nations General Assembly resolutions 57/141 and 59/24.

<sup>23</sup> Millennium Ecosystem Assessment (2005) *Ecosystems and Human Well-Being: Biodiversity Synthesis*, World Resources Institute, Washington, DC.

# DRILLING DEEPER, DRILLING MORE

by Chris Stefan\*

In September 2004, Chevron Corporation announced the discovery of a large oil field located off of the coast of Louisiana.<sup>1</sup> What is unique about this discovery is that the well was drilled at a depth of 28,175 feet, breaking a new depth record<sup>2</sup> and signaling that advances in technology likely will allow for future drilling at even greater depths.<sup>3</sup>

The environmental risks associated with conventional offshore drilling projects are well-documented. The exploratory phase of the process runs the risk of underwater explosions,<sup>4</sup> and utilizes sound waves that may adversely affect whale populations.<sup>5</sup> The drilling projects themselves contaminate the surrounding areas with toxic chemicals and byproduct waste.<sup>6</sup> The vital question is will drilling even deeper, and more often, amplify these impacts?

Concerns regarding expanded offshore oil production also involve geopolitics. In July 2006, a major oil discovery in Cuban waters sparked Congressional debate over ending the embargo of the small island nation (or at least creating an exception for energy companies).<sup>7</sup> The oil discovery in Cuban waters complicates the legal battles over drilling off of the coast of Florida because of the possible scenario where U.S. companies who are barred from drilling are replaced by international groups drilling under Cuban leases, with potentially lower environmental stan-

dards.<sup>8</sup> The proximity of the Cuban wells to U.S. waters guarantees that any environmental impact will be shared between the two countries, and the political reality ensures that the two nations likely will fail to work together to ensure environmental protection in the region.

Regardless of the political or environmental impacts, the Gulf of Mexico and its vicinity has captured the attention of U.S. domestic oil producers. While technology can enhance our ability to recover oil at greater depths, legal mechanisms need to ensure that our ability to prevent harm to the marine environment is enhanced proportional to those advancements. The environmental impact of increasing oil production in a region plagued by frequent hurricanes and political animosity through methods with uncertain environmental effects leaves many unanswered questions.

Nevertheless, the political and economic needs of modern society ensure that increased drilling is certain to occur.

---

*Legal mechanisms need to ensure that our ability to prevent harm to the marine environment is enhanced.*

---

## Endnotes:

<sup>1</sup> Press Release, Chevron, *Chevron Announces Record Setting Test Well* (Sept. 5, 2006), <http://www.chevron.com/news/press/2006/2006-09-05.asp> (last visited Sept. 24, 2006).

<sup>2</sup> Chevron, *id.*

<sup>3</sup> See *Offshore Oil Exploration: Energy From the Depths*, STAR TRIBUNE, Sept. 11, 2006, available at <http://www.startribune.com/535/story/670323.html> (last visited Sept. 24, 2006).

<sup>4</sup> Editorial, *Where We Stand: Observe Moratorium on Offshore Drilling*, VIRGINIAN PILOT, Apr. 4, 2006, available at <http://home.hamptonroads.com/stories/story.cfm?story=102478&ran=104305> (last visited Sept. 24, 2006).

<sup>5</sup> See generally US Department of the Interior, *Possible Effects of OC Oil and Gas Activities on the California Grey Whale*, available at

<http://www.mms.gov/omm/pacific/enviro/graywhale.htm> (last visited Sept. 24, 2006); see also VIRGINIAN-PILOT, *supra* note 4.

<sup>6</sup> Sierra Club, *Offshore Drilling is Messy Business*, [http://www.sierraclub.org/wildlands/coasts/factsheets/2006-07\\_hurricanepollution.pdf#search=%22offshore%20drilling%20is%20messy%20business%22](http://www.sierraclub.org/wildlands/coasts/factsheets/2006-07_hurricanepollution.pdf#search=%22offshore%20drilling%20is%20messy%20business%22) (last visited Sept. 24, 2006).

<sup>7</sup> See MSNBC, *Cuban Oil Renews Embargo Debate* (July 29, 2006), available at <http://www.msnbc.msn.com/id/14095881/> (last visited Sept. 24, 2006).

<sup>8</sup> See BBC News, *Cuban Oil Prospects Cloud US Horizon* (Sept. 11, 2006), available at <http://news.bbc.co.uk/2/hi/americas/5321594.stm> (last visited Sept. 24, 2006).

\* Chris Stefan is a JD candidate, December 2007, at American University, Washington College of Law.

# THE LEGAL IMPLICATIONS OF CARBON CAPTURE AND STORAGE UNDER THE SEA

by Ray Purdy\*

## INTRODUCTION

There is now virtually universal recognition that the earth is getting warmer and climate change is happening. In the last 150 years we have seen a rise in atmospheric concentrations of carbon dioxide (“CO<sub>2</sub>”) by nearly a half.<sup>1</sup> Although the international community has made some attempts to reduce emissions of CO<sub>2</sub>, it is increasingly clear that binding targets set for 2010 under the Kyoto Protocol will not be achieved by a significant number of parties.

The situation is escalating in seriousness. Scientists have also calculated that the parts per million (“ppm”) targets limiting CO<sub>2</sub> levels, originally considered sufficient for stabilization by 2050, could now be dangerously high and we would have to significantly reduce our emissions beyond existing target levels in order to limit average global temperature increases. It seems we currently have little alternative to continuing to burn fossil fuels for a number of decades. This, coupled with the enormous growth of the economies of China and India, has led many Governments to believe that radical action is now required to reduce atmospheric emissions of CO<sub>2</sub>.

One increasingly supported method of reducing CO<sub>2</sub> emissions to the atmosphere is to capture and store the emissions in another domain — this process is known as carbon capture and storage (“CCS”). CCS is also sometimes known as carbon sequestration, although this should not be confused with biological carbon sequestration, where CO<sub>2</sub> that has been already emitted into the atmosphere is taken up in forests or soils. CCS involves the capture of CO<sub>2</sub> from large industrial point sources, such as power plants, which account for a high percentage of CO<sub>2</sub> emissions. In basic terms, a giant vacuum cleaner sucks up the emissions before they are released into the atmosphere. It is estimated that fitting a power plant with CCS technology could reduce CO<sub>2</sub> emissions by around 85 percent.

Once captured, the CO<sub>2</sub> is transported and stored in either offshore or onshore sources. Onshore CCS, in sites such as abandoned mines, has not been championed to the same extent as offshore CCS. For many countries, the infrastructure for onshore CCS is not in place, and for countries with smaller land masses, CCS storage sites could be in close proximity to residential

areas. Although CO<sub>2</sub> is considered by many to be a safe gas, and one that we come across most days in products such as carbonated drinks, this could prove controversial.

Offshore disposal, where CO<sub>2</sub> is stored directly in the seas, is also no longer seen as a politically acceptable or favored method of disposal by the majority. Under CCS projects, CO<sub>2</sub> will be transported to the oceans and artificially piped or injected into large geological formations under the seabed, such as depleted oil and gas traps. These projects have already demonstrated their ability to store fluids over a period of time. Other storage options include reservoirs or deep saline aquifers under the seas.

After the CO<sub>2</sub> is piped or injected into sub-seabed geological formations, the exits are sealed so that the CO<sub>2</sub> cannot escape, allowing it to be stored for long periods of time. For CO<sub>2</sub> storage to be an effective way of avoiding climate change, the CO<sub>2</sub> must be stored for hundreds of years so it can bridge the gap

from the use of fossil fuels to the transition to a hydrogen economy and other sources of clean energy.

## LEGAL QUESTIONS REGARDING CCS

CCS in marine waters is being strongly considered by national governments and international bodies. Bodies such as the Intergovernmental Panel on Climate Change and the International Energy Agency recently examined both the feasibility and potential barriers to using

CCS. These bodies concluded that there remains much ambiguity as to how the legal principles, currently in place under existing international legislation, will apply to the storage of CO<sub>2</sub>.<sup>2</sup>

CCS is a relatively new concept and it does not fall easily within the remit of international legislation, as such laws were obviously not designed with this in mind. This paper will firstly consider the driving factors behind CCS. It will then set out the potential impacts of existing marine laws and set these in the context of fast moving international discussions over taking CCS forward, and possible amendments to marine conventions.

---

*Whether CCS can be part of the Clean Development Mechanism under the Kyoto Protocol will become increasingly important.*

---

\* Ray Purdy is a Senior Research Fellow and the Deputy Director of Centre for Law and the Environment, Faculty of Laws, University College London. This paper comes from research projects supported by RPS Group Ltd, and the Tyndall Centre for Climate Change research. The author can be reached at raymond.purdy@ucl.ac.uk.

Gt CO <sub>2</sub>	1990	2003	2010	2020	2030
World	20.076	24.128	27.698	32.518	36.868
OECD	11.026	12.776	13.794	14.824	15.341
Developing Countries	5.319	8.815	11.063	14.525	18.113

Table 1: Projected Global Emissions.<sup>6</sup>

### DRIVING FACTORS BEHIND CCS

There are a number of factors driving CCS. CO<sub>2</sub> can be economically useful if it is pumped at high pressure into oil/gas fields to enable recovery of significant amounts of oil/gas that are not recoverable through primary methods. The CO<sub>2</sub> used in such enhanced oil/gas recovery operations, such as the Sleipner field in Norway, remains stored in the field. CCS also offers some potentially attractive commercial benefits to industry through potential linkages with emissions trading schemes. However, what appears to be the main driver for CCS is international climate change legislation and its potential to enable governments to meet their climate targets.

The Kyoto Protocol to the United Nations Framework Convention on Climate Change (“UNFCCC”), adopted in 1997, provides binding quantified emission limitation and reduction commitments. Under the Kyoto Protocol, which entered into force in 2005, developed countries agreed to reduce their emissions to 5.2 percent below 1990 levels over the period 2008–2012. Kyoto compliance is monitored by registries and annual inventory reports, and these tracked amounts reveal that many of the largest countries are failing to meet their targets.

Canada and Japan’s projections show that they are both over 500 million tons (“MT”) of CO<sub>2</sub> away from reaching their 2010 targets. If the United States was still a party to Kyoto, then it would be approximately 2,500 MT away from reaching its target. The European Union is also projected to narrowly miss its targets. Only Russia and Poland are expected to comfortably achieve theirs, and this is only because of a period of economic instability.<sup>3</sup>

Missing Kyoto targets undoubtedly increases the threat of global warming. This problem is compounded because it was thought for many years in international negotiations that what was required for stabilization was limiting CO<sub>2</sub> levels to 550 ppm by 2050. Global emissions of CO<sub>2</sub> currently stand at around 27 gigatonnes (“Gt”) a year, and will reach 44 Gt a year by 2050 if CO<sub>2</sub> levels are limited to 550 ppm. Many scientists now argue that even this level of CO<sub>2</sub> could be dangerously high. The latest evidence suggests that atmospheric CO<sub>2</sub> concentrations would need to stay at least below 450 ppm (an increase of

18.3 Gt a year by 2050), in order to limit average global temperature increases to two degrees Celsius above pre-industrial levels.<sup>4</sup>

CCS was first considered as a mitigation tool for developed<sup>5</sup> countries who were worried that a rapid move away from fossil fuels would cause serious disruption to their economies, but still had binding targets to meet under Kyoto. It is now clear (see Table 1), that although emissions in developed countries, such as the United States, will have to be drastically kept in check, consumption in developing countries will have the greatest impact on global atmospheric CO<sub>2</sub> levels, and these could eclipse any further reductions made by the European Union and other Organisation for Economic Co-operation and Development (“OECD”) countries.

Increases to developing countries’ emissions are primarily because China and India have around a quarter of the world’s coal reserves,<sup>7</sup> and intend to support their rapid economic development by building vast new fleets of new coal-fired plants. China is currently installing one gigawatt of coal-powered generation a week and forecasts predict that by 2030, coal-fired power in India and China will add 3000 million extra tons of CO<sub>2</sub> to the atmosphere every year.<sup>8</sup> There is also evidence of growing economic expansion in other countries such as Brazil.

The emissions of developing countries need to be kept in check, with the support of developed countries. Developed countries have the double-edged sword of not wanting to be seen to blame the developing countries for trying to catch up in the industrial and competitive stakes, but at the same time providing assistance and incentives to react to the potentially catastrophic problems caused by such massive increases in their emissions.

Whether CCS can be part of the Clean Development Mechanism (“CDM”) under the Kyoto Protocol will become increasingly important. The CDM allows industrialized countries to purchase project-based emission reduction units from developing countries. The G-77 (made up of 77 developing countries) has long been opposed to the inclusion of CCS in the CDM, with Brazil being the most vocal in its opposition. Developed countries are currently pressing ahead for its inclusion and this will again be on the agenda at the next meeting of the parties to the UNFCCC in Nairobi in November 2006.

At the current time it is still unclear whether the UNFCCC/Kyoto Protocol allows developed countries to implement CCS projects. Whilst any projects that reduce greenhouse gases at source can be counted as an emission reduction, and this could include CCS, there is nothing in the UNFCCC/Kyoto Protocol that expressly prohibits or allows for CCS storage in geological formations under the sea. There are also genuine concerns about the potential for seepage from storage sites, and this complicates issuing credits for CCS projects. Either a separate mechanism for CCS may have to be introduced under the Convention, or at the very least, inventories and accounting of greenhouse gas reductions will need to be developed and approved by contracting parties to the UNFCCC/Kyoto Protocol.

### MARINE LAWS AND CCS

A number of international marine laws are relevant to CO<sub>2</sub> storage under the seas. This includes the United Nations Convention on the Law of the Sea (“UNCLOS”), which regulates all aspects of the use and protection of the sea. UNCLOS does not specifically control dumping or prohibit CO<sub>2</sub> storage offshore, but requires states to take individually, or jointly, all measures necessary to prevent, reduce, or control pollution of the marine environment.<sup>9</sup>

UNCLOS is a framework law, leaving the elaboration of precise rules to be made in other more specific laws. The London Convention and its 1996 Protocol are the global laws that control and regulate the deliberate disposal of wastes at sea. The 1996 Protocol, which came into force in 2006, goes beyond the provisions of its predecessor and aims to provide greater protection for the marine environment. Whereas the London Convention aims to regulate dumping, the Protocol seeks to prevent, reduce, and where practicable eliminate pollution, and adopts a precautionary approach as a general obligation.

Parties to both the London Convention and the 1996 Protocol are encouraged to create regional agreements that further their objectives. There are many regional agreements around the globe, which provide for protection of the marine environment in particular jurisdictions.<sup>10</sup>

Whilst these marine conventions envisage compliance with other more specific or regional conventions, and indeed operate together in strengthening environmental protection, states are only bound to follow the conventions that they ratify or accede. All of the above international marine conventions have entered into force: UNCLOS with 149 parties; the London Convention with 82 parties; and the 1996 Protocol with 27 parties.<sup>11</sup> In practice, if a party is signed up to more than one marine convention, (e.g., the UK is a party to all of the marine conventions) and there is overlap, a state would need to apply the standard of the

most specific and stringent treaty. This article will examine the London Convention and its 1996 Protocol.

### THE LONDON CONVENTION AND ITS 1996 PROTOCOL

There are four important considerations in determining the legality of CO<sub>2</sub> dumping/storage under the London Convention and 1996 Protocol. The first consideration is whether geological formations under the sea fall under the Convention’s jurisdiction. The London Convention seeks only to control dumping at “sea” and would probably not cover CO<sub>2</sub> storage. The Protocol goes beyond the scope of the Convention and applies to dumping in the “sea, seabed and subsoil.”

#### LEGALITY OF CO<sub>2</sub> STORAGE

It is arguable whether CO<sub>2</sub> storage may be prohibited under the Protocol, and this turns upon the definitions of “seabed” and “subsoil” and how far down they go. One interpretation is that the subsoil is just a layer of rock immediately under the seabed, whereas another interpretation, and one this author would favor, is that the Protocol was drafted to cover all areas below the sea column.<sup>12</sup>

The next consideration is whether CO<sub>2</sub> can be considered to be a waste. The London Convention prohibits the disposal of all wastes specified in Annex I. CO<sub>2</sub> is not specifically referred to in any of the lists that are prohibited for disposal in Annex I, but will probably fall under the “industrial waste” category in the Annex if it can be shown that it derived from a manufacturing or processing operation. The Protocol is simpler as it places a general prohibition upon the

dumping of wastes, with the exception of those wastes or matter to be found listed in Annex I. It is most unlikely that CO<sub>2</sub> will fall within the categories approved for dumping in Annex I. It is therefore suggested that as CO<sub>2</sub> would fall within the definition of waste under the Convention and Protocol and, as a result, dumping it would be prohibited. The definition of “dumping” in both conventions also refers to “wastes or *other matter*,” so technically this could also be sufficiently broad enough to include CO<sub>2</sub>.

The third consideration is the method of actual disposal. The Convention and the Protocol both define “dumping” to be “any deliberate disposal at sea of wastes or other matter from vessels, aircraft, platforms or other man-made structures at sea.” Therefore, the Convention and Protocol only apply to activities using ships or platforms to dispose CO<sub>2</sub> into the marine environment and there are no controls governing pipeline discharges direct from land based sources. This can be supported further by a provision in the Protocol stating that its remit does not extend to sub-seabed repositories accessed only from land. It is there-

---

*The problem remains that the majority of the world’s commercial energy needs are met by fossil fuels and we are no closer to the end of the fossil fuel era.*

---

fore suggested that the transportation of CO<sub>2</sub>, by pipeline, from land-based courses direct to sub-sea repositories, will not fall foul of these Conventions.

The fourth consideration is whether there are any exceptions within the Conventions, which may also provide a basis for the storage of CO<sub>2</sub>. Both of the Conventions exclude from the definition of “dumping” the disposal or storage of wastes or other matter directly arising from, or related to the exploration, exploitation, and associated off-shore processing of seabed mineral resources. This would suggest that where CO<sub>2</sub> ends up in storage, following enhanced oil/gas recovery operations, this is permissible under the Convention and Protocol.

The second possible exception is that both Conventions exclude from the definition of “dumping” the “placement of matter for a purpose other than the mere disposal.” It could be argued that the CO<sub>2</sub> is not in fact disposed of, but temporarily placed until the climate situation is brought under control. It is unclear what “placement” is intended to constitute or what is its scope, but one could guess it is intended to cover things such as the placement of artificial reefs.<sup>13</sup> On balance, it seems unlikely that one can succeed in arguing that the CO<sub>2</sub> will be temporarily stored rather than disposed of, particularly as it could gradually leak from the storage site and there are no plans to recover it later.

#### CHANGING THE LAW

Contracting Parties to the London Convention and Protocol have recently been discussing the legal implications of CO<sub>2</sub> storage. A questionnaire asking Parties for their legal opinions to a number of questions was circulated by the Secretariat in 2004. The results of this questionnaire were discussed at the 27th Meeting of the Parties in October 2005. There was no agreement amongst parties as to whether the Convention or the Protocol were compatible with CCS activities, apart from in some instances that CCS may be allowed (in enhanced oil and gas recovery for example). It was agreed that it may be expedient to either reach agreements on the interpretation of the Protocol and Convention or consider making amendments to the legislation.

An Intersessional Legal and Related Issues Working Group on CO<sub>2</sub> Sequestration was established to develop and clarify the legal issues. This was with a view to facilitating and/or regulating CCS, and, if appropriate, drafting potential amendment options to the Protocol or Convention.<sup>14</sup> The Scientific Technical Group to the Conventions was also instructed to make an assessment of the potential risks to the marine environment.<sup>15</sup>

After the legal and technical working groups met in April 2006, it became clear that the Protocol would be amended in the first instance. Australia put forward a proposal, co-sponsored by France, Norway, and the UK, recommending an amendment to Annex I of the Protocol, thus bringing the regulation of CO<sub>2</sub> into line with the regulation of other substances eligible for dumping or storage. The proposal would allow for carbon dioxide streams from CCS consisting “overwhelmingly of CO<sub>2</sub>” to be stored in geological formations.<sup>16</sup>

An amendment to the Annex was pursued because it is easier to change an Annex rather than a main text of the Convention. It would have also been considered easier to amend the Protocol in the first instance as it has less contracting parties. The next meeting of the Contracting Parties (the 28th Meeting) will be held in November 2006 and to amend the Protocol will require a two-thirds agreement of those present at the meeting.

The amendment will then enter into force immediately for any party agreeing to it, and for all other Parties (whether they agreed to it or not) after a period of 100 days following the relevant meeting, unless a declaration against acceptance is made by a Party within that period.

#### CONCLUSION

In an ideal world, it is obviously not a flawless plan to store/dump CO<sub>2</sub> in geological formations in marine waters. Many will find transferring pollution from one source to another to be morally abhorrent, as well as potentially illegal. The problem remains that the majority of the world’s commercial energy needs are met by fossil fuels and we are no closer to the end of the fossil fuel era.

The sad truth is that government and industry has been aware of the threat posed by climate change since the Rio Summit over fifteen years ago, but have been slow to react and invest in new clean technologies.

If we carry on adopting a “business as usual” approach, global temperatures will continue to increase, sea levels will rise, and extreme weather events will intensify. This is exacerbated by the economic growth in Asian countries. A toolkit of responses is necessary to deal with the urgency of global warming, and although CCS could prove unpopular in some quarters, it will probably have to be deployed worldwide if we want to continue using fossil fuels up to 2030.

Humans are faced with the difficult environmental choice of either increasing the CO<sub>2</sub> in the atmosphere to dangerous levels, or possibly polluting marine waters if CO<sub>2</sub> is not successfully stored. Although stored CO<sub>2</sub> has the capacity to leak into the sea,

---

*CCS was first considered as a mitigation tool for developed countries who were worried that a rapid move away from fossil fuels would cause serious disruption to their economies, but still had binding targets to meet under Kyoto.*

---

it should prevent it reaching the atmosphere, which in the author's opinion is probably worth the risk. CCS could also protect the seas because as things stand, there is growing evidence of ocean acidification caused by higher levels of atmospheric CO<sub>2</sub> being absorbed by the oceans. This is thought to be already exerting a detrimental effect on marine ecosystems.

It also seems unlikely that CO<sub>2</sub> storage projects will take place over huge maritime areas. Under UNCLOS, nations have the greatest amount of coastal jurisdiction and control over the waters closest to shore, with increasing responsibility to accommodate uses by other nationals as the distance from shore increases. It is suspected that most storage sites will therefore be in countries' own exclusive economic zones or continental shelves. There are also only a limited number of suitable storage sites in international waters and economic restrictions will mean that the majority of projects will take place where there is existing infrastructure and the geology is known.

Therefore, even though CCS in geological marine formations could attract criticism, there are imperative reasons for such projects to go ahead. It is debatable whether a two-thirds majority will support amending the Protocol when Parties meet in November 2006. If the vote goes against those pushing for CCS, then it is very likely it will be back on the agenda for amendment in 2007. If CO<sub>2</sub> storage does receive the two-thirds majority go-ahead in November 2006, then it is also feasible that

---

*Many will find  
transferring pollution  
from one source  
to another to be  
morally abhorrent.*

---

the London Convention and other regional agreements might also be amended.

Although the international acceptance of CCS is gathering pace, there will still be a number of challenges even if marine laws are changed to expressly allow it. Firstly, the international community still has to determine how CO<sub>2</sub> in geological formations under the sea will fit in with Kyoto. Greater clarification and certainty is needed in relation to crediting and CDM inclusion. Secondly, there will also need to be regulatory frameworks

at international and national levels covering capture, transport, and storage sites, as well as agreements in place on monitoring and liability. The EU has already stolen a march on this and has recently announced plans for a draft legislative proposal for an enabling CCS framework.<sup>17</sup>

CCS is arguably at the forefront of current climate change policy and thinking, and this is reflected in the unusual pace of international policy and legal developments. Interestingly, CCS

reflects contemporary challenges in environmental law because it not only highlights the overriding importance of interdisciplinary cooperation, but it also requires competing environmental interests (e.g., air and water) to find legal solutions and make concessions to achieve common goals. This poses real and compelling challenges for environmental lawyers, who have an increasing responsibility in helping determine difficult environmental choices.



## Endnotes: The Legal Implications of Carbon Capture and Storage

---

<sup>1</sup> Lord Ronald Oxburgh, *Capturing the Moment*, PARLIAMENTARY MONITOR, July 21, 2006.

<sup>2</sup> Intergovernmental Panel on Climate Change [IPCC], Working Group III, *Carbon Dioxide Capture and Storage* (2005); The International Energy Agency [IEA], *Legal Aspects of Storing CO<sub>2</sub>* (Mar. 2005).

<sup>3</sup> IPCC website, <http://www.ipcc.ch> (last visited Sept. 18, 2006).

<sup>4</sup> IPCC, IPCC THIRD ASSESSMENT REPORT: CLIMATE CHANGE 2001 (2001), available at <http://www.ipcc.ch/pub/online.htm> (last visited Sept. 18, 2006).

<sup>5</sup> See Kyoto Protocol to the United Nations Framework Convention on Climate Change, annex 1, Dec. 10, 1997, 37 I.L.M. 32.

<sup>6</sup> Table compiled in 2006 by Martin Hession of Defra, UK. (On file with the author).

<sup>7</sup> Oxburgh, *supra* note 1.

<sup>8</sup> House of Commons Science and Technology Committee, *Meeting UK Energy and Climate Needs: The Role of Carbon Capture and Storage*; First Report of Session 2005–06; Volume 1; HC 578-I; Stationary Office Ltd. (2006).

<sup>9</sup> United Nations Convention on the Law of the Sea art. 194, Dec. 10, 1982, 1833 U.N.T.S. 397.

<sup>10</sup> E.g., Convention for the Protection of the Marine Environment of the North-

East Atlantic, Sept. 22, 1992, 32 I.L.M. 1069.

<sup>11</sup> These numbers are current as of April 2006.

<sup>12</sup> R. Purdy, *Geological Carbon Dioxide Storage and the Law*, in CAPTURING CARBON: THE PROSPECTS FOR CARBON DIOXIDE CAPTURE AND STORAGE IN THE UK (C. Gough & S. Shackley eds., 2006).

<sup>13</sup> R. Purdy & R. Macrory, *Geological Carbon Sequestration: Critical Legal Issues* (TYNDALL CENTRE FOR CLIMATE CHANGE RESEARCH WORKING PAPER NO. 45, 2004), available at [http://www.tyndall.ac.uk/publications/working\\_papers/wp45.pdf](http://www.tyndall.ac.uk/publications/working_papers/wp45.pdf) (last visited Sept. 18, 2006).

<sup>14</sup> International Maritime Organization (IMO), *Provisional Agenda for the meeting of the CM Intersessional Legal and Related Issues Working Group on CO<sub>2</sub> Sequestration*, IMO, LC/CM-CO2 1/1, Jan. 26 2006.

<sup>15</sup> IMO, *Provisional Agenda for the meeting of the SG Intersessional Technical Working Group on CO<sub>2</sub> Sequestration*, IMO, LC/SG-CO2 1/1, Jan. 30, 2006.

<sup>16</sup> IMO, *CO<sub>2</sub> Sequestration in sub-seabed formations: Consideration of Proposals to Amend Annex I to the London Protocol*, LP 1/6, Apr. 28, 2006.

<sup>17</sup> European Commission 2006/s102-108792, *Contract: Technical Support for an Enabling Policy Framework for Carbon Capture and Geological Storage* (2006).

# ARE MARINE NATIONAL MONUMENTS BETTER THAN NATIONAL MARINE SANCTUARIES?

## U.S. OCEAN POLICY, MARINE PROTECTED AREAS, AND THE NORTHWEST HAWAIIAN ISLANDS

by Robin Kundis Craig\*

### INTRODUCTION

Since at least the 1996 Sustainable Fisheries Act amendments to the Magnuson-Stevens Fishery Conservation and Management Act,<sup>1</sup> the United States has, at least nominally, been pursuing a policy of sustainable management of fisheries, guided by the precautionary principle. Nevertheless, there is continued concern about the state of American fisheries. As the Pew Oceans Commission pointed out in May 2003, we are depleting the oceans of fish and have been for decades. While we only know the status of one-third of the commercially fished stocks in U.S. waters, thirty percent of the fish populations that have been assessed are overexploited to some degree.<sup>2</sup> In its 2004 Final Report to Congress and the President, the U.S. Commission on Ocean Policy expressed similar concerns in a chapter devoted to the topic of sustainable fisheries. Specifically, the Commission noted that “the last thirty years have witnessed overexploitation of many fish stocks, degradation of habitats, and negative consequences for too many ecosystems and fishing communities.”<sup>3</sup>

Chances are that the United States’ actual attainment of sustainable fisheries will involve the increasing use of marine protected areas (“MPAs”) and marine reserves. MPAs are location-based legal protections for marine species and ecosystems — the ocean equivalent of terrestrial national and state parks. While all MPAs restrict some activities within their boundaries, often through the use of marine zoning, the most protective MPAs are marine reserves. Within the boundaries of a marine reserve, usually all extractive uses of the marine ecosystem are prohibited, including all fishing. Some marine reserves go further and prohibit all access to the ecosystem except scientific research, but most allow non-extractive recreational uses such as snorkeling, diving, and boating.

Research has repeatedly demonstrated that MPAs and marine reserves that are scientifically chosen to protect important fish habitats, such as breeding grounds or nurseries, can be quite effective in increasing both the numbers and size of targeted species of fish.<sup>4</sup> Size can be just as important as numbers for the many species for which larger, older fish — the usual targets of commercial and recreational fishers — produce far more gametes far more often than smaller fish. As the Pew Oceans Commission summarized:

“Marine reserves — areas of the ocean in which all extractive and disruptive activities are prohibited — are a relatively new, but very promising

approach to marine conservation . . . . The establishment of areas that prohibit extractive and disruptive activities, such as wilderness areas, has been a well-accepted conservation practice on land for more than a century and has greatly enhanced ecosystem protection. While 4.6 percent of the land area of the United States is preserved as wilderness, the area of ocean under U.S. jurisdiction that is protected in marine reserves is a small fraction of one percent.”<sup>5</sup>

Similarly, the U.S. Commission on Ocean Policy linked sustainable fisheries to the increased use of MPAs and ecosystem-based management.

It recommended that fisheries managers increase the use of “essential fish habitat” designations on an ecosystem basis<sup>6</sup> and that the federal government “develop national goals and guidelines leading to a uniform

---

*While we only know the status of one-third of the commercially fished stocks in U.S. waters, thirty percent of the fish populations that have been assessed are overexploited to some degree.*

---

\*Robin Kundis Craig is the Attorneys’ Title Insurance Fund Professor of Law at Florida State University College of Law, Tallahassee, Florida. The author also serves as Chair of the American Bar Association’s Section on Environment, Energy, and Resources’ Marine Resources Committee. She may be reached by e-mail at rcraig@law.fsu.edu.



The Northwestern Hawaiian Islands Marine National Monument.

process for the effective design, implementation, and evaluation of marine protected areas.”<sup>7</sup>

Even accepting these general goals, the legal mechanism for establishing a national system of MPAs and marine reserves remains relatively unexamined. Currently, there are many legal vehicles available to create an MPA or marine reserve, even just within federal law. For example, MPAs can and have been created through the Antiquities Act of 1906,<sup>8</sup> the Marine Protection, Research, and Sanctuaries Act (“MPRSA”),<sup>9</sup> the Magnuson-Stevens Act, direct congressional legislation,<sup>10</sup> and presidential executive order. In addition, coastal states can establish MPAs and marine reserves in the first three nautical miles of the ocean pursuant to a wide variety of state statutes. This variety of legal vehicles gives credence to concerns that both the Pew Oceans Commission and the U.S. Commission on Ocean Policy raised regarding the uncoordinated patchwork of laws and regulatory programs that govern the nation’s oceans. However, differences in these regulatory regimes, and in the MPAs and marine reserves that result, can also suggest improvements in the law that might better effectuate sustainable use of the nation’s marine fisheries.

The Northwestern Hawaiian Islands provide one possible testing ground for examining the many federal legal mechanisms for creating MPAs and marine reserves. On June 15, 2006, President Bush used the Antiquities Act to create the Northwestern Hawaiian Islands Marine National Monument (“NWHI Monument” or “Monument”).<sup>11</sup> This new national monument protects almost 140,000 square nautical miles of ocean around the long chain of islands — almost 1400 miles long — that stretches north and west of Kauai, the northernmost Hawaiian island that tourists normally visit. The Monument is the largest

MPA in the world and protects the largest and arguably most pristine and remote coral reef ecosystem in the world, which is home to more than seven thousand marine species, twenty-five percent of which are found nowhere else.

President Bush’s invocation of the Antiquities Act, however, was the last in a series of federal legal actions to protect the Northwestern Hawaiian Islands coral reef ecosystem. By invoking the Antiquities Act, President Bush cut short the process of designating the Northwestern Hawaiian Islands as a national marine sanctuary pursuant to the MPRSA. The national marine sanctuary designation process, in turn, was a response to President Clinton’s use of an executive order to create the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve (“NWHI Reserve” or “Reserve”), which was itself in tension with both the Western Pacific Fishery Management Council’s (“West-Pac’s”) fisheries management planning pursuant to the Magnuson-Stevens Act and, at least for a while, the State of Hawaii’s management efforts pursuant to state law.

### PROTECTING THE NORTHWESTERN HAWAIIAN ISLANDS AS AN MPA: CHOICE OF LEGAL VEHICLE

#### JURISDICTION OVER THE NORTHWESTERN HAWAIIAN ISLANDS

Under the third United Nations Convention on the Law of the Sea (“UNCLOS III”),<sup>12</sup> which entered into force on November 16, 1994, coastal nations can assert various levels of regulatory authority over four zones of the ocean. The twelve nautical miles of ocean closest to shore are the territorial sea, in which the coastal nation may exercise sovereign control over the waters, the airspace, the seabed, and the subsoil. The next twelve nautical miles of ocean (twelve to twenty-four nautical miles out

to sea) are the contiguous zone, which coastal nations can use to enforce laws relating to activities in the territorial sea or on shore. A nation's exclusive economic zone ("EEZ") can extend up to two hundred nautical miles from shore. In its EEZ, the coastal nation has sovereign rights to explore, exploit, conserve, and manage the sea's natural resources, "whether living or non-living," in the waters, seabed, and subsoil.<sup>13</sup> Finally, coastal nations can exercise regulatory control over the continental shelf, particularly for energy development purposes.

The United States is not a party to UNCLOS III. However, it views most of the jurisdictional provisions of UNCLOS III as customary international law and has asserted conforming claims of jurisdictional authority over all four zones. Thus, as a practical matter, the United States regulates marine fisheries out to two hundred nautical miles from its shores. Given the United States' relatively long and unshared coastlines and its territorial holdings in the Pacific and Caribbean, this assertion of jurisdiction means that the United States regulates more square miles of ocean than it does of land.

Nevertheless, while, as a nation, the United States asserts jurisdiction over two hundred nautical miles of ocean extending from its shores, generally only the outermost 197 nautical miles are purely federal waters. In 1947, the U.S. Supreme Court declared all marine waters under U.S. jurisdiction to be federal.<sup>14</sup> However, six years later, Congress "restored" title to the first three nautical miles of ocean to the states through the Submerged Lands Act of 1953.<sup>15</sup> In addition, the Submerged Lands Act allowed states to assert claims to more than the standard

three nautical miles, based on historical control. While most of such claims have been unsuccessful, Texas and Florida both established that their sovereign rights extend three marine leagues (about nine nautical miles) into the Gulf of Mexico.

Title to submerged lands gives the states authority to regulate the waters above those lands. However, states' regulation of the three nautical miles of ocean closest to shore remains subject, under both the Submerged Lands Act and the Supremacy Clause, to the federal government's authority to regulate for "commerce, navigation, national defense, and international affairs."<sup>16</sup> Thus, with respect to the Northwestern Hawaiian Islands, the State of Hawaii generally has primary authority to regulate the three-nautical-mile "donut" of ocean water surrounding each island (Midway Island is an exception). The rest of the waters surrounding this island chain are purely federal.

#### FEDERAL LEGAL INSTRUMENTS FOR SETTING ASIDE THE NORTHWESTERN HAWAIIAN ISLANDS AS AN MPA

The Northwestern Hawaiian Islands have long attracted fed-

eral attention. In 1909, President Theodore Roosevelt, acting through executive order, reserved all of the Northwestern Hawaiian Islands except Midway "for the use of the Department of Agriculture as a preserve and breeding ground for native birds."<sup>17</sup> This reservation eventually became the Hawaiian Islands National Wildlife Refuge, and in 1988 the Refuge's protections were extended to the area's coral reefs and the marine life found in and around them.

#### The Clinton Executive Orders

In 1998, President Clinton issued the Coral Reef Protection Executive Order<sup>18</sup> to preserve the biodiversity and other values of the United States' coral reef ecosystems. The Order makes federal agencies directly responsible for protecting coral reefs and their associated ecosystems, and it created the Coral Reef Task Force. In March 2000, the Clinton Administration adopted the Coral Reef Task Force's *National Plan to Conserve Coral Reefs*. A key component of this plan was to set aside twenty percent of the existing coral reef MPAs as no-take fisheries reserves (also referred to as "marine wilderness areas").

On May 26, 2000, President Clinton signed the Marine Protected Areas Executive Order.<sup>19</sup> The Order seeks to establish a national system of MPAs by linking MPAs and marine reserves established under federal, state, territorial, tribal, or local law. President George W. Bush adopted this Executive Order in June 2001. The National Oceanic and Atmospheric Administration ("NOAA") is currently implementing the Executive Order through the National Marine Protected Areas Center. In November 2004, the MPA Center issued its

Strategic Plan for working toward "a cohesive and integrated system of MPAs."

The designation of the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve came about through an unusual blending of congressional and presidential action. In November 2000, through the National Marine Sanctuary Amendments Act of 2000, Congress authorized President Clinton, in consultation with the Governor of Hawaii, to "designate any Northwestern Hawaiian Islands coral reef or coral reef ecosystem as a coral reef reserve to be managed by the Secretary of Commerce."<sup>20</sup> President Clinton exercised this authority in Executive Order No. 13178,<sup>21</sup> establishing the NWHI Reserve. This Reserve set aside an area 1200 nautical miles long by one hundred nautical miles wide, protecting seventy percent of the nation's coral reefs. President Clinton ordered the Reserve to be managed pursuant to a precautionary approach that favored resource protection when information was lacking. The Order also called for the use of marine zoning, including the establishment of marine reserves

---

*Once an area is designated as a National Marine Sanctuary, no one can use or remove sanctuary resources except in accordance with federal law.*

---

("Reserve Preservation Areas"), and for restoration of degraded portions of the reef. Finally, the Order capped all fishing in the Reserve at the currently existing levels.

The problem with the NWHI Reserve Executive Order was that Congress did not permanently eliminate other sources of legal authority that could apply in the Northwestern Hawaiian Islands. The flimsiness of President Clinton's legal authority to establish the Reserve is evidenced by the fact that, in an appropriations act, Congress demanded "adequate review and comment" before the Reserve Preservation Areas could become permanent. The Secretary of Commerce held seven public hearings on the executive order's proposal, allowing President Clinton to issue a final NWHI Reserve Executive Order on January 18, 2001,<sup>22</sup> three days before he left office.

### **The Magnuson-Stevens Act**

The legal authority of the NWHI Reserve Executive Orders remained questionable, especially in light of the authority given to NOAA and WestPac pursuant to the Magnuson-Stevens Act. This Act establishes "[a] national program for the conservation and management of the fisheries resources in the United States" in order "to prevent overfishing, to rebuild overfished fish stocks, to ensure conservation, and to realize the full potential of the Nation's fishery resources"<sup>23</sup> Moreover, as noted, when Congress amended the Magnuson-Stevens Act through the 1996 Sustainable Fisheries Act, it incorporated both a precautionary approach to and a sustainable development goal for the country's fisheries management.

Pursuant to the 1996 amendments, the regional Fisheries Management Councils have begun to experiment with an ecosystem approach to fisheries management, including the use of zoning and MPAs. For example, on June 28, 2006, NOAA Fisheries used its authority under the Magnuson-Stevens Act to amend five fishery management plans for Alaska fisheries to prohibit trawling in 370,000 square miles of Alaska waters. This regulation, which became effective July 28, 2006, effectively created two MPAs — a 320,000-square-mile area in the Aleutian Islands and a 50,000-square-mile area in the Gulf of Alaska — for Alaska's cold-water coral gardens, one of the rarest marine ecosystems in the world. More recently, the Pacific Fishery Management Council has used its authority under the Magnuson-Stevens Act to create marine reserves off the California coast, especially in connection with the Channel Islands National Marine Sanctuary.

Nevertheless, nothing in the Magnuson-Stevens Act validates the establishment of the NWHI Reserve or required NOAA and WestPac to respect the Reserve Protected Area designations. In fact, under this Act, NOAA and WestPac remained legally free to choose to impose fishing regimes for the Northwestern Hawaiian Islands that would contradict the Reserve Protected Area designations.

Indeed, conflicts did arise. In December 2000, WestPac published its ecosystem-based *Draft Fishery Management Plan for the Coral Reef Ecosystems of the Western Pacific Region*. It received several comments adamantly opposing the creation of MPAs, and especially no-take marine reserves, in the Northwest-

ern Hawaiian Islands, despite the fact that federally regulated fishing there was already fairly limited. Yet, when WestPac issued the final version of this fishery management plan in October 2001, it did preserve the concept of no-take marine reserves. However, the marine reserve boundaries in the fishery management plan differed from those President Clinton had designated within the NWHI Reserve, leaving the executive order more protective of the coral reefs than WestPac allowed pursuant to the Magnuson-Stevens Act.

Incoming President George W. Bush took about a year to accept President Clinton's NWHI Reserve Executive Orders, rendering the Reserve's status even more legally ambiguous. Moreover, after the change in administration, WestPac more actively opposed the NWHI Reserve's Reserve Protection Areas and their prohibitions on fishing, proposing instead to allow harvesting of lobsters and precious coral.

Similarly, into mid-2001, Hawaiians continued to express concern about the fishing limitations in the NWHI Reserve. Indeed, the Hawaii Department of Land and Natural Resources was reluctant to commit to MPA and marine reserve protections in the Hawaiian state waters surrounding each island. Its January 2002 draft management plan for these waters was far less protective, and far more permissive of fishing, than President Clinton's executive order for the federal waters in the Reserve.

### **The Marine Protection, Research, and Sanctuaries Act of 1972**

The national marine sanctuaries provisions of the MPRSA allow the Secretary of Commerce, acting through NOAA, to designate "any discrete area of the marine environment" as a National Marine Sanctuary if NOAA makes certain findings.<sup>24</sup> Specifically, NOAA must find that: (1) the area is of special national significance; (2) the area needs protection; and (3) the area is manageable. Thirteen National Marine Sanctuaries currently exist, protecting more than 18,000 square miles of ocean. In addition, in January 2006, Governor Ted Kulongoski of Oregon proposed a new Oregon Coast National Marine Sanctuary.

Once an area is designated as a National Marine Sanctuary, no one can use or remove sanctuary resources except in accordance with federal law. Thus, National Marine Sanctuaries are MPAs. However, historically, very few National Marine Sanctuaries have included marine reserves because the MPRSA emphatically encourages multiple uses of these sanctuaries. Nevertheless, some of the National Marine Sanctuaries are experimenting with the use of marine reserves. The designation of the Dry Tortugas Ecological Reserve in the Florida Keys National Marine Sanctuary is probably the most famous example of a marine reserve negotiation. In addition, the Channel Islands National Marine Sanctuary, off the coast of southern California, has been pursuing a multi-year plan to establish marine reserves within the sanctuary.

Spurred by President Clinton's final NWHI Reserve Executive Order, NOAA announced on January 19, 2001, that it intended to designate the Reserve as a national marine sanctuary. As a result of the Bush Administration's reconsideration, however, NOAA did not begin the scoping process for the sanctuary

until March 2002, and then, because of high levels of public interest, it extended that process twice. Designation of the national marine sanctuary also required the issuance of a fishery management plan pursuant to the Magnuson-Stevens Act and a full environmental impact statement (“EIS”) pursuant to the National Environmental Policy Act.<sup>25</sup> Partially as a result of these and the MPRSA’s procedural requirements, NOAA anticipated from the beginning that sanctuary designation would take two to three years.

Even so, it is fair to say that the sanctuary designation process effectively stalled out. As late as May 2006, NOAA was still working on the draft EIS for the proposed sanctuary,<sup>26</sup> and management of the NWHI Reserve was still proceeding through the uneasy double authorities of President Clinton’s executive order and WestPac’s implementation of the Magnuson-Stevens Act.<sup>27</sup> This four-year delay helps to explain why President Bush reached for the Antiquities Act.

### **The Antiquities Act/Act of June 8, 1906**

The Antiquities Act is very short. Under it, the President of the United States is “authorized, in his discretion, to declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States to be national monuments.”<sup>28</sup> Moreover, while the Antiquities Act has a predominantly terrestrial focus, Presidents have repeatedly used it to create marine-related national monuments that function as MPAs, such as the Buck Island Reef National Monument in the Virgin Islands and the California Coastal National Monument along most of the coast of California.

President Bush’s proclamation<sup>29</sup> establishing the Northwestern Hawaiian Islands Marine National Monument is very protective of the area. Virtually all activities within the Monument are subject to regulation by the Secretaries of Commerce (water) and the Interior (land), and the proclamation imposes a vessel monitoring requirement as well. All commercial fishing is to be phased out over five years, with the lobster fishery immediately subject to an annual catch limit of zero. Oil and gas exploration and development, vessel anchoring, and introductions of invasive species are absolutely prohibited. In addition, the Secretaries cannot permit any activity within the Monument unless the activity meets ten ecosystem-preserving criteria. For example, recreational snorkeling and diving are prohibited in the Special Preservation Areas and Midway Atoll Special Management Area. Thus, effectively, most of the NWHI Monument is or will become a marine reserve, the largest such reserve on the planet.

### **CONCLUSION**

The Northwestern Hawaiian Islands’ history as an MPA strongly suggests that pure presidential authority is a more efficient vehicle for establishing MPAs, especially marine reserves. Even at the executive order stage, President Clinton accomplished far more through the NWHI Reserve Executive Order than NOAA managed in five years of the national marine sanctuary designation process. As noted, however, executive orders lack comprehensive legislative backing and authority, leading to

potential conflicts with other marine regulatory programs, such as those established under the Magnuson-Stevens Act.

In contrast, the Antiquities Act gives the President this executive authority with full legislative backing, an improvement over the use of executive orders. It also appears to have two advantages over the MPRSA. First, the Antiquities Act has the advantage of speed of designation. As soon as President Bush declared the NWHI Monument established on June 15, 2006, the Monument existed. In addition, NOAA — undoubtedly aided by the prior existence of the NWHI Reserve and the national marine sanctuary process — issued its final regulations for the national monument just two months later.<sup>30</sup>

Second, the legal protections for a marine national monument are potentially much greater than those for a national marine sanctuary. As noted, the MPRSA promotes a philosophy of multiple use regulation of national marine sanctuaries. In contrast, the Antiquities Act inspires a preservationist philosophy, as President Bush’s proclamation setting aside the NWHI Monument attests.

Congress is currently debating whether and how to implement the many recommendations of the Pew Oceans Commission and the U.S. Commission on Ocean Policy. The history of the Northwestern Hawaiian Islands suggests that if Congress decides to vigorously pursue the Commissions’ recommendation to increase the use of MPAs and marine reserves to preserve and restore fisheries and to protect marine ecosystems in general, it should seriously consider modeling at least one part of any new federal MPA legislation on the Antiquities Act and giving the president considerable direct authority to establish MPAs and marine reserves.

Of course, to create a coherent national system, Congress may want to constrain presidential authority in some way — for example, by limiting presidential designation authority to recommendations of an expert agency or panel. Nevertheless, this constrained authority would still be more likely to produce a functional national system of MPAs and marine reserves — especially if joined to a streamlined agency designation process — than the multi-use, multi-agency, multi-analysis national marine sanctuary regulatory regime.



## **Endnotes: Marine National Monuments**

<sup>1</sup> Pub. L. No. 104-297, 110 Stat. 3559-3621 (Oct. 11, 1996), amending Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. §§ 1801–1882.

<sup>2</sup> PEW OCEANS COMMISSION, AMERICA’S LIVING OCEANS: CHARTING A COURSE FOR SEA CHANGE. SUMMARY REPORT (2003), available at [http://www.sml.cornell.edu/forms/oceans\\_summary.pdf](http://www.sml.cornell.edu/forms/oceans_summary.pdf) (last visited Sept. 25, 2006).

<sup>3</sup> U.S. COMMISSION ON OCEAN POLICY, FINAL REPORT: AN OCEAN BLUEPRINT FOR THE 21ST CENTURY 2004, available at [http://www.oceancommission.gov/documents/full\\_color\\_rpt/000\\_ocean\\_full\\_report.pdf](http://www.oceancommission.gov/documents/full_color_rpt/000_ocean_full_report.pdf) (last visited Sept. 25, 2006).

**Endnotes:** Marine National Monuments *continued on page 81*

# HOW TO PROTECT A CORAL REEF: THE PUBLIC TRUST DOCTRINE AND THE LAW OF THE SEA

by J.C. Sylvan\*

## INTRODUCTION

**R**ef ecosystems are an invaluable biological resource — the “species factories” of the world’s seas.<sup>1</sup> Though they occupy less than one percent of the ocean floor, reefs are home to 25 percent of all marine species and 32 of the 33 animal phyla.<sup>2</sup> Among these reefs ecosystems, ten “Coral Reef Hotspots” comprise just one hundredth of a percent of the ocean floor in terms of area and harbor more than half of the world’s restricted-range marine species.<sup>3</sup> For the sheer concentration of biodiversity they support, only tropical rainforests can compare, and rainforests occupy 20 times the area.<sup>4</sup>

Coral reefs also rank among the most endangered marine ecosystems on earth.<sup>5</sup> The same unique biology that enables reef-building corals to create and maintain vital habitat also makes them particularly vulnerable to the cumulative and interactive effects of local and global environmental stressors, primarily overfishing, pollution, and coral bleaching. In every place they are found, reefs are now reported to be “in crisis.” Of the coral reefs that remain, nearly a third worldwide are degraded,<sup>6</sup> and more than half are considered to be at risk.<sup>7</sup> By 2030, 60 percent of the world’s coral reefs are predicted to disappear.<sup>8</sup>

Properly managed, healthy, and intact reefs could potentially provide a sustainable livelihood for coastal communities. As our knowledge of the risks to coral reefs grows, so too does the need to adapt our international legal regimes to ensure their sustainable use. This article argues that there are significant economic benefits to adapting existing legal regimes, notably the public trust doctrine, to protect the long-term sustainability of coral reefs. The first part delineates the benefits that healthy coral reefs provide as well as the primary threats they face today. The second part surveys the legal regimes most relevant to their sustainable use.

## CHARACTERISTICS OF CORAL REEFS

### THE BENEFITS OF CORAL REEFS

Coral reefs provide two kinds of benefits: “economic benefits,” which are tangible and immediate, and “ecosystem services,” which are less apparent perhaps, but no less important. Worldwide, coral reefs have a net present value of almost \$800 billion, and every year, they generate \$30 billion in net economic benefits.<sup>9</sup> One square kilometer of healthy reef habitat can feed

up to 300 people; nearly ten percent of all the fish consumed worldwide is caught on a reef.<sup>10</sup> Sustainable managed reefs can become a financially lucrative for both the marine aquarium and the live fish trades.<sup>11</sup> The annual dockside value of commercial U.S. fisheries that depend on coral reefs exceeds \$100 million; “the annual value of reef-dependent recreational fisheries probably exceeds that.”<sup>12</sup>

The pharmaceutical industry has found dozens of substances with antimicrobial, anti-inflammatory, and anti-coagulating properties in reef species.<sup>13</sup> AZT, a drug doctors have used to treat HIV, is derived in part from compounds found in a Caribbean reef sponge.<sup>14</sup> Moreover, with potentially eight million more reef species still to be identified, reefs may represent an “untapped wealth of biochemical resources.”<sup>15</sup> The aesthetic value of healthy and intact coral reefs generates another source of tourism-related income for coastal communities to the tune of \$9.6 billion in net benefits annually.<sup>16</sup> Finally, healthy reefs may

also translate into a “politically actionable existence value... [P]eople derive satisfaction from just knowing that coral reefs still exist.”<sup>17</sup>

In addition to their economic benefits, reefs also provide valuable ecosystem services that are difficult to quantify because they are provided at no cost. Healthy and intact reefs absorb as much as 90 percent of the impact of wind-

generated waves, protecting ports, shipping, coastal development, and mangroves from storms and erosion.<sup>18</sup> Replacing these services can be expensive: in the Maldives, an artificial substitute for a coral reef cost \$12 million to construct.<sup>19</sup> Reef-dependent animals also provide valuable ecosystem services. Green turtles, for example, maintain seagrass beds, ecosystems in themselves worth an estimated \$3.8 trillion.<sup>20</sup> Finally, from an aesthetic perspective, healthy reefs also keep white sand beaches clean. In the aftermath of Hurricane Allen, the combination of disease, pollution from coastal development, and historic overfishing of algae-eating reef fish, “flipped” Jamaica’s coastal ecosystem from an array of pristine coral reefs to a massive algae bloom.<sup>21</sup>

---

*Coral reefs also rank among the most endangered marine ecosystems on earth.*

---

\* J.C. Sylvan is a JD candidate, May 2008, at American University, Washington College of Law.

Sound environmental policies do not easily translate into conventional measures of economic health, such as gross national product. Nonetheless, “[i]nvesting in environmentally sustainable management and development of [coral reefs today] will be more cost effective than restoring human livelihoods and ecosystems after a catastrophe.”<sup>22</sup> While any attempt to put a price on ecosystem services should be viewed with caution, valuations can guide us in weighing the costs and benefits of sustainable reef management. A healthy and intact coral reef may be worth as much as \$600,000 per square kilometer — well worth the \$775 per square kilometer it costs to maintain a marine protected area around them, especially considering that doing nothing will also have costs.<sup>23</sup> Harder still is to calculate the value of unknown opportunities lost when a biologically diverse reef is destroyed. Used sustainably, coral reefs will continue to provide immediate benefits. Preserved for the future, coral reefs may pay unforeseen dividends. Left undefended, their loss may deprive many development countries of their principle livelihood and a potential source of wealth.

### THREATS FACING CORAL REEFS

The trends are not encouraging. Reefs are disappearing faster than they can be counted. By one estimate, 40 percent of the world’s remaining coral reefs may be gone by 2010, 60 percent by 2030 if nothing is done.<sup>24</sup> One reason for the precipitous decline is an accident of reef ecology. Nearly 40 percent of the world’s human population now lives within 100 kilometers of a coastline.<sup>25</sup> As a result, reef species become overexploited, habitat is destroyed, watersheds are altered, and runoff pours sediment, sewage, pollutants, hydrocarbons, litter, and pathogens into coastal waters. Invasive species, stowed away in ballast water of tankers, are discharged along with cargo in port. Air pollution carries heavy metals, persistent organic pollutants (“POPs”) and persistent toxic substances (“PTSs”) miles from shore. Even excess nutrients can generate harmful plankton blooms that stifle corals.<sup>26</sup>

Another reason for the decline is a general failure of fisheries to account for the dynamic nature of reef ecosystems. Historic overharvesting of one species can have cascading effects on others. The pressure is compounded by the fact that many of the over-fished species play vital roles as “ecosystem engineers” and maintain the health of reef ecosystems.<sup>27</sup> When they are removed faster than their stocks can be replenished, reef ecosystems break down and lose their capacity to recover. Without a viable habitat, overexploited populations cannot recover. This entire process can happen quickly, but the effects endure. A reef discovered in Guam in 1957, for example, was fished down in six months and 40 years later the populations have yet to recover.<sup>28</sup>

In the long run, some species of reef fish and some areas of reef habitat may be more valuable if left alone. However, even a complete moratorium on reef fishing will not address all the

threats reefs face today. When subjected to severe stress, corals release symbiotic microalgae that account for their vivid colors, resulting in “coral bleaching.” Bleaching seems to be occurring with increasing frequency, such that every coral reef region in the world has experienced some bleaching over the past decade.<sup>29</sup> In 2005, scientists witnessed the worst bleaching event on record in the Caribbean.<sup>30</sup> The interaction of local and global pressures has a cumulative effect on the long-term health of corals, reducing their reproductive capacity, and making them susceptible to diseases. Given that the recovery time of reefs can take decades, successive environmental stressors can kill a reef. Permanent damage comes at significant cost. Bleaching on the Great Barrier Reef in Australia could cost nearly \$300 million over the next 15 years.<sup>31</sup> Globally, the economic losses over 50 years could approach \$83 billion.<sup>32</sup>

### LEGAL REGIMES FOR CONSERVATION AND SUSTAINABLE USE

Despite the benefits they provide, the risks they face, and the legal regimes created to manage them, coral reefs today remain largely unprotected. Like fisheries, reef conservation is a classic case of “the tragedy of the commons.” When access to a valuable resource is open, such that everyone can use it and no

one can bar or limit another’s use, exploitation will inevitably occur. Traditionally, oceans were like air, with benefits so abundant that reducing them to possession as private property was impracticable. This is not quite true for reefs. Limited in scope, fixed in location, they could arguably be reduced to private ownership.

While nearly 20 percent of the world’s coral reef habitat lies within one of 980 Marine Protected Areas (“MPAs”), less than 0.1 percent are protected by “no-take” rules that prohibit poaching, and none are protected from risks arising outside the MPA.<sup>33</sup> Even when reefs are officially “protected,” a mandate to regulate on behalf of a species, an area, a process or a habitat may not guarantee protection in an area subject to fractured jurisdiction or authority.<sup>34</sup> Divided authority engenders incoherent conservation goals for natural resources and undermines any opportunity for their sustainable use.

But even a regional approach to conservation will not work if it does not attend to the full range of risks facing a particular ecosystem. For example, The Magnuson-Stevens Fishery Conservation and Management Act (“Magnuson Act”) authorizes the drafting of a Fishery Management Plan for Coral and Coral Reefs of the Gulf of Mexico and South Atlantic to preserve “all corals on the seabed in U.S. federal waters (of the Gulf) from harvest, sale, and destruction from fishing related activities.”<sup>35</sup> Nevertheless, the National Marine Fisheries Service itself concluded that “[n]o regulatory mechanisms are currently in place, or expected to be in place in the foreseeable future, to control or prevent [the three principal threats to corals in the Gulf: elevated

---

*Worldwide, coral reefs  
have a net present value  
of almost \$800 billion.*

---

sea surface temperature, and hurricanes, and disease.] [T]he inadequacy of existing regulatory mechanisms is contributing to the threatened status of these species.”<sup>36</sup> Success of coral reef conservation depends on a unified authority with jurisdiction extending “from the inland extent of coastal watersheds to the offshore boundary of the nation’s exclusive economic zone,” and over “a wide range of ocean and coastal issues.”<sup>37</sup> Writ large, the gaps in United States ocean policy exemplify the problem of fragmentation facing coral reef conservation internationally.

#### THE GLOBAL: UNITED NATIONS CONVENTION ON THE LAW OF THE SEA<sup>38</sup>

When they entered into force in 1994, the 320 articles and nine annexes of the United Nations Convention on the Law of the Sea (“UNCLOS”) became the most comprehensive international legal agreement for marine conservation to date.<sup>39</sup> Most importantly, UNCLOS shifted the legal assumption that the ocean was an inexhaustible commodity, and adopted a precautionary approach that treated the seas as a vulnerable resource worthy of human stewardship. This idea is implicit throughout UNCLOS. However, certain provisions of UNCLOS undermine its effectiveness as a tool for protecting coral reef ecosystems. Under UNCLOS, living resources do not belong to the “common heritage of mankind.”

Moreover, because most reef-building corals depend on photosynthesis, they are limited to a “sunlit zone,” part of the ocean where light penetrates (about 660 feet). Thus, by another accident of ecology, most of the world’s coral reefs are well within coastal states’ jurisdiction, entitling them to conserve or to exploit most of the world’s reefs as they see fit.

While a state may invoke its obligation to maintain or restore populations of marine life at levels that can produce the maximum sustainable yield to justify a conservation policy, nothing requires them to do so. A state need only “consider” the effects of its policies on the marine environment. Moreover, the state itself sets its own benchmark for what level of protection of the marine environment is appropriate. While UNCLOS does caution Parties against undertaking actions which jeopardize the marine environment of their neighbors, absent proof of transboundary damage, no state can challenge the policies or practices of its neighbors. Ultimately, the state decides the sustainable limits of the living resources within its EEZ and the degree to which it will enforce them leading to instances where enforcement is so lax as to be nonexistent.

All told, “the one international agreement theoretically most suited for marine biodiversity protection is at best only a decidedly incomplete response to the mass extinction bubbling under the surface of the planet’s waters.”<sup>40</sup> Unfortunately, UNCLOS falls prey to a false dichotomy. When food pressures are at odds with reef conservation, people come first, as they should. But sustainable economic development and environmental conserva-

tion need not be at odds; they may even be synonymous. What happens, for instance, when a state allows pollution to continue unabated in the name of economic development and its reefs are permanently destroyed as a result, taking with them one of the few resources that developing nations have to generate economic growth?

#### THE LOCAL: MPAS AND MARINE RESERVES

In their approach to coral reef management, coastal states have had to find a balance between conservation and economic development. This has meant picking a regulatory scheme that protects reefs by limiting the ways the public can use them. A more permissive scheme, the Marine Protected Area (“MPA”), allows some commercial and recreational activities. A more restrictive subset of MPA, the marine reserve, implements a “no-take” rule which prohibits all activities that upset the natural ecological functions of the area. “No-take” reserves tend to be the exception rather than the rule, and less than 0.1 percent of coral reefs worldwide are protected by these kinds of “no-take” provisions.<sup>41</sup> Governments are reluctant to create marine reserves because “no-take” provisions fly in the face of the open access people associate with marine resources. In California, for example, a no-take reserve near Santa Barbara provoked a grass-

roots campaign to put a “Freedom to Fish Act” on the state and federal legislative agenda.<sup>42</sup>

Today, federal and state governments in the United States have ample legislative authority to create no-take marine reserves. The Supreme Court did away with the notion of State title to fisheries as a 19th-century legal fiction, but it

---

*40 percent of the world's remaining coral reefs may be gone by 2010.*

---

kept state “sovereignty over lands covered by tide waters, [...] with the consequent right to use or dispose of any portion thereof, when that can be done without substantial impairment of the interest of the public in the waters[.]”<sup>43</sup> Legitimacy of protecting fisheries turns upon “whether the State has exercised its police power in conformity with the federal laws and Constitution.”<sup>44</sup> But this approach begs the question: who decides what “the interest of the public in the waters” is, precisely?<sup>45</sup>

One view maintains that the legislature, as the ultimate representative of the public, is the final arbiter of the public interest. Another view elevates the public interest to an informal constitutional right — not even the legislature could assign a general benefit held in trust for the many to a privileged and well-connected few. Florida and Louisiana went so far as to include the public trust doctrine in their state constitutions.<sup>46</sup> A third approach views the public interest as a government defense against takings claims by private parties contesting conservation restrictions on private land. Under this view the public trust created a pseudo-easement on the land. If a private party bought tidal lands, it did so with constructive knowledge of the public’s traditional interests in fishing, or navigation thereon. Under this view, “the individual States have the authority to define the lim-

its of the lands held in public trust and to recognize private rights in such lands as they see fit.”<sup>47</sup>

But if two equally legitimate public property rights — like recreational fishing and coral reef conservation — are at odds, which interest wins out? Absent enactment of a “Freedom to Fish” bill or the like, the courts are left to decide. While tradition limited the public trust to navigation, fishing and commerce, time has amended the list, adding recreation, conservation and aesthetic concerns, without necessarily creating a hierarchy among them. The Florida State constitution added to the list marine living resources which “should be conserved and managed for the benefit of the state, its people, and future generations.”<sup>48</sup> The Supreme Court of Washington upheld a ban on the use of jet-skis on county waters reasoning, “it would be an odd use of the public trust doctrine to sanction an activity that actually harms and damages the waters and wildlife.”<sup>49</sup> This seems to suggest that the vitality of the ecosystem in general is paramount to any particular use to which it can be put.

As MPAs become more pervasive, and their classification becomes more fixed, the question of no-take provisions becomes more salient. In 1999, California passed its Marine Life Protection Act to create a network of MPAs and marine reserves along its coast that would be “managed according to clear, conservation-based goals and guidelines that take full advantage of the multiple benefits that can be derived from the establishment of marine life reserves.”<sup>50</sup> In 2000, President Clinton signed Executive Order 13158 to bring 1,500 MMAs under one national system with individual areas classified according to a single set of criteria.<sup>51</sup> Regionally, the United States, Mexico, and Canada are working on a North American MPA Network (“NAMPAN”).<sup>52</sup>

To date there are approximately 400 MPAs which include coral reefs in more than 65 countries around the world.<sup>53</sup> As the number of MPAs worldwide continues to grow, coastal states will have to choose which rules will govern reef conservation; how many of these new protected areas will have no-take provisions remains to be seen.

The advantage of “no-take” reserves is that they promote a more holistic approach to conservation management by aiming to restore the vitality to an entire ecosystem rather than just a single species. Reserves protect habitat, conserve biological diversity, provide a sanctuary for sea life, establish a benchmark to measure changes elsewhere in the marine environment, and help rebuild depleted fisheries by cushioning crashes in local fish stocks from overfishing in adjacent areas. On the other hand, the benefits of reef reserves have their limits. Sanctuary status only reduces the risk of overharvesting; it does not address the damage that arises from pollution, shipping, or coral bleaching. These require the cooperation of local authorities with responsibility for regulating the source of these threats. Marine reserves may also be inappropriately situated. Creating reserves where none are needed while leaving essential habitat unprotected is not a strategy for sustainable coral reef conservation. Understandably, communities that depend on reefs for food or other resources may have a strong incentive not to establish marine reserves in those reefs’ most productive areas, regardless of whether they are fragile ecosystems susceptible to overexploitation.

Paradoxically, a more permissive approach to use within an area may do more to protect fragile habitat. So long as use occurs at a sustainable level, the trade-off for less stringent protections potentially creates greater community involvement and cooperation between managers and users. One way to accomplish this is through zoning. “Several zones can and generally should exist within a single MPA, contributing to the strength of MPAs in protecting the biodiversity of a location, rather than trying to address each individual human impact separately.”<sup>54</sup> The most successful MPAs have this in common. The Great Barrier Reef of Australia is exemplary “of integrated and multiple-use management, allowing sustainable utilization of the reef by a wide range of users with numerous and often conflicting needs.”<sup>55</sup> In the Philippines, the Apo Island Reserve “has allowed [fish] stocks to recover sufficiently so that local fishermen operating in the surrounding areas are reporting major increases in fish yields.”<sup>56</sup> This question of enforcement remains a crucial as many developing countries face real constraints in terms of the resources available to enforce even the most lenient provisions. Without resources MPAs risk becoming “paper tigers.” One global study of 383 MPAs found that conservation objectives were only enforced effectively in one third of them (117).<sup>57</sup>

## CONCLUSION

Increasingly, governments will be forced to choose between protecting their publics’ right to use marine resources today against its right to have them there to use tomorrow. While giving a coastal state exclusive jurisdiction over valuable marine habitat enables that state to manage it in a coherent manner and provides that state with an economic incentive to do so, the public trust doctrine also could serve as a check on any exploitative or unsustainable practices the state decides to permit.

Even so, the public trust doctrine cannot alone save reef ecosystems. For even though they could be reduced to private property, fragile reef ecosystems cannot be fenced off. They depend on fluid ocean currents for their survival. The boundaries of even the best protected marine reserves are permeable. Environmental stressors from around the world will continue to afflict them if we cannot find a way to hold ourselves in check. “It is no longer sufficient to talk of state responsibility for environmental damage. The context must change to reflect state responsibility for the preservation of global environmental well-being.”<sup>58</sup> This sentiment is especially apt for the world’s coral reefs, given their breakneck pace towards mass extinction.

## Endnotes: How to Protect a Coral Reef

<sup>1</sup> Erika Kranz, *Scientists Confirm Bird’s Head Seascape Is Richest on Earth: CI-Led Survey Reveals Trove of Biodiversity Near ‘Lost World’ of Foja*, CONSERVATION INTERNATIONAL, Sept. 18, 2006, available at <http://www.conservation.org/xp/frontlines/2006/09180601.xml> (last visited Oct. 17, 2006).

<sup>2</sup> UNITED NATIONS ENVIRONMENT PROGRAMME (“UNEP”), Coral Reef Unit and WWF Coral Reefs Advocacy Initiative, *Conventions and Coral Reefs: Fourteen*

**Endnotes:** How to Protect a Coral Reef continued on page 81

# OIL AND WATER DON'T MIX:

## LEGAL REMEDIES FOR ENVIRONMENTAL WARTIME DESTRUCTION ON LEBANON'S MEDITERRANEAN COAST

by Abigail Okrent\*

### INTRODUCTION

In July 2006, an oil spill approaching the size of the Exxon Valdez disaster of 1989 began making its way along the Mediterranean Sea.<sup>1</sup> Unlike the infamous Exxon Valdez incident, this was no accident but the result of a military action by Israel on the Jiyeh power utility in Lebanon. While environmental destruction as a war tactic is an ancient practice, legal scholars, environmentalists, and military tacticians are increasingly focusing their attention on this phenomenon. International laws contain provisions for such destruction and tribunals such as the International Criminal Court ("ICC") are empowered to hear these types of claims, though almost none of these laws or venues have been tested.

### EFFECTS ON THE HEALTH OF OCEANS AND SEAS

The oil spill from the Jiyeh plant spread along 150 kilometers of Lebanon's coastline and up to Syria.<sup>2</sup> Early estimates put the volume of oil spilled at between 10,000 and 15,000 tons,<sup>3</sup> though the eventual count could reach 35,000 tons.<sup>4</sup> The shores of a nature reserve off the coast of Tripoli were covered in oil, threatening numerous species of birds as well as loggerhead turtles and rare monk seals.<sup>5</sup> The spill contains carcinogenic substances of the kind which caused the fish population to collapse years following the Exxon Valdez accident in Alaska.<sup>6</sup>

The social and economic impact of the spill on the region is equally alarming. Lebanese families living along the coast depend on fish as a major food and income source and much of that fish will become toxic as a result of the spill.<sup>7</sup> The effects on the Lebanese economy will be severe, since tourism is sixteen percent of the economy and many tourist destinations are along the coastline.<sup>8</sup>

More disturbing is that the total tonnage of oil spilled into seas and oceans in the 1990s is estimated at 1,140,000 tons and this figure does not even include wartime spills.<sup>9</sup> While more oil releases into the ocean through routine dumping than through spills, the concentrated nature of oil spills makes the effects on the environment more visible and immediate. Oil is extremely harmful to the marine environment, coating birds and marine

mammals, poisoning fish, killing reefs, and creating long-lived toxic effects.<sup>10</sup>

### INTERNATIONAL LAW AND WARTIME ENVIRONMENTAL DESTRUCTION

Lebanon announced in September 2006 that it intends to seek damages from Israel for the oil spill through the ICC.<sup>11</sup> The enabling statute of the ICC, the Rome Statute, contains environmental crimes within the list of triable war crimes.<sup>12</sup> War crimes include "intentionally launching an attack in the knowledge that such attack will cause . . . long term and severe damage to the natural environment which would be clearly excessive in relation to the concrete and direct overall military advantage anticipated."<sup>13</sup> Problems with the use of ICC as a means to seek remedies include the fact that the ICC was designed to deal with individuals, not states. Thus Lebanon cannot seek relief from Israel, but only from individuals involved in the bombing.

The International Court of Justice ("ICJ") is another venue through which states could address wartime environmental destruction. The ICJ has not decided an environmental crime claim yet; however in a 1996 advisory opinion it repeatedly mentioned destruction of the natural environment as a concern.<sup>14</sup> Unfortunately, the power of the ICJ is limited, and it can only hear cases if all state parties involved consent.

Several international environmental laws address wartime environmental damage. The Convention on the Prohibition of Military or Other Hostile Use of Environmental Modification Techniques ("ENMOD")<sup>15</sup> was created on the heels of environmental destruction in Vietnam. ENMOD has been interpreted to mean large-scale manipulation of natural forces and not oil spills.<sup>16</sup> In addition, the World Charter for Nature prohibits damaging military activities<sup>17</sup>, and the Stockholm Declaration of 1972<sup>18</sup> and Rio Declaration of 1992<sup>19</sup> both address the need to protect the environment during armed conflict.

Moreover, maritime laws are at odds with each other regarding liability for war damage to waterways.<sup>20</sup> The United Nations

---

*Several international  
environmental laws  
address wartime  
environmental damage.*

---

\*Abigail Okrent is a JD candidate, May 2007, at American University, Washington College of Law.

Convention on the Law of the Sea (“UNCLOS”) contains a chapter devoted to the protection of the marine environment, yet it explicitly exempts warships and crafts (including airplanes) from compliance.<sup>21</sup> UNCLOS does however make the flag state of warships responsible for loss or damage to another state through non-compliance with the laws and regulations of that state.<sup>22</sup> In addition, the UN Convention on the Non-Navigational Uses of International Watercourses, adopted in 1997 but not yet in force by 2005, provides that these areas shall enjoy the protections of international law for international and non-international armed conflict.<sup>23</sup>

### CONCLUSION

The very nature of wartime environmental damage makes it difficult to address through existing international law. The destruction on Lebanon’s Mediterranean coastline occurred amidst continuing hostilities, and cleanup was delayed several weeks until Israel gave permission for a crew to begin and conditions became safe enough for work.<sup>24</sup> Given the nature of warfare, it is not unusual that environmental destruction should occur long before the end of the military actions. Unfortunately, given the nature of oil spills, any delay in clean up can cause

irremediable damage. The wait before surveys for cleanup could begin in Lebanon was “pretty unprecedented” for a spill of its size, according to a UN Environmental Programme spokesperson.<sup>25</sup>

Environmental wartime destruction in seas poses an additional problem due to the nature of tides, currents, and ownership of those bodies of water. As evidenced in the Lebanese oil spill, the slick can spread rapidly to protected areas, other countries’ coastlines, and international waters. To effectively remedy environmental destruction, any damages must include clean up costs in coastal waters and international waters.

Though the forums and laws are somewhat deficient, an increased focus by scholars on prosecution of environmental war crimes may make this a ripe

time to move forward with such a claim. If Lebanon does bring this case, it will be a canary for this emerging jurisprudence, and the results will forecast how well the international community is prepared to deal with the widening problem of wartime environmental destruction.

## Maritime laws are at odds with each other regarding liability for war damage to waterways.



### Endnotes:

<sup>1</sup> BBC News, Richard Black, *Environmental ‘Crisis’ in Lebanon* (July 31, 2006), available at <http://news.bbc.co.uk/2/hi/science/nature/5233358.stm> (last visited Sept. 22, 2006).

<sup>2</sup> United Nations Environment Programme, *The Crisis in Lebanon: Environmental Impact*, <http://www.unep.org/lebanon/> (last visited Sept. 23, 2006).

<sup>3</sup> Experts Working Group for Lebanon, *Lebanon Marine and Coastal Oil Pollution International Assistance Action Plan* (Aug. 25, 2006), available at [http://www.unep.org/PDF/lebanon/LebanonOilSpill\\_ActionPlan20060825.pdf](http://www.unep.org/PDF/lebanon/LebanonOilSpill_ActionPlan20060825.pdf) (last visited Sept. 23, 2006).

<sup>4</sup> Black, *supra* note 1 (noting that the amount of oil spilled by the Exxon Valdez was 37,000 tons).

<sup>5</sup> World Conservation Union (IUCN), *Lebanon Oil Spill Threatens Migrant Birds and Marine Life* (Aug. 27, 2006), <http://www.iucn.org/places/wescana/news/lebanonoilslick.html> (last visited Sept. 23, 2006).

<sup>6</sup> World Conservation Union, *id.*

<sup>7</sup> Christopher Allbritton, *An environmental disaster emerges on Lebanon coast*, *SAN FRANCISCO CHRON.*, Aug. 28, 2006, at A1, available at <http://www.sfgate.com/cgi-bin/article.cgi?f=c/a/2006/08/28/MNGHDKQHK31.DTL> (last visited Sept. 23, 2006).

<sup>8</sup> Allbritton, *id.*

<sup>9</sup> The International Tanker Owners Pollution Federation Limited, *Oil Tanker Spill Statistics: 2005*, available at [www.moe.gov.lb](http://www.moe.gov.lb) (follow “Some Oil Tanker Spill Statistics” hyperlink) (last visited Sept. 25, 2006).

<sup>10</sup> Australian Maritime Safety Authority, *The Effects of Oil on Wildlife*, [http://www.amsa.gov.au/Marine\\_Environment\\_Protection/Educational\\_resource\\_s\\_and\\_information/Teachers/The\\_Effects\\_of\\_Oil\\_on\\_Wildlife.asp](http://www.amsa.gov.au/Marine_Environment_Protection/Educational_resource_s_and_information/Teachers/The_Effects_of_Oil_on_Wildlife.asp) (last visited Sept. 25, 2006).

<sup>11</sup> *Lebanon to Sue Israel for Ecological Damage*, *MOROCCO TIMES*, Sept. 11, 2006, available at <http://www.moroccotimes.com/news/article.asp?id=16986> (last visited Sept. 24, 2006).

<sup>12</sup> Rome Statute of the International Criminal Court, Art. 8(2)(b)(iv), entered into force July 1, 2002 [hereinafter Rome Statute].

<sup>13</sup> Rome Statute, *id.*

<sup>14</sup> *Legality of the Threat or Use of Nuclear Weapons*, Advisory Opinion, 1996 I.C.J. 226 (July 8), available at <http://www.icj-cij.org/icjwww/icasess/iunan/iunanframe.htm> (last visited Sept. 24, 2006).

<sup>15</sup> *Convention on the Prohibition of Military or Other Hostile Use of Environmental Modification Techniques*, Dec. 10, 1976, 31 U.S.T.S. 333.

<sup>16</sup> Meredith Dubarry Huston, *Wartime Environmental Damages: Financing the Cleanup*, 23 U. PA. J. INT’L ECON. L. 899, 907 (2002).

<sup>17</sup> World Charter for Nature, G.A. Res. 37/7, Art. XX, U.N. Doc. A/Res/ 37/51 (Oct. 28, 1982).

<sup>18</sup> Stockholm Declaration of the United Nations Conference on the Human Environment, U.N. Doc. A/Conf.48/14, Principles 21 and 26 (June 16, 1972).

<sup>19</sup> Rio Declaration on Environment and Development, Principle 24, U.N. Doc. A/Conf. 151/5/Rev. 1 (June 14, 1992).

<sup>20</sup> See Andy Rich, *The Environment: Adequacy of Protection in Times of War*, 12 PENN. ST. ENVTL. L. REV. 445 (2004).

<sup>21</sup> UN Convention on the Law of the Sea, Part XII, Art. 236, Dec. 10, 1982, 1833 U.N.T.S. 3.

<sup>22</sup> UN Convention on the Law of the Sea, *id.* at Part II, Art. 31.

<sup>23</sup> G.A. Res. 51/229, *Convention on the Law of the Non-navigational Uses of International Waterways*, Art. 29, adopted by the G.A. on May 21, 1997.

<sup>24</sup> Allbritton, *supra* note 7.

<sup>25</sup> Allbritton, *supra* note 7.

# PORT STATE MEASURES TO COMBAT IUU FISHING:

## INTERNATIONAL AND REGIONAL DEVELOPMENTS

by Judith Swan\*

### INTRODUCTION

In recent years, international recognition of the value of port State measures in combating illegal, unreported, and unregulated (“IUU”) fishing has intensified. All fish harvested at sea must be landed, and a coordinated system of controls at port — including requirements for vessels, information systems, inspections, and training — increasingly can be used to detect and enforce against IUU-caught fish. There is also an important cost-benefit consideration: the use of port State controls does not necessarily entail significant resources, and they represent a promising avenue for implementation by developing States. Operationally, the measures can be integrated into a wider system of port controls extending to areas such as health, safety, and security.

The concept of coordinated port State control for merchant vessels is not new. Comprehensive regimes and requirements relating to vessel safety, labor conditions and pollution prevention have been progressively developed by legally binding instruments for over two decades.<sup>1</sup>

Additionally, port State measures for fishing vessels have been addressed by international fisheries instruments since 1982, but particularly since 1995. Relevant instruments have tended to focus on the role of the port States individually or through regional fishery bodies (“RFBs”), rather than through the mechanism of specific regional MOUs such as those developed for merchant ships.

In March 2005, the FAO Committee on Fisheries (“COFI”) endorsed the Model Scheme on Port State Measures to Combat IUU Fishing (“FAO Model Scheme”). The FAO Model Scheme built upon provisions of the preceding international fisheries instruments<sup>2</sup> and paved the way for the development of international consensus on whether a binding instrument on port State measures should be developed.<sup>3</sup> The FAO Model Scheme includes elements of the 2001 FAO International Plan of Action to prevent, deter, and eliminate illegal, unreported, and unregulated fishing (“IPOA-IUU”) which contains guidelines for port State access, information to be collected from fishing vessels, and a process for actions to be taken where IUU fishing is suspected.

The FAO Model Scheme provides voluntary minimum standards for port State measures, including the responsibilities of a port State, inspections, follow-up actions, and information requirements for vessels. The annexes contain details on reporting requirements for and port State inspection procedures of foreign fishing vessels, training of port State inspectors, and more.

Implementing such port State measures are cost-effective and result in a compelling array of enforcement tools by the port State, flag State, and/or third State. For example, the imposition of port State measures can result in denial of port access, prohibiting the landing, transshipment, and/or processing of catch; the seizure and forfeiture of catch; the initiation of criminal, civil, or administrative proceedings under national law, and cooperating with the flag State and/or members of an RFMO on enforcement and/or deterrence.

However, not all States are currently prepared to implement port State measures. Industrial IUU fishing is often highly organized and driven by high stakes and high profits. It is an activity that falls in the realm of environmental crime. In some cases, IUU interests may offer economic or other incentives to a port State to avoid the implementation of controls; in other cases, port States lack the necessary capacity, policy and legal frameworks, and institutional arrangements. This has resulted in “ports of convenience” for IUU vessels seeking to offload their catch and resupply in ports that do not have or do not implement controls. As noted, there are different reasons why a State may not exercise controls, and the need to agree on a definition of “ports of convenience,” was underscored at the UN Fish Stocks Review Conference in May 2006.<sup>4</sup>

Despite such challenges, countries continue to progressively strengthen the role of the port State through international instruments. The pivotal role of the port State is realized in relation to relevant regional activity, information systems, and linkages with other IPOA-IUU tools. International fora firmly support stronger and deeper action based on the FAO Model Scheme as described below.

### LINKAGES WITH REGIONAL GOVERNANCE AND OTHER IPOA-IUU TOOLS

It is said that port State measures are the “last untapped area” in efforts to combat IUU fishing. The spotlight had been directed mostly at the flag State, having primary responsibility for compliance, and the coastal State, having sovereign rights over its fishery resources. Port State measures did not reach the forefront until 2005, when the emergence of the FAO Model Scheme provided a launching pad for strengthened and coordinated approaches.

\* Judith Swan is Senior Programme and Policy Officer, FishCode Programme, Fisheries Department, Food and Agriculture Organization of the United Nations (“FAO”) Rome, Italy. The views expressed in this paper are those of the author; they do not necessarily reflect the views of FAO or any of its Members.

Broader forces also drive the crescendo of international activity encompassing port State measures. Foremost is a shift toward intensified governance at regional level, involving the unprecedented and rapid increase in the establishment of RFBs and efforts to strengthen governance in existing bodies. At the international level, the development and strengthening of international information systems will add to effective implementation of port State measures. Finally, because the IPOA-IUU is to be applied in a holistic and integrated manner, linkages with other key compliance tools demonstrate the synergies contributing to the essential role of port State measures.

#### THE RAPIDLY INCREASING NUMBER OF NEW RFBs

The international community recognizes the continuing need to strengthen international cooperation and institutions that work on a regional basis and to increase coverage of the oceans.<sup>5</sup> Consequently, the family of RFBs — already numbering thirty-eight including seventeen bodies with a management mandate — is rapidly expanding: in the past three years, no less than five RFBs have been or are being established. This will result in a growing body of international conservation and management measures for which strengthened and coordinated compliance tools will be essential. In this regard, it is foreseeable that port State measures will play an increasingly significant role.

Regional Fisheries Management Organizations (“RFMOs”) established in recent years include the South East Atlantic Fisheries Organization (“SEAFO”) (2003) and the Western and Central Pacific Fisheries Commission (“WCPFC”) (2004). The respective conventions of these RFMOs refer to port State measures, building upon provisions in the UN Fish Stocks Agreement.<sup>6</sup>

The South Indian Ocean Fisheries Agreement (“SIOFA”), signed in July 2006, has a mandate over fishery resources other than tuna in areas that fall outside national jurisdictions. Among other things, parties will conduct inspections of ships visiting ports of the parties to verify they are in compliance with SIOFA regulations and deny landing and discharging privileges to those that do not comply.

Negotiations to establish the South Pacific Regional Fisheries Management Organisation were initiated at the first meeting, held in February 2006. Participants agreed to work to establish, as a matter of priority, a legally binding instrument for the conservation and management of living marine resources, other than species listed in Annex I of the 1982 UN Convention, in the high seas of the South Pacific Ocean.<sup>7</sup> It was also agreed that the second meeting, scheduled for November 2006, will consider the adoption of interim arrangements to apply prior to the entry into force of the instrument, in light of the information and advice provided by the working groups and participants.

Another initiative is underway to establish an RFMO in the North Western Pacific Ocean to regulate bottom trawl fishing, including through the development of interim measures for the management of bottom trawling and for the conservation of vulnerable marine ecosystems.<sup>8</sup>

WCPFC, SEAFO, and SIOFA give early indication of the importance with which they regard the role of port State meas-

ures in their regions. In particular, the WCPFC is developing its regional scheme based on the FAO Model Scheme and SIOFA has agreed to carry out port inspections. Other RFBs under negotiation have agreed to apply interim measures, but, at the time of writing, had not yet addressed the content of such measures.

#### STRENGTHENED GOVERNANCE IN RFMOs

Members of RFMOs recognize the benefits of strengthened governance and agree upon a number of actions and measures that will improve control and compliance with management measures. Consequently, port State measures, already adopted by many RFMOs,<sup>9</sup> will be strengthened and integrated with a broad range of other compliance tools.

Parties to the UN Fish Stocks Agreement have agreed that there is a duty of non-members to cooperate in the conservation and management of fish stocks.<sup>10</sup> To this end, RFMOs have been working towards enhancing participation by cooperating non-members and identifying the roles of non-members in the context of regional port State schemes.

A number of RFMOs have developed regional plans of action to combat IUU fishing<sup>11</sup> and port State measures and/or regional schemes would be an important component of these plans. Many RFMOs have adopted resolutions to support Monitoring, Control and Surveillance (“MCS”) measures that have similar requirements and are linked with port State measures. Examples include: regional schemes for boarding and inspection, observer coverage and monitoring transshipment; presumptions of IUU fishing by non-member vessels; and vessel lists for IUU and authorized vessels

Many have also recently adopted Vessel Monitoring Systems (“VMS”) requirements or schemes, enabling the detection of IUU fishing and fishers before a vessel enters into port. Flag States of these RFMOs increasingly implement the use of VMS to monitor fishing vessels under their control. VMS and other monitoring systems are moving toward electronic data transmission to promote the transmission of “real time” information.

Catches are generally registered routinely in a logbook, in landing declarations, and in sales notes and cross-checked with VMS-data to allow an effective management of the quota uptake. Port State controls can contribute to the verification of information obtained through VMS requirements and the catch information described above.

The international community underlined the importance attached to the use of VMS on the high seas in the March 2006 UN General Assembly Resolution on Sustainable Fisheries. It urged flag States to require that all their large-scale fishing vessels operating on the high seas be fitted with VMS no later than December 2008, as called for in the 2005 Rome Declaration on IUU Fishing.<sup>12</sup>

#### STRENGTHENED INTERNATIONAL INFORMATION SYSTEMS

##### FAO Databases

FAO maintains information systems with databases useful for combating IUU fishing. Information on IUU fishing vessels

is kept in the FAO High Seas Vessel Authorization Record (“HSVAR”) database. It contains descriptive elements of high seas fishing vessels as well as information on registration and authorization status, infringements, and other relevant information. Access to the database is granted by FAO to countries that provide data.<sup>13</sup>

The international community identified a need for additional data relevant to IUU fishing activities, vessels, and port State measures. In March 2006 the UN General Assembly, in its Resolution on Sustainable Fisheries,<sup>14</sup> encouraged and supported the development of a “comprehensive global record” within FAO of fishing vessels that incorporates available information on beneficial ownership, subject to confidentiality requirements in accordance with national law. Potential synergies between the proposed global record and port State inspections are being considered. A data base that identifies IUU vessels and catch at port could assist in the activation of port controls with respect to relevant vessels. A report will be prepared for consideration by the 2007 Session of COFI.

#### **International MCS Network**

There have been recent efforts to strengthen the International MCS Network for Fisheries Related Activities, which has a protocol for information exchange that could be used to support port State controls.<sup>15</sup> It consists of a network of national organizations and institutions formed to coordinate efforts to prevent, deter, and eliminate IUU fishing. The objective of the International MCS Network is to improve the efficiency and effectiveness of fisheries-related MCS activities through enhanced cooperation, coordination, information collection, and exchange among national organizations/institutions responsible for fisheries-related MCS. It is intended to give agencies support in meeting national fisheries responsibilities as well as international and regional commitments in relation to the UN Convention on the Law of the Sea, the Code of Conduct, the Fish Stocks Agreement, and the IPOA-IUU.

The strengthening of the MCS Network was recommended by the Organization for Economic Cooperation and Development (“OECD”) High Seas Task Force and is supported by the current UK IUU Action Plan.<sup>16</sup>

#### **TRADE AND INTERNATIONALLY AGREED MARKET-RELATED MEASURES TO COMBAT IUU FISHING**

Ports play a pivotal role as points of entry into a country for fish and fish products. This role contributes to the need for effective use of the IPOA-IUU tools aiming at diminishing the economic incentive for IUU fishing through preventing IUU caught fish from entering trade. In turn, these efforts are also buttressed by eco-labelling initiatives, trade monitoring under the Convention on International Trade in Endangered Species (“CITES”), and requirements for traceability— including the agreement on

rules of origin taken through the World Trade Organization (“WTO”). In this regard, the IPOA-IUU provides encouragement for internationally agreed market-related measures to be taken at the national, bilateral, and regional levels.<sup>17</sup> An increasing number of RFMOs have adopted such measures.<sup>18</sup>

The IPOA-IUU encourages States to take all steps necessary, consistent with international law, to prevent fish caught by vessels identified by the relevant RFMO as having been engaged in IUU fishing from being traded or imported into their territories.<sup>19</sup> To address this situation, many RFMOs have implemented catch certification and trade documentation schemes<sup>20</sup> that enable identification of the vessel that harvested a particular fish.

These schemes require that fish and fish products be accompanied by forms indicating, for example, when and where the fish were harvested and by whom. Catch certification schemes typically require such forms to accompany all fish and fish products to which they apply, whether or not they become part of international trade. Trade documentation schemes cover only fish and fish products that enter international trade. Inspection at port would serve to assist in verification of information required under the schemes, and therefore play a major role in their success.

At national level, many countries have adopted legislation based on the US Lacey Act,<sup>21</sup> prohibiting activities such as the import, export, sale, purchase, or acquisition of IUU caught fish, and port State measures figure prominently in the enforcement of such legislation.<sup>22</sup>

The IPOA-IUU also calls upon states to deter importers, transshippers, buyers, consumers, equipment suppliers, bankers, insurers, and other service suppliers within their jurisdiction from doing business with vessels engaged in IUU fishing, including adopting laws to make such business illegal.<sup>23</sup> Efforts are being made in a number of quarters to increase awareness of the detrimental effects of doing business with vessels engaged in IUU fishing by identifying marketing and sales routes of fish derived from IUU activities.<sup>24</sup> Information obtained through port inspections would assist with the identification of such routes, and conversely, identification of the routes would alert enforcement officers to the ports used for landing.

Port State measures could also contribute to efforts to target businesses involved in IUU fishing, prevent laundering of catches by IUU vessels and to take actions against businesses involved in IUU fishing and other cooperative actions with countries where the businesses are based.<sup>25</sup>

#### **FLAG STATE AND PORT STATE INTERACTIONS**

The flag State has primary responsibility for its fishing vessels to ensure that they do not engage in IUU fishing. However, this has often proved ineffective due to the practice of IUU fishing vessels using flags of non-compliance or the inability or

---

*Port State measures are the “last untapped area” in efforts to combat IUU fishing.*

---

unwillingness of some flag States to effectively exercise control over their fishing vessels. In such cases, the port State is seen as the next line of defence to combat IUU fishing, and interactions between port States and flag States are significant in this regard.

Key interactions involving port States and flag States, described in the IPOA-IUU, encourage the port State to report to the flag State where there is clear evidence of IUU activity *and* where IUU fishing took place *beyond* the coastal State's jurisdiction. The port State may then take other action with the consent of, or upon the request of, the flag State.

In any event, where a port State has clear evidence that a vessel having been granted access to its ports has engaged in IUU fishing activity, the port State should not allow the vessel to land or transship fish in its ports, and should report the matter to the flag State of the vessel.

In addition, the port State should not allow a vessel engaged in IUU to land or transship fish in its ports.<sup>26</sup> However, there is no requirement to report to the flag State if the vessel is presumed to have engaged in IUU fishing as defined by a relevant RFMO.

Additionally, the IPOA-IUU encourages States to consider developing within relevant RFMOs port State measures building on the presumption that fishing vessels entitled to fly the flag of States not parties to a regional fisheries management organization and which have not agreed to cooperate with that RFMO, which are identified as being engaged in fishing activities in the area of that particular organization, may be engaging in IUU fishing. Such port State measures may prohibit landings and transshipment of catch unless the identified vessel can establish that the catch was taken in a manner consistent with those conservation and management measures.

The policies and procedures adopted by countries and RFMOs involving the refusal of port calls against certain flag vessels have varied.<sup>27</sup> For the most part, the vessels themselves are targeted and not the flag States. Vessels that have undermined conservation and management measures of an RFMO to which a country is party, are refused entry into port as are foreign fishing vessels that have taken part in an unregulated fishery on the high seas.

RFMOs take different approaches in their application of port State measures, with some only requiring measures for non-members and others including all members and national vessels. This could be an area for further coordination and strengthening.

### **ERA OF THE FAO MODEL SCHEME: SOME RESPONSES AND NEXT STEPS**

There has been a swift and significant response by the international community to the endorsement by COFI of the FAO Model Scheme in March 2005. Prior to that time, the need for strengthened port State controls had been recognized by a num-

ber of international organizations and fora. The rapid global and high level response to the adoption of the Model Scheme is indicative that the scheme was long overdue, and that much work remains to be done at all levels.

### **THE UN SYSTEM**

In its July 2005 report to the General Assembly, the UN Open-Ended Informal Consultative Process on Oceans and the Law of the Sea ("ICP") promoted the FAO Port State Model Scheme and suggested the possibility of a legally binding instrument.<sup>28</sup> The recommendation was made in the context of considering fisheries and their contribution to sustainable development. It is significant that, only four months after COFI endorsed the FAO Model Scheme, there was already a call for the possibility of adopting a legally binding instrument.

Four months after the ICP report, the UN General Assembly ("UNGA"), at its 60th session in November 2005, carried forward the momentum supporting a binding instrument in its Resolution on Sustainable Fisheries. Earlier that year, prior to the endorsement of the Model Scheme by COFI, the UNGA Resolution on Sustainable Fisheries had recognized the need for enhanced port State controls and encouraged the elaboration of a draft model scheme.<sup>29</sup>

Importantly, in the November 2005 Sustainable Fisheries Resolution, the UNGA encouraged States to apply the FAO Model Scheme, promote its application through RFBs, and to "consider, *when appropriate*, the possibility of developing a legally binding instrument"<sup>30</sup> (emphasis added). The November Resolution continued the two-track approach encouraged

by ICP, recognizing that the value of the voluntary scheme but the need for a binding instrument.

Six months later, in May 2006, the momentum for the two-track approach was reinforced, and a new and more immediate call for a binding instrument was put forward by the Review Conference for the UN Fish Stocks Agreement. The Report noted the following in connection with the review and assessment of the Conference on matters relating to Monitoring, Control and Surveillance, and Compliance and Enforcement:

"A number of port States and RFMOs have developed measures or schemes to prevent the landing and transshipment of illegally caught fish in order to promote compliance with RFMO conservation and management measures. However, there is still much to be done in developing such measures or schemes. In particular, a more coordinated approach among States and RFMOs is required."<sup>31</sup>

To address this, the Conference recommended that States individually and collectively through RFMOs:

"Adopt all necessary port State measures, consistent with Article 23 of the Agreement, particularly those envisioned

---

*Ports play a pivotal role  
as points of entry into  
a country for fish and  
fish products.*

---

in the 2005 FAO Model Scheme on Port State Measures to Combat IUU Fishing, and promote minimum standards at the regional level; and in parallel, initiate, *as soon as possible*, a process within the FAO to develop, as appropriate, a legally binding instrument on minimum standards for port State measures, building on the FAO Model Scheme and the IPOA-IUU<sup>32</sup> (emphasis added).

It is clear that the international community is moving forward in an increasingly strong manner, not only to enhance port State measures at all levels and apply the FAO Model Scheme, but to develop a legally binding instrument sooner rather than later.

#### MINISTERIAL INITIATIVES AND FORA

There were three Ministerial meetings or conferences and one Ministerially-led initiative between September 2005 and August 2006. Significantly, two Ministerial meetings that have taken place since the UN Fish Stocks Review Conference endorsed its recommendation for a process to be initiated within FAO as soon as possible to develop, as appropriate, a legally binding instrument on minimum standards for port State measures.

The Second Asian Pacific Economic Commission (“APEC”) Ocean-Related Ministerial Meeting, held in September 2005, involved twenty member economies and adopted the Bali Plan of Action Towards Healthy Oceans and Coasts for the Sustainable Growth and Prosperity of the Asia-Pacific Community. The Ministers committed, where appropriate, to undertake certain actions, including strengthening efforts to combat IUU fishing

including by pursuing the use of at-sea, port-state and trade-related measures, in accordance with international law, as key compliance tools, through APEC capacity building and sharing of best practices, and strengthening efforts to collaborate through MCS regimes and the MCS network.<sup>33</sup> They did not refer specifically to the FAO Model Scheme, but it is significant that port State measures figured as one of the three priority compliance tools.

At the 11th Conference of North Atlantic Fisheries Ministers (“NAFMC”), in June 2006, Ministers focused their discussions on fighting IUU fishing in the North Atlantic and on the progress made to strengthen RFMOs. They also agreed to focus future activities on strengthening port State control through the development of a legally binding instrument as advised by the 2006 UNFSA Review Conference, and to consider the potential for a comprehensive regional scheme for port State control, based on the outcome of the NEAFC process.<sup>34</sup>

A Round Table Conference on Measures against IUU Fishing was held at Trondheim, Norway, on August 7, 2006, and was attended by Ministers or their representatives from eight coun-

tries and the European Commission. There, the Norwegian, Danish, and Swedish governments stressed the importance of introducing official management of ports, stating that IUU fishing is nothing short of theft from legitimate fishermen, undermining the conservation and management of fish stocks. They also stressed the value of continuing cooperative efforts to combat IUU fishing particularly through closer cooperation between relevant RFMOs. Specifically, participants agreed to look at future activities on strengthening port State control, through the development of a legally binding instrument as advised by the 2006 United Nations Fish Stocks Agreement Review Conference, and to consider the potential for a comprehensive regional scheme for port State control, based on the FAO Model.

The Ministerially-led High Seas Task Force (“HSTF”) of the Organization for Economic Cooperation and Development had an overall goal of setting priorities among a series of practical proposals for confronting the challenge of IUU fishing on the high seas. The end result announced in February, 2006 was an Action Plan on IUU Fishing currently being implemented under the leadership of the UK Minister responsible for fisheries. The HSTF, in its final report, reviewed the measures adopted by Task

Force members and RFMOs and compared them to the FAO Model Scheme. The report also made recommendations to strengthen both national port State measures and develop regional arrangements on port State controls. An outcome of the HSTF report was a proposal to support greater use of port and trade measures by promoting the FAO Model Scheme as the international minimum standard for regional port State con-

trols and to support the proposal by COFI that FAO develop an electronic database of port State measures.<sup>35</sup>

#### CONCLUSION

The overdue FAO Model Scheme is being repeatedly and increasingly adopted at all levels as a framework for further development of port State measures. At the same time, the two-track approach recommended by ICP, the UN General Assembly, and the UN Fish Stocks Review Conference, which also had been endorsed at Ministerial meetings and conferences, has attracted considerable energy and support in a short space of time. Why is this so?

The need for a legally binding agreement at this stage could be questioned. The FAO Model Scheme, although still in its infancy, is already being used as the basis for national and regional measures; therefore, all efforts should be put into building on its recommended standards. Supporting this is the perception of implementation fatigue: the 1990s was the decade of developing international fisheries instruments, and this is the decade of implementation, not of creating more binding instruments. Laws, institutions, policies, and human capacity need to

---

*The flag State has primary responsibility for its fishing vessels to ensure that they do not engage in IUU fishing.*

---

be developed to implement the instruments that have already been agreed. One should question whether a binding instrument would make any difference to environmental crime — would ports of convenience not continue to exist?

On the other hand, there are a number of reasons to respond, sooner rather than later, to the call for a binding instrument. Generally, the Model Scheme, although a sound document that reflects international consensus on a range of minimum standards, was developed and concluded in just one FAO Technical Consultation, an achievement, to be sure. However, the process was not as comprehensive or inclusive as those agreed for other international fisheries instruments.

The FAO Model Scheme could be regarded as a stepping-stone; a broader process, involving a full complement of players, could build on, and as appropriate, expand the current standards. Unlike more general voluntary fisheries instruments, the FAO Model Scheme is highly technical and specific, building on the IPOA-IUU. The next step could result in more comprehensive and universal technical standards that could be applied nationally and adapted regionally.

Experience to date in implementing the FAO Model Scheme could benefit the process to develop a binding instrument; strengths, constraints, and gaps uncovered in the process to implement the Model Scheme could be addressed. Such a process could accommodate the increasing commitment of the international community in combating IUU fishing.

Implementation of the Model Scheme would not preclude development of a binding instrument but could enhance the final outcome. Although an agreed binding instrument could mean that port controls based on the FAO Model Scheme will need to be updated, the fact that the measures are binding would strengthen the prospects for strong and coordinated efforts to combat IUU fishing.

It is anticipated that the issue will be considered in the next session of COFI in March 2007. By that time the international community will have had further opportunities to express its views on the subject, including in the November, 2006 General Assembly Resolution on Sustainable Fisheries. In the meantime, in many quarters, exemplary progress is being made in implementing the FAO Model Scheme at national and regional levels.



## Endnotes: Port State Measures to Combat IUU Fishing

<sup>1</sup> Key regimes include (1) the 1982 Paris Memorandum of Understanding on Port State Control (“the Paris MOU”), which established a coordinated control system with respect to vessel safety and pollution prevention standards and equipment, *available at* <http://www.parismou.org> (last visited Nov. 6, 2006); (2) MOUs establishing regional port State regimes around the world, which incorporate universal standards and were inspired by procedures agreed under the Paris MOU; (3) The International Maritime Organization’s (“IMO”) technical conventions, many of which contain provisions for ships to be inspected when they visit foreign ports to ensure that they meet IMO requirements, *available at* <http://www.imo.org/home.asp> (last visited Nov. 6, 2006); and (4) IMO’s global strategy for port State control.

<sup>2</sup> The 1993 FAO Compliance Agreement refers to situations where the port State has reasonable grounds to believe that a fishing vessel voluntarily in its port has been used to undermine management measures of a regional fishery management organization (“RFMO”); The 1995 UN Fish Stocks Agreement took a stronger approach than the Compliance agreement, and referred to the “right and duty” of a port State to take non-discriminatory measures in accordance with international law to promote the effectiveness of sub-regional, regional and global conservation and management measures. It also provided that States may, among other things, inspect documents, fishing gear and catch on board fishing vessels, when they are voluntarily in its ports or at its offshore terminals, and empower their authorities to prohibit landings and transshipments where the catch was taken in a manner which undermines high seas conservation and management measures; the 1995 FAO Code of Conduct for Responsible Fisheries, in the context of fishing operations, recommends that port States should take non-discriminatory measures to achieve and assist others in achieving the objectives of the Code of Conduct, and inform other States; the 2001 FAO International Plan of Action to prevent, deter and eliminate illegal, unreported and unregulated fishing (“IPOA-IUU”) contains guidelines for port State access, information to be collected from fishing vessels and the process for actions to be taken where IUU fishing is suspected.

<sup>3</sup> David J. Douman, The FAO/FFA Regional Workshop to Promote the Full and Effective Implementation of Port State Measures to Combat IUU Fishing, Aug. 28–Sept. 1, 2006, *Role of the Port State in Combating IUU Fishing and Promoting Long-term Sustainability in Fisheries*, *available at* [ftp://ftp.fao.org/FI/DOCUMENT/tc-psm/Reg\\_Workshop\\_2006/Default.htm](ftp://ftp.fao.org/FI/DOCUMENT/tc-psm/Reg_Workshop_2006/Default.htm) (last visited Sept. 30, 2006).

<sup>4</sup> Report of the Review Conference on the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks. New York, 22 to 26 May 2006 A/CONF.210/2006/15 (July 3, 2006), para. 82, *available at* [http://www.un.org/depts/los/convention\\_agreements/reviewconf/reviewconferencedraftreport.pdf](http://www.un.org/depts/los/convention_agreements/reviewconf/reviewconferencedraftreport.pdf) (last visited Nov. 6, 2006) [hereinafter Fish Stocks Report].

<sup>5</sup> See Fish Stocks Report, *id.*

<sup>6</sup> See Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 Dec. 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, art. 23, *available at* <http://www.oceanlaw.net/texts/unfsa.htm> (last visited Nov. 6, 2006) [hereinafter UN Fish Stocks Agreement].

<sup>7</sup> Report of the First International Meeting on the Establishment of the Proposed South Pacific Regional Fisheries Management Organisation, held in Wellington, New Zealand, 14–17 February 2006. Participants understood that conservation and management includes the sustainable utilisation of resources and the protection of the marine environment, and that the new instrument should, as far as possible, avoid duplication and overlap with existing international instruments and should be consistent with international law relating to law of the sea. The meeting was attended by representatives from 26 states and regional economic integrated organisations, including coastal states and states with a historical fishing interest in accordance with FAO statistics. Eleven international and regional fisheries organisations, and eight non-governmental organisations and industry groups also participated as observers at the meeting.

<sup>8</sup> Participants are the Republic of Korea, Japan and the Russian Federation. The three States have agreed to cooperate in the compilation, analysis and exchange of data on bottom trawling in this region.

<sup>9</sup> See High Seas Task Force, *Port States Measures Final Report — Promoting Responsible Ports*, *available at* <http://www.high-seas.org/> (last visited Sept. 30, 2006); see also T. Lobach, the FAO/FFA Regional Workshop to Promote the Full and Effective Implementation of Port State Measures to Combat IUU Fishing, Aug. 28–Sept. 1, 2006, *Port State Measures to Combat IUU Fishing: The FAO Model Scheme on Port State Measures*, *available at* [http://www.fao.org/fi/NEMS/events/detail\\_event.asp?event\\_id=34648](http://www.fao.org/fi/NEMS/events/detail_event.asp?event_id=34648) (last visited Sept. 30, 2006).

<sup>10</sup> See UN Fish Stocks Agreement, *supra*, note 6, at art. 17.1.

# CHANGING TIDES: THE NEED FOR NEW LEGISLATION TO PREVENT ALGAE BLOOMS

by Marcel De Armas\*

Under normal conditions, many species of algae form the base of the ocean's food chain and support the growth of aquatic and terrestrial animals.<sup>1</sup> However, algae can grow out of control creating a large mass called a harmful algae bloom ("HAB") that produces dangerous toxins and threatens both humans and aquatic animals.<sup>2</sup> In 2003, Congress passed legislation promoting more research on HABs in an attempt to prevent the damaging effects of these blooms on our oceans and lakes.<sup>3</sup> Nevertheless, even after Congress recognized that a single HAB can cost millions of dollars in damage, it has not passed any legislation aimed at preventing or controlling this problem.<sup>4</sup>

Red tide, a form of HAB, is prevalent in oceans worldwide, including in all major bodies of water that touch the United States.<sup>5</sup> States and people affected by red tide, or other HABs, often suffer economically and socially because of beach closings and bans on shellfish harvests. For example, red tide forced the governors of Maine and Massachusetts to declare states of emergency during the summer of 2005; federal aid was also requested to soften the financial impact of an HAB on the shellfish industry.<sup>6</sup>

Additionally, there are often fatal consequences for animals that consume shellfish containing toxins from HABs.<sup>7</sup> In a one-year period, researchers found HABs responsible for the deaths of 72 manatees in Florida, along with 57 dolphins, and 319 sea lions in California.<sup>8</sup> What makes addressing the HAB issue even more difficult is the fact that many estuaries located in the U.S. are affected by different species of algae that produce a diverse range of toxins. Consequently, the varied effects of algae species lead to the erroneous belief that a decentralized approach will best solve the problems created by HABs. Unfortunately, many of the factors believed to support the growth of algae blooms are

the same throughout all coastal waters: (1) increased water temperatures; (2) coastal water pollution; and (3) algae cyst deposits.<sup>9</sup>

The combination of warmer waters and the increase of pollution run-off into rivers will only intensify the problem and create larger areas of blooms.<sup>10</sup> While Congress should be applauded for conducting and promoting research on HABs, it needs to move beyond research and start protecting these vulnerable ecosystems before these blooms permanently damage our coastal waters and the surrounding environments.



---

*Algae can grow out of control creating a large mass called a harmful algae bloom.*

---

## Endnotes:

<sup>1</sup> See H.R. REP. NO. 108-326, at 5 (2003).

<sup>2</sup> *Id.* 5-6 H.R. REP. NO. 108-326, *id.* at 5-6.

<sup>3</sup> See Harmful Algal Bloom and Hypoxia Research and Control Act of 1998 §§ 601-05, 16 U.S.C. § 1451 (2006).

<sup>4</sup> See H.R. REP. NO. 108-326, at 6 (2003).

<sup>5</sup> See WHO, *Algae and Cyanobacteria in Coastal and Estuarine Waters*, in

GUIDELINES FOR SAFE RECREATIONAL WATER ENVIRONMENTS, available at [http://www.who.int/water\\_sanitation\\_health/bathing/srwe1-chap7.pdf](http://www.who.int/water_sanitation_health/bathing/srwe1-chap7.pdf) (last visited Oct. 24, 2006)

<sup>6</sup> *Tide Pushing Shellfishers Into Red*, USA TODAY, June 12, 2005, available at [http://www.usatoday.com/news/nation/2005-06-12-red-tide\\_x.htm](http://www.usatoday.com/news/nation/2005-06-12-red-tide_x.htm) (last visited Oct. 23, 2006) [hereinafter Red Tide].

<sup>7</sup> See H.R. REP. NO. 108-326, at 5-6 (2003).

<sup>8</sup> H.R. REP. NO. 108-326, at 5-6 (2003).

<sup>9</sup> See Red Tide, *supra* note 6.

<sup>10</sup> See H.R. REP. NO. 108-326 (2003).

---

\* Marcel De Armas is a JD candidate, May 2008, at American University, Washington College of Law.

# COASTAL AND PORT ENVIRONMENTS: INTERNATIONAL LEGAL AND POLICY RESPONSES TO REDUCE BALLAST WATER INTRODUCTIONS OF POTENTIALLY INVASIVE SPECIES

by Jeremy Firestone & James J. Corbett\*

## INTRODUCTION

**S**hips take on water by gravity or through pumping and store that water in onboard tanks to control trim and draft, provide stability, and enhance voyage safety — an action known as ballasting. Although any heavy solid or liquid can serve as ballasting material, ships almost exclusively employ ballast water for operational convenience. Ships often store ballast water as compensation for those times in which they are less than fully loaded. The term ballast water is a bit of a misnomer, however, as the “water” contains organisms and pathogens that were present in the aquatic environment from which the ballast originated; while other organisms and pathogens that have been entrained in ballast water tanks are found in a sediment layer, which separates out from the liquid phase in the tanks.<sup>1</sup> When ships reach destination ports, they discharge ballast (both water and the surviving organisms and pathogens) into those new port environments. Ballast is discharged for many reasons, including to lighten loads to aid navigation or to take on additional cargo. In new aquatic environments, some introduced organisms reproduce, live more than one life cycle, and become established. These organisms — referred to as exotic, non-native, non-indigenous, alien, nuisance, marine pests, or invasive — may, for example, out-compete native aquatic species, transmit diseases to native species, or contaminate the genome of native species through inter-breeding. Pathogens such as *E. Coli* also may be present in ballast water (for example, where local discharge of untreated sewage to coastal waters occurs), thus providing a vector for disease transmission to human populations from one port to the next.

The use of ballast to stabilize ships has been employed since the Phoenicians began to trade by sea, however two changes during the industrial era have greatly increased the rate of species transfer from one aquatic environment to another: first, a technological shift from solid to liquid ballast; and second, globalization of trade and the concomitant increase in the number, size, and speed of ships engaged in waterborne commerce. Because the marine transportation system presently moves the vast majority of international trade,<sup>2</sup> vessels have become the primary vector for the introduction of non-indigenous species.<sup>3</sup>

Indeed, each day some three thousand species are transported in ship ballast or on ships’ hulls.<sup>4</sup>

Although the impact of species introduction is in one sense ecological, those ecological impacts have potentially grave socio-economic consequences,<sup>5</sup> as witnessed by the infestation of zebra mussels in the North American Great Lakes.<sup>6</sup> In response, there have been efforts at local, national, and global levels to control species introductions from ships’ ballast. A number of countries have adopted rules and regulations related to the handling of ballast water, including Argentina, Australia, Canada, Chile, Israel, United Kingdom, New Zealand, and the United States.<sup>7</sup> Significant achievements have been realized at the global scale — the arena that is the focus of this paper. Of particular relevance is a recently adopted convention by the International Maritime Organization (“IMO”) regarding ballast water, the International Convention for the Control and Management of Ships’ Ballast Water and Sediments, 2004 (“Ballast Water Convention” or “BWC”).<sup>8</sup>

## THE BALLAST WATER CONVENTION

Each Party to the Ballast Water Convention is required, “with due regard to its particular conditions and capabilities,” to develop national ballast water management policies and “promote the attainment” of the Convention objectives.<sup>9</sup> Each Party also “shall require” ships flying its flag to comply with the Convention, including taking “effective measures” to ensure such compliance.<sup>10</sup> The Convention applies to all ships with a few practical exceptions,<sup>11</sup> although States may exempt certain vessels from the ballast water discharge standards that follow specified routes based on a risk assessment undertaken in accordance with guidelines to be developed by the IMO.<sup>12</sup> The Ballast Water Convention is to be applied by Parties as a condition for port entry for non-parties; thus ships of non-parties receive “no more favorable treatment.”<sup>13</sup>

The Parties to the Convention have a number of obligations,

---

*Each day some three  
thousand species are  
transported in ship ballast  
or on ships’ hulls.*

---

\* Jeremy Firestone and James J. Corbett are respectively Assistant and Associate Professors of Marine Policy at the College of Marine and Earth Studies, at the University of Delaware. A longer version of this article appeared in 36 OCEAN DEV. & INT’L., 291 (2005).

## APPLICATION OF THE CONVENTION

including: to provide technical assistance “as appropriate;” “to cooperate actively” in technology transfer “subject to their national laws;” and to enhance regional cooperation, particularly in enclosed and semi-enclosed seas.<sup>14</sup> The Parties also have obligations regarding monitoring, data gathering and sharing,<sup>15</sup> inspection<sup>16</sup> and enforcement,<sup>17</sup> and are required to inform the IMO and other Parties of domestic ballast water management requirements, procedures, and reception facilities for ballast water and related sediments.<sup>18</sup>

Article 9 provides that when a ship is flying the flag of one Party to the Convention in a “port or offshore terminal of another Party,” the ship is subject to inspection for the “purpose of determining whether the ship is in compliance with this Convention.”<sup>19</sup> A port State also may inspect a ship if a request is received from another Party, “together with sufficient evidence that a ship is operating or has operated in violation of a provision” of the Convention.<sup>20</sup> In general, inspections are limited to verifying that the ship has a valid International Ballast Water Management Certificate, inspecting the Ballast Water record

book, and sampling the ballast water in accordance with guidelines to be developed by IMO.<sup>21</sup> By authorizing port States to sample ballast water to determine compliance with ballast water discharge standards in the absence of “clear grounds” for believing that the ship does not conform substantially to the Certificate, the Ballast Water Convention, like the 2001 International Convention on the Control of Harmful Anti-Fouling Systems on Ships,<sup>22</sup> represents a significant departure from prior international practice.<sup>23</sup> Authorizing compliance

sampling rather than merely a paper examination is a major step that should enhance compliance with the Ballast Water Convention. The Convention requires flag, coastal, and port States to establish sanctions for violations.<sup>24</sup> Importantly, port and coastal States have authority under the Convention to not only furnish the flag State with information regarding a violation, but, in the alternative, can themselves institute enforcement proceedings.<sup>25</sup> This grant of authority to port and coastal States, while not unusual on its face,<sup>26</sup> takes on added significance given the ability of port States to engage in compliance sampling. In contrast, the two most prominent examples of international instruments providing for enhanced port and coastal State control and/or jurisdiction, the United Nations Convention on the Law of the Sea (“UNCLOS”)<sup>27</sup> and the United Nations Fish Stocks Agreement,<sup>28</sup> are structured in such a manner that enforcement under those regimes ultimately can devolve to the flag State if that State so wishes.<sup>29</sup> The Ballast Water Convention thus encompasses an expanded vision of port State control.

The Ballast Water Convention applies to discharges of “harmful aquatic organisms and pathogens” and to “sediments” that settle out of ballast water from ships that fly the flag of, or are otherwise under the administration of, a Party to the Convention. The Convention defines the term “harmful aquatic organisms and pathogens” as organisms and pathogens, “which, if introduced into the sea including estuaries, or into fresh water courses, may create hazards to the environment, human health, property or resources, impair biological diversity, or interfere with other legitimate uses of such areas.”<sup>30</sup> By reference to “biological diversity” and the use of the permissive “may,” this definition is less anthropocentric than other definitions of “pollution” under international law, such as found in UNCLOS or as crafted by the Joint Group of Experts on the Scientific Assessment of Marine Environmental Protection (“GESAMP”).<sup>31</sup> Moreover, in the preamble of the Ballast Water Convention there is explicit acknowledgement of the threat that

ballast water poses to the conservation and sustainable use of biological diversity and of the actions taken by the Convention on Biological Diversity Conference of Parties to protect marine biodiversity from invasive species.<sup>32</sup> These developments suggest an expanded regulatory horizon for the IMO; in addition, the definition moves beyond pollution prevention to biodiversity protection.

While no mention of the precautionary approach is found in the substantive text of the Convention, the Parties were at least “mindful” of it.<sup>33</sup> Rather than explicitly relying on the precautionary approach, the Convention establishes specific requirements in a number of areas, including: ballast water management planning and reporting,<sup>34</sup> ship surveying and certification,<sup>35</sup> ballast water exchange,<sup>36</sup> sediment management,<sup>37</sup> ballast water treatment,<sup>38</sup> and additional measures for certain areas in order to prevent, minimize, and ultimately eliminate the threat posed by aquatic organisms and pathogens contained in ballast water.<sup>39</sup>

When in force, the Ballast Water Convention will require each ship from a signatory Party to have an approved ship-specific Ballast Water Management Plan (“BWMP”).<sup>40</sup> A ship also must have on board a ballast water record book in which to enter and maintain a record of its ballast activities and explain the circumstances behind, and the reasons for, any non-standard ballasting activities (*e.g.*, due to an exemption, for safety, or as a result of an accident).<sup>41</sup>

Each ship of 400 gross tonnage or more will be required to undertake a series of surveys to ensure that its BWMP “and any

---

*Perhaps the most important aspect of the Ballast Water Convention is its establishment of concentration-based ballast water performance standards.*

---

associated structure, equipment, systems, fitting, arrangements, and material or processes comply fully” and “have been maintained in accordance with” the Convention and “remain satisfactory for the service for which the ship was intended.”<sup>42</sup> These surveys must be conducted after each significant ship repair and at other specified intervals. After passing the surveys the ship receives certification. This certificate is valid for a period of not greater than five years, but it ceases to be valid if the ship changes its flag registry to a different State.<sup>43</sup>

The Convention requires ships to engage in ballast water exchange with “at least 95 percent volumetric exchange” or to pump through three times the volume of each ballast water tank.<sup>44</sup> Each Party to the Convention must ensure that “adequate” sediment reception facilities are provided “where cleaning or repair of ballast water tanks occurs.”<sup>45</sup>

Perhaps the most important aspect of the Ballast Water Convention is its establishment of concentration-based ballast water performance standards, which ships that fly the flag of a State Party must meet. Assuming timely entry into force of the Convention, these standards will come into effect between 2009 and 2016 depending on vessel class, size, and construction date.<sup>46</sup> Vessels can gain an additional five years by participating in a technology demonstration project.<sup>47</sup> Two performance standards (limits) are set for “viable organisms” and three performance standards are set for “indicator microbes” in order to protect human health from pathogens.<sup>48</sup> These standards must be achieved unless the vessel undertakes alternative methods that ensure an equivalent level of protection.<sup>49</sup>

The Ballast Water Convention also explicitly acknowledges the right of individual States to establish “more stringent measures . . . consistent with international law.”<sup>50</sup> While States enjoy broad authority to condition entry into their ports on compliance with environmental and other mandates — for example, the U.S. Oil Pollution Act of 1990 requires oil tankers to be double hulled<sup>51</sup> — it is unusual, although not unprecedented, for an international treaty to explicitly acknowledge the right of States to establish more stringent standards.<sup>52</sup>

### IMPLEMENTATION CHALLENGES

Given the aquatic organism and pathogen performance standards and the lack of off-the-shelf technology to necessarily meet them, it is expected that substantial thought and effort will be directed in the near-term toward developing treatment technologies that will reduce or eliminate the introduction of species

from ballast water as cheaply as possible. However, as noted above, individual States may regulate ballast water discharges more stringently, and the global standards established by the Ballast Water Convention are not inviolate. Indeed, the Convention performance standards are subject to review by the Marine Environment Protection Committee (“MEPC”) “no later than three years before” their “earliest effective date.”<sup>53</sup> To assist the MEPC in its review of ballast water standards, Resolution Two of the Conference Final Act,<sup>54</sup> calls for the application of “suitable” decision-making tools. Fundamental, interdisciplinary research is thus needed not only to facilitate implementation of the specified standards, but to design and develop these decision and risk assessment tools as well.

In light of the existing performance standards, the mandated-review of the standards, and the ability of States to implement more stringent measures on a State-by-State basis, what is

needed is: (a) an enhanced understanding of which trade routes and vessel types present the greatest risk of introducing non-indigenous species; (b) information on which treatment technology or suite of technologies will need to be employed on a particular vessel that follows a specific route to reduce the concentration of viable organisms and pathogens prior to discharge to levels that are below the standards specified in the Convention; (c) exploration of the least-cost solution for that vessel to come into compliance with the standards; and (d) an evaluation of the cost-effectiveness of meeting the present standards and/or alternative standards. Attention also may be directed toward whether an administratively feasible and

enforceable alternative market-based standard that would allow for trading among vessels can provide equal protection at lower cost.

Decisions such as how to implement the BWC can be difficult for several reasons.<sup>55</sup> To begin with, a decision may simply be complicated, with a number of factors to consider. In addition, some considerations that bear on a decision may be uncertain. In the present context, ecosystem risk factors, vector characteristics, and treatment technology efficacy and costs are all uncertain to at least a limited degree. Frequently, a decision also poses tradeoffs among desirable attributes or objectives. Moreover, because differently-situated actors often approach a question from their own unique perspectives, they in turn weigh decision criteria differently. While port States may place a priority on protecting sensitive ecosystems from species introduc-

---

*Policy-makers could construct a ballast water management regime that applies selectively to those vessel voyages posing the greatest risk or, alternatively, could apply more stringent measures to those vessels that pose the greatest risk.*

---

tions, the major maritime nations may be more interested in meeting the economic goals of shippers that fly their flags.

### PROPOSED MODEL TO FACILITATE BWC IMPLEMENTATION

With the above discussion as a backdrop, what is proposed is a Ballast Water Discharge Compliance and Policy Support Model (“BWDCPSM”)<sup>56</sup> that is premised on five primary objectives:

- Minimizing the number of viable organisms discharged (or, alternatively achieving a specified standard);
- Reducing the time needed to achieve reductions;
- Minimizing total cost (public and private);
- Protecting particularly sensitive ecosystems; and
- Maximizing technology adoption by vessels according to their relative risk of introducing organisms.

By evaluating how alternative policy scenarios fare under these five objectives, such a model could shed light on points of agreement, identify other considerations in need of more scientific research or policy development, and generally assist policy-makers in the implementation of the Ballast Water Convention and other applicable policies.

The BWDCPSM extends a recent model that Winebrake, Corbett, and others developed to generate optimal passenger ferry air pollution reductions.<sup>57</sup> In laymen’s terms, it is an optimization model that allows determination of the minimum cost required for a given ship (or ships) that takes a particular voyage to meet a specified ballast water discharge performance standard given the cost and efficacy of the suite of available treatment technologies. The BWDCPSM can generate results in a disaggregated fashion that will: 1) permit analysis of the relative risk posed by a given vessel (*e.g.*, by type, tonnage, ballast tank capacity) undertaking a particular voyage;<sup>58</sup> 2) support implementation of the Ballast Water Convention; and 3) assist policy-makers in their consideration of the relative merits of alternative policy goals.

The model can be run under various policy scenarios, including the Ballast Water Convention’s concentration-based standards. Alternatively, the BWDCPSM permits a user to model either more stringent or more lenient concentration-based standards to facilitate the Convention-mandated review of standards established therein. It also assists States that may wish to set more stringent standards. Indeed, a legislative proposal before the U.S. Senate would, if adopted, set ballast water organism discharge standards for U.S. waters at 1/100 of those established by the Ballast Water Convention.<sup>59</sup> Moreover, recent testimony before the U.S. Congress recommended establishing a standard of zero live organisms above 50 microns to simplify enforcement.<sup>60</sup>

The BWDCPSM can facilitate the analysis of other policy scenarios as well. For example, concentration-based standards could vary by port (*e.g.*, some ports may have sensitive ecosystems while others may have ecosystems that have only a slight chance of being invaded) or be even more finely-tuned standards that vary by source-destination port pair. Furthermore, the model is flexible enough that, at a given port, a concentration-based standard could be set at the average concentration of

viable organisms in the ballast water across all discharges. Finally, in addition to, or in place of a concentration-based standard, other constraints could be specified such as one on the total number of organisms that could be discharged into a port ecosystem over a given period of time. In sum, inclusion of policy variables in the BWDCPSM permits decision-makers to model the technical feasibility of achieving various policy objectives, alternative means of achieving those objectives, and the comparative compliance costs associated with those means. And for any given policy scenario, the model will generate the least-cost solution. More specifically, the objective function for the model, assuming a policy that places limits on both the concentration and the total number of viable organisms that may be discharged, is:

$$(1) \quad \min \left( \sum_v \sum_k BINK_{v,k} \cdot KTE_{v,k} \right) \text{ subject to:}$$

$$(1a) \quad C_v < P_v$$

$$(1b) \quad \sum_v C_v \cdot V_v \leq \sum_v Q_v$$

The binary variable  $BINK_{v,k}$  takes on a value of “1” if a given treatment technology ( $k$ ) (*e.g.*, filtration) is incorporated on a specific vessel ( $v$ ) and a value of “0” otherwise. The variable  $KTE_{v,k}$  is the total annual expense (the capital cost annualized over its lifetime at a given discount rate plus operation and maintenance costs) of incorporating technology  $k$  on vessel  $v$ . Those two variables are multiplied together in equation (1) and the resulting product is summed over all vessels and treatment technologies, with the objective of minimizing total costs.  $C_v$  is the concentration of viable organisms (*e.g.*, the number per cubic meter) in the ballast water discharge of vessel  $v$ . It is a function of the initial organism/pathogen concentration by size and a number of factors that affect survivability, including: donor and recipient attributes such as water temperature and salinity; voyage duration; ballast water tank size; volume exchanged at sea; and treatment efficacy.  $P_v$  is the maximum concentration of viable organisms permitted by regulatory authorities to be discharged by vessel  $v$ . Under equation (1a), the concentration discharged must be less than that permitted. Finally,  $V_v$  is the volume of ballast water discharged by vessel  $v$  and  $Q_v$  is the maximum quantity of organisms permitted by regulatory authorities to be discharged by vessel  $v$ .

The use of limits on the concentration and quantity of organisms discharged (the risk of introduction) in the model rather than the risk of harm/invasion<sup>61</sup> has parallels in the surface water quality discharge regulatory context where regulators can choose to focus on end of pipe discharge limits rather than water quality parameters. The choice of risk of introduction also is sensible given a similar focus in the Ballast Water Convention. Moreover, at this point in time, we believe it prudent to avoid modeling individual species or quantifying species invasive potential given the fact that the majority of species that move in international waterborne commerce have yet to be identified, let

alone analyzed for their invasive potential.<sup>62</sup> In any event, predicting invasiveness continues to confound experts.<sup>63</sup>

## CONCLUSION

The Ballast Water Convention has ushered in a new era: it suggests that the international community has come to recognize that near-exclusive flag State control is outmoded and that flag State prerogatives must be complemented by, and in some circumstances give way to, coastal and port State jurisdiction. In this modern era, crew safety remains paramount and a reasonable flag-State interest, but it has been joined by biodiversity protection, which is primarily a port or coastal State interest. The BWC also provides evidence that the international community has begun to take seriously the threat posed by organisms and pathogens contained in ballast water.

In regard to the last point, the Ballast Water Discharge Compliance and Policy Support Model can help decision-makers

evaluate regulatory standards and market-based policies to enable innovation of environmental technologies to meet performance-based targets. Policy-makers could construct a ballast water management regime that applies selectively to those vessel voyages posing the greatest risk or, alternatively, could apply more stringent measures to those vessels that pose the greatest risk. The model also will assist ship operators in complying with the Ballast Water Convention's concentration-based standards and at the same time minimize costs. Third, the model will allow interested ports to gather and input the necessary data to determine costs associated with protecting individual port ecosystems. And finally, because the model includes treatment technologies and policy options, policy-makers can use the model to assist with their consideration of the relative merits of differing policy and treatment combinations.



## Endnotes: Coastal and Port Environments

<sup>1</sup> See, e.g., Gregory M. Ruiz & James T. Carlton, *Invasion Vectors: A Conceptual Framework for Management*, in *INVASIVE SPECIES: VECTORS AND MANAGEMENT STRATEGIES* 459, 468 (G.M. Ruiz & J.T. Carlton eds., 2003). The International Convention for the Control and Management of Ships' Ballast Water and Sediments defines "ballast water" as "water with its suspended matter taken on board a ship to control trim, list, draught, stability or stress of the ship" and "sediments" as "matter settled out of Ballast Water within a ship." The International Convention for the Control and Management of Ships' Ballast Water and Sediments art. 1.11, 1.2, Feb. 13, 2004, BWM/Conf/36, available at [http://www.bsh.de/de/Meeresdaten/Umweltschutz/Ballastwasser/Konvention\\_en.pdf#search=%22International%20Convention%20for%20the%20Control%20and%20Management%20of%20Ships%20Ballast%20Water%20and%20Sediments%22](http://www.bsh.de/de/Meeresdaten/Umweltschutz/Ballastwasser/Konvention_en.pdf#search=%22International%20Convention%20for%20the%20Control%20and%20Management%20of%20Ships%20Ballast%20Water%20and%20Sediments%22) (last visited October 15, 2006) [hereinafter BWC].

<sup>2</sup> MARINE TRANSPORTATION TASK FORCE, U.S. DEPARTMENT OF TRANSPORTATION, AN ASSESSMENT OF THE U.S. MARINE TRANSPORTATION SYSTEM: A REPORT TO CONGRESS 19 (1999), available at <http://www.dot.gov/mts/report/mtsfinal.pdf> (last visited Oct. 15, 2006).

<sup>3</sup> Paul W. Fofnoff et al., *In Ships or on Ships? Mechanisms of Transfer and Invasion for Nonnative Species to the Coasts of North America*, in *SPECIES: VECTORS AND MANAGEMENT STRATEGIES*, at 152; see also NATIONAL RESEARCH COUNCIL, COMMITTEE ON SHIPS' BALLAST OPERATIONS, *STEMMING THE TIDE: CONTROLLING INTRODUCTIONS OF NONINDIGENOUS SPECIES BY SHIPS' BALLAST WATER* 1 (1996). Cf. Z. Yang & A. N. Perakis, *Multiattribute Decision Analysis of Mandatory Ballast Water Treatment Measures in the US Great Lakes*, 9D *Transportation Research Part D* 81 (Jan. 2004); Andrew N. Cohen & James T. Carlton, *Accelerating Invasion Rate in a Highly Invaded Estuary*, 279 *SCIENCE* 555, 556 (1998).

<sup>4</sup> JOINT GROUP OF EXPERTS ON THE SCIENTIFIC ASPECTS OF MARINE ENVIRONMENTAL PROTECTION ("GESAMP"), A SEA OF TROUBLES UNEP, at 13 (2001), available at [http://gesamp.imo.org/no70/report.pdf#search=%22\(GESAMP\)%2C%20%E2%80%9CA%20Sea%20of%20Troubles%22](http://gesamp.imo.org/no70/report.pdf#search=%22(GESAMP)%2C%20%E2%80%9CA%20Sea%20of%20Troubles%22) (last visited Oct. 15, 2006) [hereinafter A SEA OF TROUBLES].

<sup>5</sup> European Commission, Life III Programme, et al., *Alien Species and Nature Conservation in the EU: The role of the LIFE program* 14 (2004), available at [http://ec.europa.eu/environment/life/infoproducts/alienspecies\\_en.pdf#search=%22Alien%20Species%20and%20Nature%20Conservation%20in%20the%20EU%3A%20The%20role%20of%20the%20LIFE%20program%22](http://ec.europa.eu/environment/life/infoproducts/alienspecies_en.pdf#search=%22Alien%20Species%20and%20Nature%20Conservation%20in%20the%20EU%3A%20The%20role%20of%20the%20LIFE%20program%22) (last visited Oct. 15, 2006); see also Meinhard Doelle, *The Quiet Invasion: Legal and Policy Responses to Aquatic Invasive Species in North America*, 18 *INT'L J. OF MARINE & COASTAL L.*, 261, 263 (2003); A SEA OF TROUBLES, *supra* note 4, at 13; Duncan Knowler & Edward B. Barbier, *The Economics of an Invading Species: A*

*Theoretical Model and Case Study Application*, in *THE ECONOMICS OF BIOLOGICAL INVASIONS* 70, 71 (Charles Perrings et al. eds., 2000).

<sup>6</sup> See NATIONAL RESEARCH COUNCIL, *supra* note 3, at 11, 18.

<sup>7</sup> See Intertanko, *Ballast Water Requirements*, <http://www.intertanko.com/tankerfacts/environmental/ballast/ballastreq.htm> (last visited Oct. 15, 2006); Moira McConnell, *Global Ballast Water Management Programme, Global Ballast Legislative Review, Final Report* (2002), available at <http://globallast.imo.org/monograph1%20legislative%20review.pdf> (last visited Oct. 15, 2006). But see David Mckie, *Ballast Water 'Minefield' Could Explode on Owners*, *Elbornes.com & Lloyd's List*, Mar. 28, 2001, [http://www.elbornes.com/articles/shipping/shi\\_0006.htm](http://www.elbornes.com/articles/shipping/shi_0006.htm) (last visited Oct. 15, 2006). See generally, Mark L. Miller & R. M. Fabian, eds., *HARMFUL INVASIVE SPECIES: LEGAL RESPONSES* (2004). Nevertheless, for the most part, state laws implement the Guidelines adopted by the IMO and emphasize ballast water exchange outside of coastal waters. IMO Res. A.774(18), *Guidelines for Preventing the Introduction of Unwanted Organisms and Pathogens from Ships' Ballast Water and Sediment Discharges* (Nov. 4, 1993); IMO Res. A.868(20), *Guidelines for the Control and Management of Ships' Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens* (Nov. 27, 1997).

<sup>8</sup> BWC, *supra* note 1.

<sup>9</sup> BWC, *supra* note 1, at art. 4.2.

<sup>10</sup> BWC, *supra* note 1, at art. 4.1.

<sup>11</sup> See BWC, *supra* note 1, art. 3.2 (excluding, *inter alia*, ships where the ship: does not carry or discharge ballast water, operates solely within the territorial waters and the high seas of a single party, and military vessels). The exceptions are qualified, however, with the proviso that they are subject to the concept that the state parties may not allow a flag to damage the environmental resources of another state.

<sup>12</sup> BWC, *supra* note 1, at reg. A-4.

<sup>13</sup> BWC, *supra* note 1, at art. 3.3.

<sup>14</sup> BWC, *supra* note 1, at art. 13-14.

<sup>15</sup> BWC, *supra* note 1, at art. 6.

<sup>16</sup> BWC, *supra* note 1, at art. 9.

<sup>17</sup> BWC, *supra* note 1, at art. 10.

<sup>18</sup> BWC, *supra* note 1, at art. 14.

<sup>19</sup> BWC, *supra* note 1, at art. 9.1.

<sup>20</sup> BWC, *supra* note 1, at art. 10.4.

<sup>21</sup> BWC, *supra* note 1, at art. 9.1.

# OCEANS AND CLIMATE CHANGE:

## GLOBAL AND ARCTIC PERSPECTIVES

by Magdalena A.K. Muir\*

### INTRODUCTION

Science and policy concerning oceans must be considered as strategies are developed to attempt to buffer the impacts of climate change from the global to the local levels. As discussed in this article, climate change science and policy need to be inserted into the oceans agenda, and oceans science and policy need to be inserted in the climate agenda. Also discussed are the outcomes from the Third Global Conference of Oceans, Coasts, and Islands and the effectiveness of the Arctic Climate Impact Assessment Scientific Report of 2004. Finally, possible impacts and responses to climate change for the Canadian Beaufort Sea, a “hot spot” within the Arctic, is examined.

### GLOBAL CLIMATE AND OCEANS INITIATIVES

The Third Global Conference on Oceans, Coasts, and Islands took place in Paris from January 23 to 28, 2006 and included a panel on oceans and climate issues. A summary of the panel was drafted, which included recommendations arising from the panel and the following discussion.<sup>1</sup> Recognition of and recommendations for oceans and climate issues are crucial, as the need for global mitigative measures (as well as global, regional, and local adaptive measures) are of vital importance. These measures are required to minimize climate impacts on coasts and oceans, coastal and marine ecosystems, and the environmental and economic goods and services these ecosystems provide.

### SEA LEVEL RISE IMPACTS

The panel summary began with a discussion of the Intergovernmental Panel on Climate Change (“IPCC”), which will present the Fourth Assessment Report to the Thirteenth Conference of the Parties to the United Nations Framework Convention on Climate Change in December 2007. The panel summary indicated that sea level rise is a significant threat for small islands, coasts, and low-lying lands. Ocean acidification is a new and potentially overwhelming threat that could undermine the marine ecosystems and food web, preclude coral development, and even affect atmospheric and ocean interactions. Irrespective of what mitigative measures are adopted, changed sea levels and acidification will remain for the next few millennia.<sup>2</sup>

Parallel changes are occurring, and parallel approaches will be required for small islands, as well as equatorial and tropical regions. For example, coral reefs, marine fisheries, and marine resources also will be affected by climate change and climate variability. However, small islands with large Exclusive Economic Zones already have limited capacity to manage these zones, and climate change will compound these management issues.<sup>3</sup> Sea level rise due to flooding, salt water intrusion into fresh water, salination of the soils, and declines in water quality and quantity will impact subsistence and commercial agriculture on small islands. Sea level rise and extreme events will affect infrastructure and development in all regions, including tourism, agriculture, transportation, and the delivery of health, fresh water, food, and other essential services.

The Arctic Climate Impact Assessment Scientific Report

documents climatic changes for the circumpolar Arctic and is subsequently discussed in this article. The Arctic has been warming rapidly, and larger and more significant changes are projected for the future.<sup>4</sup> Small islands are also vulnerable to the impacts of climate change, sea level rise, and extreme events because of size and exposure to natural hazards and more limited adaptive capacity. According to the Third Assessment Report of the IPCC, islands, like the Arctic, are early indicators of global climate change. Islands

often depend on rainwater and are vulnerable to changes in the distribution in rainfall.

### ALTERATIONS IN THE WEATHER

Another emerging and more immediate threat is the impact of high sea surface temperatures on the intensity of tropical cyclones and hurricanes. Understanding of the role of oceans as a regulator of the earth’s climate system is also increasing: the oceans control the timing and magnitude of changes in the

---

*Climate change mitigation is a major challenge and must be considered while formulating energy, economic, technological, and development policy.*

---

\*Magdalena A.K. Muir is a Research Associate at the Arctic Institute of North America and an Advisory Board Member, Climate Change, EUCC- The Coastal Union and the EUCC Mediterranean Centre, two European coastal non-governmental organizations. Ms. Muir also serves as the President and Associate of the International Energy, Environmental and Legal Services, Ltd. The author can be reached at [makmuir@ieels.com](mailto:makmuir@ieels.com).

global climate system, primarily through the absorption of carbon dioxide and heat. Other climate impacts include arctic sea ice reduction, cyclonic storms, changes in ocean circulation, intensification of eutrophication in shallow waters and enclosed seas, and inter-related changes in biodiversity and fisheries.<sup>5</sup>

### WARMING SEA IMPACTS EXTEND TO LAND

Human health is also impacted by climate change. Outbreaks of vector-borne diseases like dengue fever and malaria will increase, with the Caribbean islands and equatorial zones being at greater risk. Shortages of water and drought, as well as contamination of water quality during floods and storms, will increase disease risk, including cholera, diarrhea, and dengue fever.

Africa is very vulnerable to climate change, with negative impacts expected for the watersheds, coasts, and seas of Africa. Worsening desertification in northern and southern Africa is also forecasted to occur. The continent is most vulnerable to the impacts of projected change because of widespread poverty and limited adaptation capabilities. A parallel recognition of the disproportionate impacts of climate change on Latin America and the Caribbean, including coastal and oceans areas exists. A recent report catalogues the impact of climate change and environmental degradation ranging from drought in the Amazon to floods in Haiti and elsewhere; vanishing glaciers in Colombia to extreme cold in the Andes; and hurricanes, not only in Central America and the Caribbean, but also in southern Brazil.<sup>6</sup>

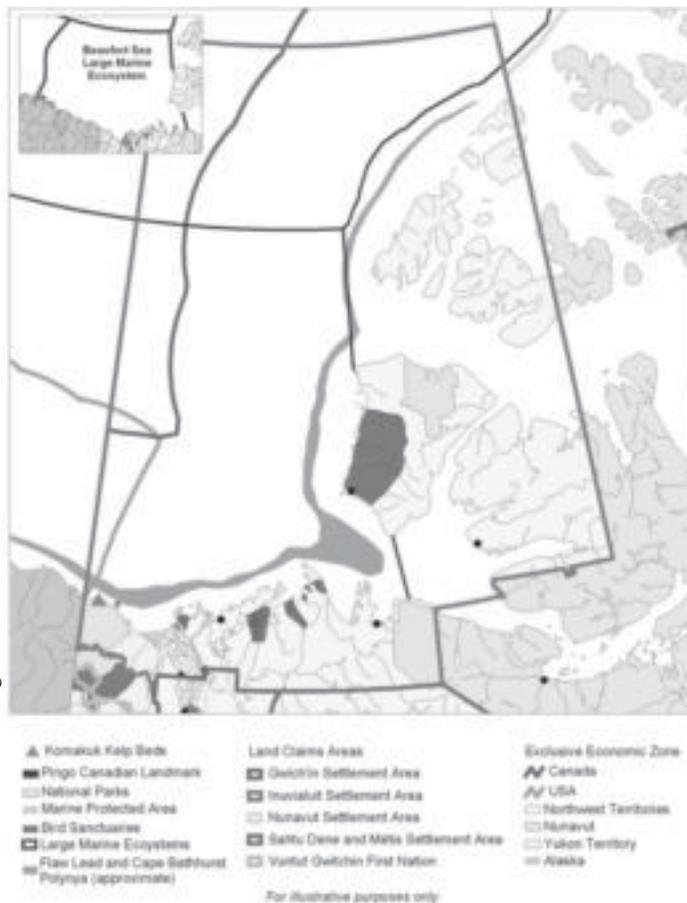
### STRATEGIZING CLIMATE CHANGE POLICY SOLUTIONS

Climate change mitigation is a major challenge, and must be considered while formulating energy, economic, technological, and development policy. The Eleventh Conference of the Parties of the United Nations Framework Convention on Climate Change (“UNFCCC”) in Montreal in December 2005 initiated a two-track process to develop future climate strategy with the Kyoto Protocol as the first track. The second track is an informal Convention Dialogue aimed at exchanging experiences and analyzing strategic approaches for long-term cooperative action. This dialogue is not confined to the present Parties to the Kyoto Protocol and will address technology, adaptation, market-based opportunities, the development context, and voluntary action by developing countries.<sup>7</sup>

In short, the UNFCCC process addresses adaptation through understanding of climate impacts, vulnerability, and other possible measures on the one hand and financial and technical assistance to the most vulnerable Parties on the other. For example, proceeds from the Clean Development Mechanism project activities will fund a new Adaptation Fund under the Kyoto Protocol. Additionally, the bulk of two other dedicated funds under the Convention are targeted for adaptation to the impacts of climate change by developing countries.<sup>8</sup>

On a global and regional level, climate change science and policy need to be inserted into the oceans agenda, and oceans science and policy need to be inserted in the climate agenda. Adaptation is not enough; mitigation is also required through reducing greenhouse gases and shifting to renewable energy and

Magdalena Muir and Fisheries and Oceans Canada 2006



Map of the Beaufort Sea LOMA, divided into coastal and offshore areas.

increasing energy efficiency. Thinking globally, planning regionally, and acting locally is necessary.

Climate issues are complex and require input from many disciplines and the integration of ecosystem-based and other integrated approaches. In addition, constant dialogue between scientists and decision-makers is required. Scientific data and analysis, from accurate and timely predictions of hurricanes to improved global and regional forecasts of future sea level rise and the impacts of ocean acidification, lay the foundation for adaptation policy discussions and the development of climate strategies. In order to be effective, this data and analysis needs to be communicated to decision-makers on a timely basis and in the appropriate language.

As policies adapt to climate change and variability, opportunities must be considered as well as risks. With accelerating climate change and variability, reliable scientific information becomes crucial for formulating policy on a wide variety of issues, including fisheries, marine infrastructure, and transportation. Therefore, more resources need to be devoted to ocean climate research, paying attention to the short and medium term, regional, and global impacts.

### ARCTIC CLIMATE CHANGE AND OCEANS

One of the key findings of the Arctic Climate Impact Assessment Scientific Report is that the Arctic has been warming rapidly and much larger changes are projected for the future. Increasing temperatures, melting glaciers, reductions in the



Beluga whales at an ice edge. The Beaufort Sea LOMA contains three marine protected areas for migratory beluga whales in the Mackenzie Delta.

extent and thickness of sea ice, thawing permafrost, and rising sea level illustrate this warming trend. Chapter 10 of that report, *Principles of Conserving the Arctic's Biodiversity*, begins the dialogue on management and policy approaches for conserving biodiversity and related ecosystem services in the circum-arctic.

In the Arctic, changes in sea ice are a key indicator and agent of climate change, affecting surface reflectivity, cloudiness, humidity, exchanges of heat and moisture at the ocean surface, and ocean currents. Changes in sea ice have enormous economic, environmental, and social implications. There are negative impacts on ice-dependent wildlife and northern peoples like the Inuit with a traditional subsistence lifestyle based on hunting mammals on, or adjacent to, sea ice. Changes may also have positive economic effects, as it may facilitate increased marine transportation, economic development, and immigration into the region.<sup>9</sup>

### THE CANADIAN BEAUFORT SEA<sup>10</sup>

The Beaufort Sea Large Ocean Management Area (“LOMA”) is composed of the Mackenzie Delta and the Canadian Beaufort Sea, extending to the northernmost extent of Canada’s jurisdiction. Despite its relatively pristine state, the region is on the brink of significant economic and environmental change. Hydrocarbon activity and is other forms of economic development are underway against a backdrop of the implementation of comprehensive northern land claims and complicated by global and regional climate change and contamination issues. Integrated management under the Beaufort Sea LOMA reflects the commitment under the Canadian Ocean Policy Framework to manage oceans so as not to compromise coastal and marine ecosystems while encouraging multiple uses of ocean spaces and resources.<sup>11</sup>

The Arctic Ocean receives significant freshwater input from

ivers, and the Beaufort Sea receives freshwater inputs from the Mackenzie River year-round, resulting in the “Mackenzie Lake” beneath the ice in the winter and the Mackenzie freshwater plume in the summer. Given the extent of the freshwater input year-round, it is difficult to separate the impacts of the Mackenzie River from coastal and ocean processes. With the deltaic nature of the terrain, aquatic and terrestrial ecosystems are difficult to differentiate. There are vast arrays of freshwater lakes and rivers in the summer, land-fast ice and ice on river, coasts and land in the winter, continuous permafrost underlying the land, the coasts, and the Beaufort Sea, and a highly unstable, shifting and eroding coastline formed of consolidated ice, gravel, and sand.

### COMPLEXITIES OF THE BEAUFORT SEA CLIMATE SYSTEM

Sea ice is an important component of the global, Arctic, and Beaufort Sea climate system. Sea ice variability not only indicates climate change but also is directly driven by and feeds into the atmospheric, oceanic, and hydrologic cycle. Sea ice, particularly the diminishing summer sea ice conditions, has the potential to drastically alter the cycles of atmosphere, ocean, hydrology, and other components in the Beaufort Sea LOMA. Examining sea ice, including flaw leads and polynyas<sup>12</sup> can be a good way to understand climate change and how ocean warming, or a longer open season, affects biologic productivity. The mechanisms and impacts of long-term variability and trends for Arctic sea ice are not fully understood and developing an integrative understanding of the past, current, and possible future influences of polar sea ice on climate systems is necessary.

Interactions of freshwater, marine water, and brackish water, including mixing and stratification and the implications of these interactions with climatic changes are useful considerations. Unlike tropical oceans, which are temperature stratified, the Arctic Ocean is salinity stratified, with a halocline where salinity increases with depth. This is important for the formation of sea ice, as saltwater is most dense just before freezing, and sea ice is largely salt free.

Salinity influences the presence of marine species directly through salinity preferences of particular species and indirectly through its effects on stratification, water movements, and phytoplankton productivity. Differences in the density of seawater throughout the water column, or stratification, affect the aggregation of biological matter in the upper layers of the ocean. Density is a function of salinity, temperature, and pressure and varies with depth. Temperature is another important environmental factor because many species have narrow temperature tolerance, which will affect their spatial distribution. Temperature also influences metabolism, growth rate, and reproductive output.<sup>13</sup>

## LAND CLAIMS AND ECONOMIC ACTIVITIES INFLUENCE BEAUFORT SEA MANAGEMENT

When one imagines the Beaufort Sea LOMA, the complexity and overlapping land claims agreements are an important consideration. All the land claims agreements in northern Canada are constitutionally protected and override inconsistent federal and territorial legislation and policy. The Canadian federal government has a strong commitment to Inuit and First Nation involvement and participation under the Oceans Act and the Oceans Action Plan, and thus in the Beaufort Sea Partnership and other initiatives for the LOMA. There are also international cooperative management arrangements between Canada and the United States for migratory and ice dependent marine species such as bowhead and beluga whales, seals, and polar bears. The Gwich'in and Inupiat of Alaska could also participate to reflect and support these international wildlife management arrangements.<sup>14</sup>

The Oceans Policy Framework commits Canada to manage impacting activities in oceans in a way that does not compromise marine and coastal ecosystems, while encouraging multiple uses of oceans spaces and resources. The Beaufort Sea LOMA is subject to multiple use designations, with extensive economic development on the horizon, at a time when climate and contaminant impacts are increasing. Significant hydrocarbon development is on the horizon, with the proposed Mackenzie Gas Project. Though this project is currently limited to three fields in the Mackenzie River delta and the construction of an extensive natural gas and natural liquids pipeline from that delta to northern Alberta, there are significant impacts from the construction of the pipeline and the likelihood of extensive future developments and habitat and landscape fragmentation over time.<sup>15</sup>

Multiple use designations will remain the norm in the LOMA, except where certain uses are excluded or restricted by marine protected areas or other designations. As indicated by the implementation of the proposed marine protected areas in the LOMA, it is important to provide early information to federal and territorial government departments of potential ecological and biologically significant areas and species in order to condition or to limit the issuance of economic rights and developments in these areas.<sup>16</sup>

### NATIONAL MANAGEMENT OF AN ARCTIC "HOT SPOT"

Identifying areas that have particularly high ecological or biological significance is necessary to facilitate provision of

greater than usual degree of risk aversion in the management of activities in these areas. Providing early information to federal and territorial governments of potential ecological and biologically significant areas and species, and conditioning or limiting the issuance of rights and subsequent developments in these or adjacent areas is important.<sup>17</sup>

The Beaufort Sea is a climatic hot spot for the Arctic. Observation and scientific experiments have shown that climate change is affecting permanent, seasonal, and land-fast ice; permafrost and coastal erosion; fresh water inputs, flows, and sediment deposits; and temperatures, stratification, and salinity. Climate change may be one of the biggest challenges facing the Beaufort Sea LOMA, and its institutions and processes. This challenge may drive much of the management, monitoring, and research efforts for the Beaufort Sea Partnership and Regulatory Coordination Committee that are being established to manage the LOMA. Much of the biology, biodiversity, and ecosystems in the Beaufort Sea LOMA is not extensively known or studied. All

are likely to be affected in some way by climate change, whether adversely or positively.

Coastal change in the Beaufort Sea is a product of the interaction between local geological and geo-morphological conditions and waves and storm surges driven by winds. Sea ice formation and movement may also play a subordinate role. Also, it is possible that the severity, not number, of storms has increased in this area. Decreasing ice concentration and increasing wind speeds together suggest a more severe wave climate in Beaufort. Observations of land loss along the coast, including subsi-

dence and slumping, have been made. There will be a decreased sea ice that previously protected infrastructure and inhibited wave formation. If sea ice is mobile, it could cause ice scour, more coastal erosion, and damage to infrastructure.

There may be increasing hazards to coastal infrastructure in the Beaufort Sea, but not in a catastrophic way and without risk of loss of life. Instead, it will be a slow and very predictable process. There are some positive aspects in that very limited infrastructure is currently in place, and thus, one can plan and defend for climate change. For example, roads and pipelines can be constructed away from coasts, with a similar planning approach for communities. Coastal change is occurring in Tuktoyaktuk, which is the only northern community with coastal defenses. Erosion has been reduced but with other implications, and there is concern for the inner harbor.<sup>18</sup>

Considering the scope of federal activities in the Beaufort Sea LOMA, several Canadian government departments are

---

*On a global and regional level, climate change science and policy need to be inserted into the oceans agenda, and oceans science and policy need to be inserted in the climate agenda.*

---

likely to have complimentary activities on climate and marine issues. Fisheries and Oceans Canada is the coordinating agency for oceans matters, as well responsible for fisheries and marine resources. The Department of Indian Affairs and Northern Development is involved in northern communities in all the territories as the major landowner on land and in the offshore, as well as specifically focusing on contaminants and climate interaction.<sup>19</sup> Environment Canada and the Canadian Ice Service focus on sea ice and climate issues, including ice thickness and extent, ice modeling and climate science. Transport Canada is interested in the regulation of marine shipping, which is affected by all sea ice issues.

Natural Resources Canada is involved in programs such as Reducing Canada's Vulnerability to Climate Change Program, which has been re-named, Enhancing Canada's Resilience to Climate Change Program. This program covers everything from sea ice and permafrost response to municipal case studies and

integrated socio-economic assessments. Much of the Mackenzie Delta work focuses on permafrost's impacts and costs to communities. Natural Resources Canada's Climate Change Impacts & Adaptation Program has funded several projects in the Beaufort Sea. Currently, there are three projects underway, two of which are transportation projects and the other is a coastal management project.<sup>20</sup>

## CONCLUSION

Climate change is a global concern. The Beaufort Sea can be used as a microcosm to demonstrate the impact of climate change on our oceans, and forecast the problems we might have to face in the future. Currently, steps are underway to understand the impacts of the changing climate and to provide adaptive management approaches. Likewise, mitigative measures are also underway in global, regional, and national forums.



## Endnotes: Oceans and Climate Change

<sup>1</sup> GlobalOceans.org, Oceans and Climate Panel, <http://www.globaloceans.org/globalconferences/2006/pdf/NextStepsClimate.pdf> (last visited Oct. 30, 2006). The panel summary was prepared by the author and reports on Third Global Conference on Oceans, Coasts and Islands, January 23 to 28, 2006, UNESCO, Paris and relies on the underlying expertise of the panel members and their presentations for that panel.

<sup>2</sup> See GERMAN ADVISORY COUNCIL ON CLIMATE CHANGE, *THE FUTURE OCEANS, RISING UP, WARMING UP AND TURNING SOUR* (2006), available at [http://www.wbgu.de/wbgu\\_sn2006\\_voll\\_en.html](http://www.wbgu.de/wbgu_sn2006_voll_en.html) (last visited Oct. 12, 2006).

<sup>3</sup> See MILLENNIUM ECOSYSTEM ASSESSMENT, CH.10: PRINCIPLES OF CONSERVING THE ARTIC'S BIODIVERSITY (2005), available at [http://www.acia.uaf.edu/PDFS/ACIA\\_Science\\_chapters\\_final/ACIA\\_CL10\\_Final.pdf](http://www.acia.uaf.edu/PDFS/ACIA_Science_chapters_final/ACIA_CL10_Final.pdf).

<sup>4</sup> ACIA, ARCTIC CLIMATE IMPACT ASSESSMENT SCIENTIFIC REPORT (Feb. 2006), available at <http://www.amap.no> (last visited Oct. 30, 2006) [hereinafter Arctic Climate Report].

<sup>5</sup> Real Climate website, <http://www.realclimate.org> (last visited Oct. 12, 2006).

<sup>6</sup> *Up in Smoke? Latin America and the Caribbean: The Threat from Climate Change to the Environment and Human Development*, Third Report from the Working Group on Climate Change and Development (Aug. 2006), available at <http://www.neweconomics.org/gen/uploads/15erpvfzbbipu552pnoo1f128082006213002.pdf> (last visited Oct. 12, 2006); see also *Africa-Up in Smoke*, the UK Working Group on Climate Change and Development, available at [http://www.oxfam.org.uk/what\\_we\\_do/issues/climate\\_change/africa\\_up\\_in\\_smoke.htm](http://www.oxfam.org.uk/what_we_do/issues/climate_change/africa_up_in_smoke.htm) (last visited Oct. 12, 2006).

<sup>7</sup> UNFCCC website, <http://unfccc.int> (last visited Oct. 12, 2006).

<sup>8</sup> Important measures are also underway in the European Union to adapt to climate change through the Impacts and Adaptation Working Group, including climate change for coastal and marine areas, under the European Climate Change Programme II. These measures are proceeding towards a draft Green Paper, an eventual White Paper, and perhaps either new or revised EU Directives and policies.

<sup>9</sup> See Arctic Climate Report, *supra* note 4. For further and more extensive information on the Scientific Report see <http://www.amap.no> (last visited Oct. 12, 2006).

<sup>10</sup> This analysis of the Beaufort Sea Large Ocean Management Area draws upon the author's work for Fisheries and Oceans Canada, Beaufort Sea Large Ocean Management Area Ecosystem Assessment and Overview: Volume 2, Final Draft Remarks, 2006. Aspects of this report will be incorporated in the final ecosystem assessment for the Beaufort Sea.

<sup>11</sup> Fisheries and Oceans Canada, Canada's Oceans Action Plan, 2005; Fisheries and Oceans Canada, *Tarium Niryutait* Regulatory Intent, 2005; *Tarium Niryutait Management Plan*, 2005 and Powelles H., et.al., Proceedings of the Canadian Ecoregions Workshop, CSAS Proceedings Series 2004/16.

<sup>12</sup> A polynya is an open water or thin ice area surrounded by thicker ice.

<sup>13</sup> For a discussion of the Mackenzie River, the freshwater plume and "Mackenzie Lake," as well as oceanographic features, see Macdonald R. et al, *The Mackenzie Estuary of the Arctic Ocean*, HDB ENV. CHEM., vol. 5 (2005).

<sup>14</sup> See M. Muir, *Analysis of the Inuvialuit Final Agreement and Marine Protected Areas under the Oceans Act*, (1997); see also Arctic Institute of North America and the Canadian Institute of Resources Law, *Comprehensive Land Claims Agreements for the Northwest Territories: Implications for Land and Water Management* (Nov. 1994); The Beaufort Sea Partnership, *An Integrated Management Initiative for the Beaufort Sea* (2005).

<sup>15</sup> The Mackenzie Gas Project, available at <http://www.mackenziegasproject.com/theProject/regulatoryProcess/index.html> (last visited Oct. 12, 2006), and the Canadian Arctic Resources Committee report filed November 9, 2005 with the Joint Review Panel: Petr Cizek, A Choice of Futures: Cumulative Impact Scenarios of the Mackenzie Gas Project.

<sup>16</sup> See Fisheries and Oceans Canada, *supra* note 11. This overall discussion relies upon a report by the author entitled, Beaufort Sea Large Ocean Management Area Ecosystem Overview and Assessment: Volume 2, Final Draft Remarks, 2006.

<sup>17</sup> Fisheries and Oceans Canada, *Identification of Ecologically and Biologically Significant Areas*, ECOSYSTEM STATUS REPORTS (2004).

<sup>18</sup> S.M. SOLOMON, EFFECTS OF CLIMATE VARIABILITY AND CHANGE ON ARCTIC COASTS AND COASTAL INFRASTRUCTURE (Coastal Zone Canada 2006 Conference and Youth Forum 2006); D. WHALEN ET. AL., PAST, PRESENT AND FUTURE COASTAL FLOODING IN THE WESTERN CANADIAN ARTIC (Coastal Zone Canada 1006 Conference and Youth Forum 2006); G. K. MANSON & S. M. SOLOMON, PREDICTING THE IMPACTS OF CHANGING CLIMATE ON BEAUFORT SEA SHORELINES (Coastal Zone Canada 2006 Conference and Youth Forum 2006).

<sup>19</sup> For example, climate interactions may be a useful focus in order to understand the observed increased methyl mercury levels in marine mammals in the Beaufort Sea region, either through local erosion or permafrost degradation, or the transport of mercury through the Mackenzie River from that watershed. See G. Stern et al., *Riverine and Coastal Erosional Input of Mercury to the Beaufort Sea under a Changing Climate*, Coastal Zone Canada (2006).

<sup>20</sup> Natural Resources Canada website, [http://www.adaptation.nrcan.gc.ca/home2\\_e.asp?CaID=9&PgID=23](http://www.adaptation.nrcan.gc.ca/home2_e.asp?CaID=9&PgID=23).

# FISH FRIENDLY VINEYARDS:

## IS COOPERATIVE CONSERVATION ENOUGH?

by Christine Erickson\*

Over the past decade, Californians have witnessed ever-increasing damage to the water quality and fish populations of the wine growing regions.<sup>1</sup> Despite the best efforts of many winegrowers, agencies, and environmental groups, farming practices continue to exhaust certain species and violate provisions of the Endangered Species Act (“ESA”) and Clean Water Act (“CWA”).<sup>2</sup> The lack of substantive law in this area makes conservation very difficult. Rather than settling for so-called incentive based voluntary programs, the time has come for California’s legislature to provide explicit and meaningful regulations to help safeguard California’s fish populations.

Hundreds of vineyards rest alongside the waterways and tributaries of the Russian, Napa, and Navarro Rivers, which are home to various threatened and endangered species.<sup>3</sup> Among these, the anadromous Coho and Chinook salmon and Steelhead trout face particular problems because they live in freshwater, travel to the ocean, and return to freshwater for spawning.<sup>4</sup> These species are severely affected by pesticides, heavy sedimentation, and fertilizer run-offs, which pollute the water and prevent them from laying eggs in the gravel bottom.<sup>5</sup>

Organizations such as the Fish Friendly Farming Certification Program (“FFFCP”) and the Napa Sustainable Winegrowing Group (“NSWC”) have attempted to address this problem by seeking to promote winegrowing practices that are “economically viable, socially responsible, and environmentally sound.”<sup>6</sup> These programs set up voluntary watershed management guidelines marketed as “incentive based” because they authorize participating wineries and grape growers to label and advertise their wine as eco-friendly.<sup>7</sup> Next, the vineyards work with organizations like FFFCP and NSWC to create an inventory of natural resources and management practices and to devise a plan to upgrade their property and improve environmental quality.<sup>8</sup> While many vineyards, including Clos du Bois and Fetzer, have been willing to make a start at such programs, their impact is limited because of a lack of public recognition.<sup>9</sup> Moreover, the absence of near-term benefits and long-term enforcement methods make these voluntary programs susceptible to imminent failure.

Cooperative conservation and feeble marketing techniques will not suffice to get wine the same recognition as other sustainable products such as coffee and seafood. It is time for realistic government action that would hold vineyards accountable for nonconformity with the ESA and CWA. The legislature ought to implement, for instance, a statewide labeling system that classifies wines based on the extent to which their production was

environmentally viable. In consideration of the impact and vital role wine producers play in California’s economy, the government could provide growers with money to start implementing the sustainable practices. Whatever the means, the occasion has come for state measures. As vineyards in California continue to grow, it will become increasingly necessary that mechanisms by which they produce their grapes safeguard the threatened fish populations.



### Endnotes:

<sup>1</sup> See Laurel Marcus, PRACTICAL WINERY AND VINEYARD, Mar.–Apr. 2004, at 20, available at <http://practicalwinery.com/marapr04/marapr04p20.htm>; see generally Fish Friendly Farming, <http://www.fishfriendlyfarming.org> (last visited Sept. 25, 2006).

<sup>2</sup> Endangered Species Act, 16 U.S.C. § 1538 (1973); Clean Water Act, 33 U.S.C. §§ 1251-1376 (1972).

<sup>3</sup> See Laurel Marcus, *Fish Friendly Farming: Read the Label, Save the Salmon*, Coastal Conservancy, Summer 2000, at 6, available at <http://www.coastalconservancy.ca.gov/coast&ocean/summer2000/pages/psix.htm> (last visited Sept. 25, 2006) [hereinafter READ THE LABEL].

<sup>4</sup> READ THE LABEL, *id.*

<sup>5</sup> READ THE LABEL, *id.*; see also Fish Friendly Farming, *supra* note 1; READ THE LABEL, *supra* note 3.

<sup>6</sup> NSWG.org, [www.nswg.org/infoonnswg.htm](http://www.nswg.org/infoonnswg.htm) (last visited Sept. 23, 2006).

<sup>7</sup> NSWG.org, [www.nswg.org/n3.fishfriendly.htm](http://www.nswg.org/n3.fishfriendly.htm) (last visited Sept. 23, 2006).

<sup>8</sup> NSWG.org, *id.*

<sup>9</sup> See FishFriendlyFarming.com, *Details on the FFF program*, [http://www.fishfriendlyfarming.org/a\\_details.html](http://www.fishfriendlyfarming.org/a_details.html) (last visited Sept. 23, 2006).

\* Christine Erickson is a JD candidate, May 2008, at American University, Washington College of Law.

# CASTING THE NET BROADLY:

## ECOSYSTEM-BASED MANAGEMENT BEYOND NATIONAL JURISDICTION

by Arlo H. Hemphill and George Shillinger\*

“EBM looks at all the links among living and nonliving resources, rather than considering single issues in isolation . . . Instead of developing a management plan for one issue . . . EBM focuses on the multiple activities occurring within specific areas that are defined by ecosystem, rather than political, boundaries.”

— US Ocean Commission Report, 2004

### INTRODUCTION

Rapid decline in ocean health has led scientists and policy makers alike to conclude that single-sector and single-species approaches to managing ocean resources and wildlife will not be successful in the long term. Coral bleaching, dead zones, red tides, and fishery collapses are becoming all too common in coastal areas. Meanwhile, we have become increasingly aware that the open ocean and the deep sea, which includes the 64 percent of the ocean beyond national jurisdiction, have not gone unscathed. Recent articles in scientific journals such as *Nature* and *Science* have described global declines of up to 90 percent in populations of large ocean predators (*i.e.*, tunas, billfish, sharks, and sea turtles) during the past 50 years.<sup>1</sup> In this same period, predator diversity has declined by tenfold in all regions of the ocean.<sup>2</sup> At least five species of deep sea fishes (three of which are non-target species exploited only as by-catch) can now be classified as critically endangered under the World Conservation Union (“IUCN”) Red List Criteria,<sup>3</sup> while two other species of deep sea fish, orange roughy and oreo dories, are now considered by the United Nations (“UN”) Food and Agriculture Organization (“FAO”) as overexploited or depleted in all areas where fishing has developed,<sup>4</sup> and deep sea bottom trawling is destroying seamount and coral ecosystems before they can even be studied.<sup>5</sup> In order to protect our marine resources, there must be a move towards an Ecosystem-Based Management (“EBM”) approach to oceans and fisheries management.

### FRAGMENTED AND INCONSISTENT APPROACHES TO OCEAN MANAGEMENT

#### CURRENT INEFFICIENCIES IN OCEAN MANAGEMENT WITH A BIAS TOWARDS FISHERIES

Beyond national jurisdictions, fragmented and inconsistent management — relying largely on sector-based and single-species approaches — have proven ineffective in ensuring the health and integrity of marine ecosystems. One approach has been the creation of regional fisheries management organizations (“RFMOs”). The majority of RFMOs are limited to single-

species or species group fisheries, namely tuna and “tuna-like” species. For example, the Commission for the Conservation of Southern Bluefin Tuna and the Inter-American Tropical Tuna Convention cover huge swathes of ocean, but their mandates are narrow and their track records are poor. Several tuna stocks under their management are now listed as endangered or critically endangered under the IUCN Red List.<sup>6</sup>

Another approach has been protection under the UN Fish Stocks Agreement (“FSA”). The FSA requires the conservation of, not only target species, but also of associated species and the ecosystem as a whole. However, the agreement applies only to fish populations that “straddle” political boundaries or to a limited number of highly migratory species, leaving other highly migratory species and all discrete high seas (*e.g.*, deep sea) fish stocks unprotected.

Obstacles are also created by fragmented legal frameworks. For example, under the UN Convention on the Law of the Sea (“UNCLOS”), the water column beyond national jurisdiction, the high seas, is treated differently than the seabed. Hence, while deep seabed mineral resources are the “common heritage of mankind” to be exploited only pursuant to specific rules for the protection of ecological integrity, the living seabed and associated resources are regarded by some as open access frontiers to be freely exploited and essentially “mined.”<sup>7</sup>

#### A LICENSE FOR LAWLESSNESS

As a result of this smorgasbord of legal approaches, vulnerable ecosystems beyond national jurisdiction remain largely unprotected. The right to free passage and trade inherent in the 17th century concept of freedom of the seas has been translated in the 21st century as a virtual license for lawlessness, under which exploiters can freely impact ocean wildlife and marine resources that are, or at least should be, the common heritage of all humankind, with little or no legal consequence.

Deep sea bottom trawling exemplifies the problems created by this free-for-all approach. In addition to having a disproportionately high impact on targeted species, to the point that many

\* Arlo Hemphill and George Shillinger recently left Conservation International, where Hemphill served as a Director of Global Marine Strategies and Shillinger as a Senior Marine Research Fellow, to help establish a new foundation dedicated to the conservation of the deep and high seas. Shillinger is also a Ph.D. Candidate in Marine Biology in the Block Lab of Stanford University. This article is based on a position paper originally prepared for the 7th Informal Consultative Process on Oceans and the Law of the Sea (“UNICPOLOS VII”) on behalf of Conservation International, Greenpeace International, the Natural Resources Defense Council, the Marine Conservation Biology Institute, and Seas at Risk. The authors wish to acknowledge Kristina Gjerde, Kelly Rigg, and Lisa Speer for their guidance and helpful editing.

are now considered overexploited or depleted, bottom trawling simultaneously destroys the highly diverse and highly endemic benthic communities upon which the targeted species depend. As noted in a recent report for the FAO, observers monitoring the first year of the orange roughy fishery in the South Tasman Rise, an area straddling Australia's Exclusive Economic Zone and the high seas, recorded 10 tonnes of coral by-catch per tow. This means that for every 4,000 tonnes of orange roughy caught, 10,000 tonnes of coral were brought up in the nets.<sup>8</sup> The report notes further that the by-catch of corals is just one symptom of the larger impact of trawling on deep seabed communities.

### THE MOVE TOWARDS AN ECOSYSTEM-BASED MANAGEMENT APPROACH

Recent global and regional assessments<sup>9</sup> of the marine environment such as the Pew Oceans<sup>10</sup> and U.S. Ocean Commission<sup>11</sup> reports in the United States, the UK Royal Commission's *Turning the Tide* report on the Northeast Atlantic ("OSPAR") region,<sup>12</sup> and the *Defying Ocean's End* Agenda for Action<sup>13</sup> have taken note of these trends. These reports have nearly unanimously recommended an EBM approach to address the full range of ocean uses, inclusive of fisheries. Furthermore, the 2002 World Summit on Sustainable Development ("WSSD") emphasized the crisis of ocean resource exploitation and habitat destruction — mostly from large-scale commercial fishing — and urged implementation of EBM and conservation, including networks of marine protected areas ("MPAs"). The WSSD set a target for the introduction of EBM by 2010.

These assessments suggest that the tools of spatial planning and zoning that separate and govern human activities on land can also be used in the ocean. Within a framework of marine EBM, these land-based tools have the potential to protect ecosystem services, preserve ecosystem structures, functions, and processes and allow sustainable use of the ocean resources upon which we all depend. Thus, EBM is defined as having the following elements:<sup>14</sup>

- *Sustainability*: ecosystem management does not focus primarily on "deliverables" but rather, regards intergenerational sustainability as a precondition.
- *Goals*: ecosystem management establishes measurable goals that specify future processes and outcomes necessary for sustainability.
- *Sound ecological models and understanding*: ecosystem management relies on research performed at all levels of ecological organization.
- *Complexity and connectedness*: ecosystem management

recognizes that biological diversity and structural complexity strengthen ecosystems against disturbance and supply the genetic resources necessary to adapt to long-term change.

- *The dynamic character of ecosystems*: recognizing that change and evolution are inherent in ecosystem sustainability, ecosystem management avoids attempts to "freeze" ecosystems in a particular state or configuration.
- *Context and scale*: ecosystem processes operate over a wide range of spatial and temporal scales, and their behavior at any given location is greatly affected by surrounding systems. Thus, there is no single appropriate scale or time frame for management.
- *Humans as ecosystem components*: ecosystem management values the active role of humans in achieving sustainable management goals.
- *Adaptability and accountability*: ecosystem management acknowledges that current knowledge and paradigms of ecosystem function are provisional, incomplete, and subject to change. Management approaches must be viewed as hypotheses to be tested by research and monitoring programs.

### FIVE STEPS TOWARDS THE ECOSYSTEM-BASED MANAGEMENT APPROACH

In its strategy for achieving the Millennium Development Goals ("MDG") in the area of environmental sustainability and human well-being, the UN Millennium Project frames its highest level recommendations within an EBM approach.<sup>15</sup> Addressing fisheries and marine resources as a major component

under this approach, it recommends the elimination of bottom trawling on the high seas by 2006 to protect seamounts and other ecologically sensitive habitats and as a means to restore depleted fish populations. Such a measure would need to be implemented prior to the introduction of EBM, as bottom trawling's destructive nature on the ecosystem would directly conflict with the management of it.

The Millennium Project highlights the work of the IUCN Commission on Ecosystem Management, which has identified five steps towards achieving implementation of the ecosystem approach. All five of these steps are conspicuously missing from the current ocean governance regime for areas beyond national jurisdiction.

#### STEP ONE: STAKEHOLDER ANALYSIS CONDUCTED WITHIN THE APPROPRIATE ECOSYSTEM CONTEXT

The first step involves a stakeholder analysis that must be conducted within the appropriate ecosystem context. Pursuant to the 1970 UN General Assembly ("UNGA") resolution,

---

*As a result of this smorgasbord of legal approaches, vulnerable ecosystems beyond national jurisdiction remain largely unprotected.*

---

resources of the deep seabed are the common heritage of mankind and all nations and their citizens are stakeholders in the use of these marine resources.<sup>16</sup> Unfortunately, individual resource users (e.g., fisheries, bioprospecting, ocean tourism, energy prospecting, and exploitation) have many different and potentially conflicting interests, as some are not fixed to a specific locale, and are free to move on to the next seamount or hydrothermal vent once the resources have been consumed or damaged.

This migratory pattern of deep seabed use may undermine the notion that those with a direct relationship to the resource are its best stewards.<sup>17</sup> Conservation, which represents the broader and long-term interests of humankind and the planet, is rarely given as much weight as individual industrial users. Stakeholders operating within ecosystems outside of national jurisdictions must be encouraged to establish a better balance between long-term, global-scale interests versus short-term, sector-based economic benefits. These methods must simultaneously encourage full accountability, transparency, and participation.

#### STEP TWO: CHARACTERIZING ECOSYSTEM STRUCTURE AND FUNCTION TO MANAGE AND MONITOR

The second step involves characterizing ecosystem structure and function and establishing appropriate mechanisms to manage and monitor them. Little is known about deep sea habitats and their vulnerability or resilience to human impacts. Biogeographic classification workshops could be a first step in defining these ecosystems, but more work needs to be done in order to adequately characterize the structure and function of

these ecosystems and to develop ongoing mechanisms to monitor them. Their management must begin with broad protection via a moratorium on destructive activities, or an equivalent measure, to sustain their survival while the science is underway.

#### STEP THREE: IDENTIFYING KEY ECONOMIC ISSUES AFFECTING THE ECOSYSTEM AND ITS INHABITANTS

Once the baseline data on ecosystem structure and function has been acquired, the next necessary step is to identify key economic issues affecting the ecosystem and its inhabitants. Every stakeholder has a unique set of economic checks and balances, and each stakeholder carries differing degrees of fiscal risk and reward.

For example, the single most significant and immediate threat to deep sea ecosystems beyond national jurisdictions as well as to the legal continental shelves of states, when these extend beyond 200 nautical miles (“nm”), is high seas bottom

trawling. Yet, high seas bottom trawling accounts for only 0.5 percent of the estimated value of the annual global marine catch. This fishery, as a whole, provides work for approximately 100 to 200 vessels, significantly fewer than the 3.1 million vessels worldwide engaged in other fishing activities.<sup>18</sup> The economic impact of closing this fishery is low, with potentially high economic returns gained by protecting seamounts, cold water coral beds, and other deep sea ecosystems. These efforts will insure the opportunity to pursue alternative methods of exploitation for purposes such as medicine, tourism, or less destructive fisheries.

#### STEP FOUR: UNDERSTANDING THE IMPACTS AND INTERCONNECTEDNESS OF ECOSYSTEMS

Within the highly dynamic and interconnected oceanic realm, understanding how one ecosystem can influence functionality within surrounding ecosystems is imperative. For instance, there is increasing evidence for connectivity between the deep sea bed and coastal ecosystems, as well as the surface

layers of the pelagic water column.<sup>19</sup> Examples include daily migration of fish and invertebrates from the deep sea to surface, the use of mid-ocean seamounts as spawning grounds for American, Asian, and European eels,<sup>20</sup> and the use of benthic habitats as nursery and breeding grounds for the very fish that bottom trawl fisheries target and subsequently annihilate. However, the inadequacy of current knowledge on ecosystem connectivity beyond national jurisdiction and the long-lasting and potentially irreversible nature of the harm caused by deep sea bottom trawling underscore the need for the precautionary principle,

defined as: “where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”<sup>21</sup>

#### STEP FIVE: DETERMINING LONG-TERM GOALS AND REQUISITE APPROACHES

The fifth step, determining long-term goals and requisite approaches for ecosystem-based management, is essential. The international community has repeatedly expressed the need to protect vulnerable deep sea biodiversity, particularly along seamounts, cold water corals, and hydrothermal vents, and to introduce EBM in the marine realm. However, very few ideas or measures for reaching these goals have been expressed.

For example, one major tool of EBM is the use of protected areas. Thus far, an adequate governance framework does not exist for extending a globally representative network of MPAs

---

*Within the highly dynamic and interconnected oceanic realm, understanding how one ecosystem can influence functionality within surrounding ecosystems is imperative.*

---

into waters beyond national jurisdiction. The European Union has recently introduced a proposal for a new UNCLOS implementing agreement for biodiversity management and conservation beyond national jurisdiction that would include such a framework. In the interim, without a comprehensive assessment on the extent of impacts from current activities, or even where the most vulnerable areas are located, the precautionary principle must be evoked, particularly on activities that leave no room for doubt as to their destructive and wide-spread nature.

### CONCLUSION

In consideration of current ocean governance regimes and threats to marine biodiversity beyond national jurisdiction, the authors recommend a series of steps for promptly moving EBM forward. First, for reasons outlined above, an immediate moratorium on all deep sea bottom trawling on the high seas is required as a first stage measure. This should occur through a UN General Assembly resolution and would voluntarily be enforced by Flag States. Second, agreed upon methodologies and on-going strategies should be established for defining biogeographic provinces and ecosystem structure beyond national jurisdiction. Third, a

mechanism needs to be established, potentially a new UNCLOS implementing agreement, for permanent protection for critical, unique, and vulnerable habitats on the high seas and in the Area, specifically through the establishment of a globally representative network of MPAs. Finally, a World Ocean Public Trust that unites governance of the high seas and the Area into one regime under an EBM framework should be established throughout the world's oceans in areas beyond national jurisdiction. Such a Trust would treat the world ocean as the common heritage of humankind, with governments of the world responsible for safeguarding biodiversity as well as ecosystem structure, function, and processes for the benefit of present and future generations. The Trust would operate on the principle of a precautionary approach to all uses of high seas marine life, biogenetic and other living resources, habitats, and ecosystems, in order to conserve and protect the world ocean,<sup>22</sup> while ensuring long-term sustainable and equitable use for all. Existing regulations, regimes, programs, and objectives would be harmonized as necessary to ensure consistency with these goals.



## Endnotes: Casting the Net Broadly

<sup>1</sup> See Ransom A. Myers & Boris Worm, *Rapid Worldwide Depletion of Predatory Fish Communities*, 423 NATURE 280, 280-83 (2003); see also James R. Spotila et al., *Pacific Leatherback Turtles Face Extinction*, 405 NATURE 529, 529-30.

<sup>2</sup> See Boris Worm et al., *Global Patterns of Predator Diversity in the Open Oceans*, 309 SCIENCE 1365, at 1365-69 (2005).

<sup>3</sup> Jennifer A. Devine, *Fisheries: Deep-sea Fishes Qualify as Endangered*, 439 NATURE 29 (2006).

<sup>4</sup> See Jean J. Maguire et al., *THE STATE OF WORLD HIGHLY MIGRATORY, STRADDLING AND OTHER HIGH SEAS FISHERY RESOURCES AND ASSOCIATED SPECIES*, FAO FISHERIES TECHNICAL PAPER, 495 (FAO 2006).

<sup>5</sup> See Henry Nicholls, *Marine Conservation: Sink or Swim*, 432 NATURE 12, 12-14 (2004).

<sup>6</sup> 2006 IUCN Red List of Threatened Species, IUCN website, <http://www.iucnredlist.org> (last visited Oct. 6, 2006).

<sup>7</sup> See Fikret Berkes et al., *Globalization, Roving Bandits, and Marine Resources*, 311 SCIENCE 1557, 1557-58 (2003).

<sup>8</sup> See MAGUIRE, *supra* note 4; see also Owen F. & Malcolm R. Clark *Analysis of the Bycatch in the Fishery for Orange Roughy, Hoplostethus atlanticus, on the South Tasman Rise*, 54 MARINE AND FRESHWATER RESEARCH, 643 (2005).

<sup>9</sup> See PEW OCEANS COMMISSION, *AMERICA'S LIVING OCEANS: CHARTING A COURSE FOR SEA CHANGE* (May 2003), available at [http://www.pewtrusts.org/pdf/env\\_pew\\_oceans\\_final\\_report.pdf](http://www.pewtrusts.org/pdf/env_pew_oceans_final_report.pdf) (last visited Oct. 6, 2006); see U.S. COMMISSION ON OCEAN POLICY, *AN OCEAN BLUEPRINT FOR THE 21ST CENTURY*, (2004), available at [http://www.oceancommission.gov/documents/full\\_color\\_rpt/000\\_ocean\\_full\\_report.pdf](http://www.oceancommission.gov/documents/full_color_rpt/000_ocean_full_report.pdf) (last visited Oct. 6, 2006); see ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION, *TURNING THE TIDE: ADDRESSING THE IMPACT OF FISHERIES ON THE MARINE ENVIRONMENT*, (2004), available at <http://www.rcep.org.uk/fisheries/Turningthetide.pdf> (last visited Oct. 6, 2006).

<sup>10</sup> See PEW OCEANS COMMISSION, *supra* note 9.

<sup>11</sup> See U.S. COMMISSION ON OCEAN POLICY, *supra* note 9.

<sup>12</sup> See ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION, *supra* note 9.

<sup>13</sup> See *DEFYING OCEAN'S END: AN AGENDA FOR ACTION* (Linda K. Glover & Sylvia A. Earle eds., Island Press 2004).

<sup>14</sup> See generally Norman L. Christensen et al., *The Report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management*, 3 ECOL. APPS. 665 (1996).

<sup>15</sup> UN Millennium Project, *Environment and Human Well-being: A Practical Strategy* (2005).

<sup>16</sup> G.A. Res. 2749 (XXV), Dec. 17, 1970.

<sup>17</sup> See Berkes et. al, *supra* note 7.

<sup>18</sup> See Matthew Gianni, *High Seas Bottom Trawl Fisheries and their Impacts on the Biodiversity of Vulnerable Deep-Sea Ecosystems: Options for International Action* (World Conservation Union 2004).

<sup>19</sup> See WILLIAM R. CRAWFORD ET AL., *IMPACT OF HAIDA EDDIES ON CHLOROPHYLL DISTRIBUTION IN THE EASTERN GULF OF ALASKA DEEP-SEA RESEARCH II* 975-89 (Elsevier 2005).

<sup>20</sup> Katsumi Tsukamoto, *Spawning of Eels Near a Seamount*, 439 NATURE, 929, (2006).

<sup>21</sup> Nordic Council's International Conference on Pollution of the Seas: Final Document Agreed to Oct. 18, 1989, in *Nordic Action Plan on Pollution of the Seas*, 99 app. V (1990).

<sup>22</sup> Montserrat Gorina-Ysern et al., *Ocean Governance: a New Ethos Through a World Ocean Public Trust*, in *DEFYING OCEAN'S END: AN AGENDA FOR ACTION*, (Linda K. Glover & Sylvia A. Earle eds., Island Press 2004).

# GLOBAL AQUACULTURE ALLIANCE ON BEST AQUACULTURE PRACTICES:

## AN INDUSTRY PREPARES FOR SUSTAINABLE GROWTH

By Daniel Lee and John Connelly\*

### INTRODUCTION: WHAT IS AQUACULTURE

**A**quaculture — or the farming of fish — is both a new technology and one that has long been part of human history. Aquaculture is employed for a variety of reasons: fish may be raised to stock public waters for sport fishing and for commercial fishing; it may be used to save an endangered species; or it may be used to harvest a commercially valuable crop in ponds or coastal waters. In simple terms, aquaculture is an extension of agriculture: the farmer farms the water instead of the land.<sup>1</sup> Aquaculture's importance to the global food supply is hard to overestimate. It has grown faster than any other agriculture segment in the past half century, from less than one million tons to 59.4 million tons in 2004, representing \$70.3 billion in value.<sup>2</sup>

### FISH AND SHELLFISH AS GROWING PART OF A HEALTHY DIET: SEAFOOD SUPPLY ISSUES

As people in developed countries seek a healthy life style, they are increasing their seafood intake. Globally, the United Nations Food and Agriculture Organization ("FAO") predicts that the yearly per capita demand for seafood will grow by nearly twenty percent, from 35.5 to 42.1 pounds, between 2000 and 2015,<sup>3</sup> and forecasts that the total demand for seafood will surge by 50 million tons in the coming decade, representing a 3.1 percent annual increase since 1985,<sup>4</sup> and will reach 133 million tons by 2015. As an illustration of the importance of aquatic products in human diets, FAO further reports that for more than 2.6 billion people, fish provides twenty percent or more of their animal protein.<sup>5</sup>

While increased fish and shellfish consumption presents benefits to public health, supplying this demand is a significant challenge. The total world supply of wild capture<sup>6</sup> fisheries has been stable at about 88 million tons since 1985.<sup>7</sup> FAO experts project this to be the global sustainable limit of harvest, stating, "catches in the wild are still high, but they have leveled off, probably for good."<sup>8</sup>

If world demand for seafood reaches 133 million tons in 2015, and wild capture fisheries can only yield 88 million tons, how will society fill this gap? There is clear evidence that aquaculture is rising to the challenge. FAO notes that the global production from aquaculture continues to grow in terms of both quantity and its relative contribution to the world's supply of fish for direct human consumption.<sup>9</sup> Aquaculture already supplies 43 percent of the fish humans eat (up from 27.5 percent in 2000), and that percentage is expected to grow in the future.<sup>10</sup>

Countries in Asia and Latin America are the largest aquaculture producers and developing countries accounted for 90.7 percent of production in 2002.<sup>11</sup> The output of China alone is massive and was reckoned to account for 71 percent of global aquaculture production in 2002,<sup>12</sup> although production figures from China are a source of controversy.<sup>13</sup>

So if developing nations are producing most of the globe's aquaculture products, where are these products going? Clearly, of that which is internationally traded, much of it is coming to the United States. The U.S. imports about eighty percent of its fish.<sup>14</sup> A review of the top ten fish and shellfish that Americans eat reveals that four of the top six are, to a great extent, supplied through imports and aquaculture (shrimp, salmon, catfish and tilapia). Of the top six species, only pollock and tuna are solely or primarily produced from the wild.

### SUSTAINABILITY AND SEAFOOD

There is a growing call for a rational use of the globe's resources, often couched in terms of "sustainable development" or "sustainability." However, in the context of world trade policy, the UN has noted that the sustainability principle should not be extended for ostensibly environmental purposes so that it acts as a trade barrier. Specifically, Principle 12 of the United Nations' Rio Declaration on Environment and Development states: "States should cooperate to promote a supportive and open international economic system that would lead to economic growth and sustainable development in all countries, to better address the problems of environmental degradation. Trade policy measures for environmental purposes should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade."<sup>15</sup>

### FISHERIES CERTIFICATION AND ECO-LABELING

Since the mid-1990s, sustainability and certification efforts in the seafood industry have proliferated. Much of the impetus for these programs has come from large institutional buyers in North America and Europe who seek to ensure they buy products that are sustainably harvested.

To ensure consistent guidelines for these eco-labeling systems, the FAO developed guidelines for eco-labeling fish products in 2005. The guidelines outline general principles that

---

\* Daniel Lee serves as the Global Aquaculture Alliance Best Aquaculture Practices Program Coordinator and is a Research Associate at the University of Wales, Bangor, UK. John Connelly is the President of the National Fisheries Institute, the leading trade association for the U.S. seafood industry.

should govern eco-labeling schemes, including the need for reliable, independent auditing, transparency of standard-setting and accountability, and the need for standards to be based on good science.<sup>16</sup>

### GLOBAL AQUACULTURE ALLIANCE

The Global Aquaculture Alliance (“GAA”) represents the world aquaculture industry. As an international, non-governmental organization (“NGO”), GAA defines its mission as “promoting responsible aquaculture to meet world food needs.”<sup>17</sup> It takes a long-term view of the industry’s needs and focuses on issues affecting environmental, social, and economic sustainability. The organization serves to unify a large, diverse industry. Principally it seeks to raise environmental and social standards through its Best Aquaculture Practices (“BAP”) program by promoting codes of conduct and aquaculture standards developed through a synthesis of best management practices.

In the late 1990s, international environmental NGOs such as Greenpeace publicized the environmental challenges caused by the rapid growth of aquaculture, particularly tropical shrimp farming. Specific areas of concern included: damage to natural habitats such as mangroves, pollution arising from pond effluents, antibiotic residues in finished products, and the use of fishmeal and genetically modified organisms. In 1996, twenty-one NGOs and community organizations met in Choluteca, Honduras and demanded a global moratorium on the expansion of any shrimp farming that did not meet their criteria for sustainability.<sup>18</sup> Largely in response to this pressure, executives from the shrimp industry formed GAA in 1997. GAA initially concentrated on aspects of shrimp production, but soon broadened its efforts to include the full supply chain, from hatcheries and feed production to farms, and processors to retailer buyers.

Even though there are numerous aquaculture codes of practice, GAA went further and developed the BAP and defines the most important elements of responsible practices through quantitative standards. Each BAP standard was developed by a committee composed of technical experts and stakeholders, including includes members of conservation NGOs, industry leaders, representatives from regulatory agencies, and academics. Care was taken to ensure broad stakeholder participation and a balance among the different sectors of interest.

The resulting BAP standards specify the auditing procedures to objectively assess adherence with these practices. Points are awarded according to the level of compliance on individual criteria, and these points are then added together. The total must exceed a minimum level if a facility is to achieve BAP certification. Certain essential items (for example in shrimp farms, items that deal with mangroves, effluents, antibiotics, and hatchery seed) are mandatory and failure to satisfy any one of them results in automatic failure, irrespective of the total number of points scored.

GAA also registered a BAP certification mark (see Figure 1) for use in advertising and

on finished products at the wholesale and retail levels. Aquaculture facilities that pass the auditing process are deemed to be in compliance with the BAP standards and can make use of this BAP logo to promote their products.<sup>19</sup> BAP standards are currently available for shrimp farms, shrimp hatcheries, and shrimp processing plants. The standards for aquaculture feed mills and for laboratory verification of the safety of finished products are scheduled to be finalized by the end of 2006, along with a general aquaculture standard that will extend coverage to fish.



Figure 1: Best Aquaculture Practices Certification Mark.

### AQUACULTURE CERTIFICATION COUNCIL

In addition to comprehensive standards, GAA also recognizes the requirement for independent confirmation of the conditions and actions under which aquaculture products are made and processed. GAA established the Aquaculture Certification Council (“ACC”) in 2003 to embody the following characteristics:

1. Independence from GAA, the standard setting body;
2. Independence from the parties seeking certification;
3. Possession of expertise in this relatively new industry; and
4. The ability to function with a low cost base to broaden the appeal of the BAP program.

The ACC is a not-for-profit corporation with the mission to “certify aquaculture facilities that apply best management practices to ensure social and environmental responsibility, food safety, and traceability throughout the production chain.”<sup>20</sup> ACC is governed by a twelve-member board of directors, from a cross-section of aquaculture professionals from the Americas, Asia and Europe. Its members represent seafood producers, processors and buyers, academic institutions and other entities.

GAA assigned ACC the exclusive right to certify compliance with the BAP standards. In addition to certifying aquaculture facilities, the ACC trains and accredits certifiers, maintains a website, commissions software for a traceability database, and interacts with stakeholders. As of September 2006, ACC had certified 39 processing plants, 25 farms and fifteen hatcheries. Figure 2 illustrates the annual growth in certifications, which

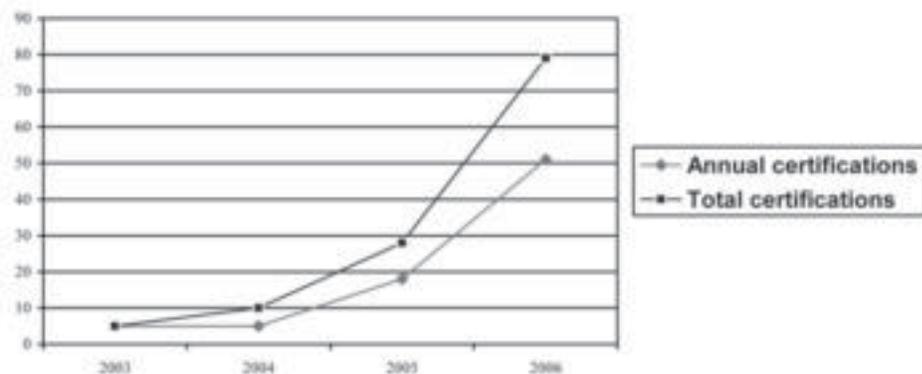


Figure 2: Number of Aquaculture Facilities Certified by ACC.

shows that the program is successfully attracting new participants. Importantly, facilities on three continents have been BAP certified. Countries with certified facilities include: Bangladesh, Belize, Brazil, Dutch Antilles, Ecuador, Honduras, India, Indonesia, Madagascar, Mexico, Nicaragua, Thailand, United States, Venezuela, and Vietnam.

To maintain consistency across the program, operations are subject to repeat inspections and the ACC also performs surprise audits of accredited facilities. ACC is separately constituted and operates independently from GAA. This separation between the GAA standard setting process and a certification body ensures the system is consistent with recently adopted FAO Guidelines for EcoLabeling of Marine Products.

### FUTURE PLANS TO EXPAND BAP STANDARDS

To meet demand for non-shellfish species, the GAA is expanding the BAP program to produce new standards to cover fish farms, feed mills, and laboratory verification of food safety in finished products. The new standards for fish farms address additional issues such as waste from cage sites, fishmeal usage, and animal welfare. Participating feed mills will be required to demonstrate that they have adopted adequate procedures for manufacturing feeds without biological and chemical hazards. Feed mills will also be required to provide information on the fishmeal and fish oil content of their feeds so that farmers can make efficient use of these valuable, yet limited, natural resources.

Large, often vertically-integrated aquaculture operators are the most financially and technically able to modify their prac-

tices to meet the BAP standards. To address the needs of the myriad small-scale farmers with less financial and technical resources, GAA is developing special provisions so that multiple small farms can certify in clusters. Cluster certification encourages small enterprises to form associations with their neighbors in order to meet the BAP criteria collectively, sharing responsibility for raising environmental and ethical performance levels and spreading the financial burden of certification. The success of cluster certification is vital to the BAP program's success.

Both the environmental NGOs and GAA represent different factions in global society that seek the same end result — a socially equitable and environmentally benign aquaculture industry. Continuing dialogue that leads to objectively considered and fairly implemented actions will be essential if these aims are to be met.

### CONCLUSION

Many international bodies such as the FAO recognize that Best Management Practices play an important part in the sustainable development of aquaculture, for both large-scale and small-scale producers.<sup>21</sup> Third party certification of these practices can help improve public confidence in the management of aquaculture facilities, provided that the certification systems function independently of the standard setting organizations. Hopefully the rapidly expanding and evolving aquaculture industry, with the assistance of groups such as the GAA and ACC, will continue to learn lessons from other industries and will continue on the path of sustainability.



## Endnotes: Global Aquaculture

<sup>1</sup> Reginal M. Harrell, *What is Aquaculture*, Marine Sea Grant Extension, Publication Number UM-SG-MAP-91-01, available at <http://www.mdsg.umd.edu/Extension/finfish/FF6.html> (last visited Oct. 5, 2006).

<sup>2</sup> UNITED NATIONS FOOD AND AGRICULTURE ORGANIZATION, STATE OF WORLD AQUACULTURE 2006 5, available at <http://www.fao.org/newsroom/en/news/2006/1000383/index.html> (last visited Oct. 6, 2006).

<sup>3</sup> UNITED NATIONS FOOD AND AGRICULTURE ORGANIZATION, THE STATE OF WORLD FISHERIES AND AQUACULTURE 2004 146, available at <http://www.fao.org/docrep/007/y5600e/y5600e00.htm> (last visited Oct. 20, 2006).

<sup>4</sup> STATE OF WORLD FISHERIES AND AQUACULTURE, *id.* at 146.

<sup>5</sup> STATE OF WORLD FISHERIES AND AQUACULTURE, *id.* at 3.

<sup>6</sup> Wild capture fisheries refer to fish harvested from marine and inland waters through traditional fishing methods rather than cultivated fish.

<sup>7</sup> STATE OF WORLD FISHERIES AND AQUACULTURE, *supra* note 3, at 5.

<sup>8</sup> United Nations Food and Agriculture Organization FAO Newsroom, *Nearly Half of All Fish Eaten Today Farmed, Not Caught*, Sept. 4, 2006, available at <http://www.fao.org/newsroom/en/news/2006/1000383/index.html> (last visited Oct. 6, 2006).

<sup>9</sup> STATE OF WORLD FISHERIES AND AQUACULTURE, *supra* note 3, at 6.

<sup>10</sup> STATE OF WORLD FISHERIES AND AQUACULTURE, *supra* note 3, at 147.

<sup>11</sup> STATE OF WORLD FISHERIES AND AQUACULTURE, *supra* note 3, at 6.

<sup>12</sup> STATE OF WORLD FISHERIES AND AQUACULTURE, *supra* note 3, at 6.

<sup>13</sup> STATE OF WORLD FISHERIES AND AQUACULTURE, *supra* note 3, at 4-5.

<sup>14</sup> Testimony of Timothy Keeney, Deputy Assistant Secretary of Oceans and Atmosphere, U.S. Department of Commerce before the Senate Commerce Committee National Ocean Policy Study Subcommittee, June 8, 2006, available at [http://commerce.senate.gov/public/\\_files/Keeney060806.pdf](http://commerce.senate.gov/public/_files/Keeney060806.pdf) (last visited Oct. 6, 2006).

<sup>15</sup> United Nations Conference on Environment And Development, Rio de Janeiro, June 3–14, 1992, *Rio Declaration On Environment and Development*, Principle 12, U.N. Doc. A/CONF.151/26 (Vol. I) (August 12, 1992), available at <http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm> (last visited Oct. 6, 2006).

<sup>16</sup> UNITED NATIONS FOOD AND AGRICULTURE ORGANIZATION, GUIDELINES FOR ECOLABELLING OF FISH AND FISHERY PRODUCTS FROM MARINE CAPTURE FISHERIES 2005, available at <http://www.fao.org/docrep/008/a0116t/a0116t00.htm> (last visited Oct. 6, 2006).

<sup>17</sup> About GAA, Global Aquaculture Alliance website, <http://www.gaalliance.org> (last visited Oct. 6, 2006).

<sup>18</sup> Choluteca Declaración (Oct. 16, 1996), available at <http://darwin.bio.uci.edu/~sustain/shrimpecos/declare1.html> (last visited Oct. 6, 2006).

<sup>19</sup> The full standards, accompanied by guidance notes and auditing forms, are freely available from the Aquaculture Certification Council, <http://www.aquaculturecertification.org> (last visited Oct. 6, 2006).

<sup>20</sup> About ACC Mission, Aquaculture Certification Council website, <http://www.aquaculturecertification.org> (last visited Oct. 6, 2006).

<sup>21</sup> Food and Agriculture Organization — Committee on Fisheries (FAO COFI), Subcommittee on Aquaculture, Report of the Third Session of the COFI (FI-702-3) FAO COFI Subcommittee on Aquaculture, adopted New Delhi India, Sept. 8, 2006.

# ISLANDS OF GARBAGE CONTINUE TO GROW IN PACIFIC

by Ursula Kazarian\*

Hundreds of square miles<sup>1</sup> of discarded plastic have formed islands on the high seas, created by drifting debris caught in the oceans' currents. The islands are held together at the points where these currents merge, producing massive, rotating vortexes of trash visible to the human eye from afar. The largest of these islands, located in the Pacific Ocean midway between Hawaii and San Francisco and known as the "Eastern Garbage Patch," is reportedly twice the size of Texas and continuing to grow.<sup>2</sup> The slightly smaller "Western Garbage Patch" lurks off of the shores of Japan. Many more are growing around the globe. Very little research has been completed, but the scant information that has been reported is certainly cause for worry. The populations of native species of birds and other wildlife near the patches are plummeting, and resort beaches throughout the Pacific are cluttering up with seasonal plastic tides. It is estimated that four-fifths of this waste originates on land and is carried to the oceans by rivers.<sup>3</sup> Existing laws and international entities focus more on "traditional" sources of ocean pollution, such as oil discharge from ships. Currently, international law fails to specifically address this crisis of mounting waste throughout the oceans.

Unlike other indirect, sometimes microscopic, causes of harm that threaten our water, air, and land, these garbage patches are visible, tangible, and persistent pollutants that threaten ocean wildlife. While much of the waste can be traced back to specific urban areas, such as the Los Angeles River in the case of the Eastern Garbage Patch, the consequences are far-reaching. Forty percent of the native species of albatross near the Eastern Garbage Patch die within their first year, and most of those deaths occur because the parent birds mistake the plastics for food and feed the garbage to their young.<sup>4</sup> The garbage patches also purge plastic debris on a seasonal basis over many beach areas and tourist hotspots throughout the Pacific. This far-reaching problem promises only to become worse with time and demands legal protection from the international community.

Annex V of the International Convention for the Prevention of Pollution from Ships ("MARPOL"), under the United Nations International Maritime Organization, addresses the problem of garbage pollution from ships in the oceans. While MARPOL considers plastic waste as "the greatest danger"<sup>5</sup> of all the garbage dumped in the ocean from ships, using this instrument as a source of remedy is limited because the Convention only applies to pollution from ships. Just one-fifth of the Eastern Garbage Patch is estimated to have originated from ships,<sup>6</sup> thereby answering only a portion of the problem. Furthermore, Annex V is optional for member countries, and thus is rarely, if ever, enforced.

Although international action is far from satisfactory, national initiatives are emerging. The U.S. House of Representatives recently passed an amendment to a Senate Act to:

"establish a program within the National Oceanic and Atmospheric Administration and the United States Coast Guard to help identify, determine sources of, assess, reduce, and prevent marine debris and its impacts on the marine environment and navigation safety, in coordination with non-Federal entities..."<sup>7</sup>

The Act even addresses "measuring and strengthening" its compliance with Annex V of MARPOL, and, in addition, explicitly incorporates land-based sources of pollution in its program.<sup>8</sup> The Act also provides for the establishment of an "Interagency Committee on Marine Debris" to "coordinate... among federal agencies, ... non-governmental organizations, industry, universities, state governments, Indian tribes, and other nations."<sup>9</sup> This is an extremely progressive approach to resolving the problem of marine debris, but it is only the first step. It is unclear whether this Act will directly affect the Eastern Garbage Patch, save through possible prevention of further debris accumulation. An international entity is surely needed in order to categorically address those issues of marine debris that fall outside of national jurisdiction. Islands of garbage are appearing all over the globe, and responsibility for drifting garbage must also be clarified. Otherwise, well-intentioned national plans could be wasted in a maelstrom of legal actions to shift the blame.

Despite the current lack of international policy regarding marine debris, there are possible trajectories for international cooperation toward resolution of this serious issue. Key elements include raising public awareness of the problem on an international level, encouraging international organizations already in place to expand their reach and hold known polluter countries accountable, and supplying short-term solutions such as onsite mobile incineration clinics. It is imperative that we combat this problem using these methods and others, or else our plastic waste will become an increasing menace to our oceans, to our wildlife, and to ourselves.

## Endnotes:

<sup>1</sup> See generally Kenneth R. Weiss, *Plague of Plastic Chokes the Seas*, LA TIMES, Aug. 12, 2006, at A1.

<sup>2</sup> Weiss, *id.*

<sup>3</sup> Weiss, *id.*

**Endnotes:** Islands of Garbage continued on page 84

\*Ursula Kazarian is a JD candidate, May 2009, at American University, Washington College of Law.

# CASE STUDY:

## THE SUCCESS OF REGIONAL SOLUTIONS IN THE BALTIC

by Anne Christine Brusendorff\*

### INTRODUCTION

The cooperation of the coastal countries surrounding the Baltic Sea provides an impressive example of regional cooperation for marine protection. Exploring the evolution of the Convention on the Protection of the Marine Environment of the Baltic Sea Area, an internationally legally binding agreement (to protect the Baltic Sea), provides a basis for future joint initiatives and actions around the globe.

### NATURAL CHARACTERISTICS OF THE BALTIC SEA

The Baltic Sea is a relatively young and rather small sea in comparison to other bodies of water on Earth. It is unique in many respects due its geographical, climatological, and hydrological characteristics. These characteristics are important to understand as they have had, and continue to have, a major influence on legal and political cooperation in the region.

The Baltic Sea<sup>1</sup> is surrounded by nine coastal countries: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Sweden, and Russia. A semi-enclosed sea, it is connected to the North Sea and the northeast Atlantic Ocean via the narrow Danish Straits. Due to a limited possibility for water exchange, the total substitution of the water in the Baltic Sea takes up to thirty years. This also means that polluting substances remain and accumulate in the sea for long periods of time.

The catchment area of the sea, and thus the area of potential input of polluting substances, is four times the size of the sea itself and densely populated, hosting a high level of agricultural and industrial activities. Additionally, the outflows from more than two hundred rivers enter the Baltic, bringing vast amounts of fresh water to the sea, along with polluting substances. This large volume of fresh water makes the Baltic Sea one of the largest bodies of brackish water in the world. Thus, living conditions are harsh for fauna and flora and not an ideal living environment for marine or freshwater species.

The low salinity level in the Baltic Sea also means that a horizontal layer develops between the upper, more oxygenated, and the lower, less oxygenated, parts of the seawater. As a result,

deep basins in the Baltic Sea can be naturally oxygen deficient and therefore devoid of life. Winter conditions can be hard, with major parts of the Baltic Sea covered by ice for several months each year. This in turn presents challenges for extensive navigation at sea — including the transportation of oil.

### COOPERATION BETWEEN THE BALTIC COASTAL COUNTRIES

Against this background, it is hardly surprising that based on an initiative of the Finnish Government, a cooperation was established in the early 1970s among the then-seven<sup>2</sup> countries surrounding the Baltic Sea (and later joined by the European Community). The resulting Convention on the Protection of the Marine Environment of the Baltic Sea Area of 1974 (the “Helsinki Convention”) was both a follow-up to the UN Conference on the Human Environment, held in Stockholm in 1972, and a reaction to the deteriorating status of the Baltic Sea.<sup>3</sup>

A legally binding obligation, the purpose of the Helsinki Convention is to protect the Baltic Sea marine environment from all sources of pollution, be it from land, air, or the sea itself. The Helsinki Convention also ensures rapid assistance and cooperation in the need for transnational response to accidents at sea. The Helsinki Commission (“HELCOM”) was designated as the governing body of the Convention.

---

*The purpose of the Helsinki Convention is to protect the Baltic Sea marine environment from all sources of pollution, be it from land, air, or the sea itself.*

---

### POLITICAL AND ENVIRONMENTAL COOPERATION

The Helsinki Convention paved the way for political cooperation in the field of marine environment protection policies

---

\*Anne Christine Brusendorff has been, since 2003, the Executive Secretary of the Baltic Marine Environment Protection Commission (“the Helsinki Commission,” or “HELCOM”). From 1998 on, she worked at HELCOM on issues of maritime transportation and responses to accidents at sea. Prior to taking up the post of Executive Secretary, she also acted as Deputy Executive Secretary from 1999–2003. Anne Christine has an LLM from the University of Copenhagen and from the London School of Economics and Political Science (“LSE”). At LSE she specialized in International Environmental Law and International Law of the Sea. Her PhD thesis from the University of Copenhagen focused on Environmental Restraints upon Shipping. Before joining HELCOM, Ms. Brusendorff worked in the Danish Administration.

during a time when many other issues divided the Baltic coastal countries. With this political foundation, the scene was set for major steps toward protecting the marine environment of the Baltic Sea area. These steps naturally correspond to the more than three decades of cooperation under the Helsinki Convention — each of them epoch-making in their own way.

#### THE FIRST DECADE

A common understanding among Baltic coastal countries was required to select the measures to protect the marine environment of the Baltic Sea, including an identification of the activities and pressures impacting its health. Thus, deciding which parameters to measure in the sea, and how to measure pollution loads coming into the sea from land-based activities was the key focus during the beginning of HELCOM.

Since the deteriorating health of the Baltic was obvious, various measures were taken in the first decade to phase out the use of certain hazardous substances. For example, one of these decisions concerned phasing out the use of polychlorinated biphenyls, or PCBs. These pollutants were targeted due to strong indications that they were primarily responsible for the serious decrease in the reproductive rate of seals and the decline in the white-tailed eagle population in the Baltic Sea region.<sup>4</sup>

From the very beginning of the cooperation, the prevention of pollution from shipping activities was high on the agenda. Arguably, shipping was not, and still is not, one of the biggest pressures on the Baltic marine environment. However, the already well-established global forum for maritime activities<sup>5</sup> created the possibility to influence — from a Baltic perspective — new shipping regulations,<sup>6</sup> and ensured their harmonized implementation in the region.

#### THE SECOND DECADE

The second decade of cooperation was characterized by the revision of the Helsinki Convention,<sup>7</sup> based upon developments within environmental and maritime law. During this time, HELCOM embraced principles such as “the polluter-pays” and “the precautionary principle” as well as the “best available techniques” and “the best environmental practice.” At the same time, the fall of the Soviet Union, the fusion of East and West Germany, and the abolition of the area’s division into eastern and western blocs increased cooperation among neighboring states. The area protected by the Convention was expanded to include internal waters,<sup>8</sup> and the area of application was enlarged to include the catchment of the Baltic Sea.<sup>9</sup> HELCOM consequently began to assess coastal waters as part of the coordinated monitoring program on the health status of the Baltic Sea.

Another important step forward was the involvement of international financial institutions (“IFIs”), which for the first

time coupled desired environmental improvements and necessary funding. With the participation of the IFIs, a list of the most polluting sites in the Baltic Sea catchment area was prepared based on pre-feasibility studies. The involvement of the IFIs during the identification phase ensured that it would later be possible to obtain funding for the remedial actions needed at the sites.<sup>10</sup>

#### THE THIRD DECADE: THE START OF A PARADIGM SHIFT?

The complexity of regulating marine environmental protection issues increased during the third decade due to the expansion of the European Union (“EU”), leaving the Russian Federation as the only non-EU contracting party to the Helsinki Convention. The supra-national character of EU cooperation, and thus the delegation by the member states of decision-making powers to the EU in fields such as agriculture and fisheries, emphasizes the need for HELCOM to act as the environmental focal point and policy maker for the region, providing information about the health of and trends in the Baltic Sea, and the efficiency of measures to protect the sea. With regard to the specific needs of the Baltic Sea, HELCOM works to ensure the adoption

of measures within other international organizations as well as the strictest regional implementation of measures imposed by other international organizations. Hereafter additional HELCOM recommendations are adopted if needed.

In this new political arena, the role of HELCOM as a catalyst for regional and supra-national policy making is increasing, with HELCOM act-

ing as the “spokesperson” for the Baltic Sea, and also for non-HELCOM countries in the catchment area, including Belarus, Ukraine, the Czech and the Slovak Republics.<sup>11</sup>

At the same time, this decade sees a shift towards holistic, quantifiable, and cost-efficient policy. This is motivated by changes at the international level, where specifically, in 2002, the World Summit on Sustainable Development in Johannesburg, South Africa, set the pace by stating that member states shall, by 2010, implement the ecosystem approach to the management of human activities that impact the marine environment. This ecosystem approach was taken onboard HELCOM in 2003, and was followed in 2005 by the European community’s adoption of a thematic strategy on the protection and conservation of the marine environment.<sup>12</sup>

The ecosystem approach advocates a comprehensive approach to the understanding and anticipation of ecological change, whereby the full range of consequences is assessed. This assessment is then used as the basis for developing appropriate management responses. Thus, while HELCOM has already decided on needed reduction measures in pollution loads (such as a 50 percent reduction in the nutrient loads reaching the Baltic

---

*The role of HELCOM as a catalyst for regional and supra-national policy making is increasing.*

---

Sea), the ecosystem approach takes as the starting point the current health of the Baltic Sea and the changes that the Baltic coastal countries would like to see in the future. Since stakeholder involvement is one of the major components when applying an ecosystem approach, it is necessary to be able to quantify the state of the Baltic Sea that is desired and what actions are needed in order to reach that condition.

The initial step toward the application of the ecosystem approach in the Baltic region was taken during the first stakeholder conference, arranged by HELCOM in March 2006. The stakeholders agreed that a HELCOM Baltic Sea Action Plan shall be developed under the overall vision of a Baltic Sea with all its components in balance, thus guaranteeing a diversity of life and supporting a sustainable use of its resources. Furthermore, the stakeholders decided to develop the plan of action according to four strategic goals: 1) a Baltic Sea unaffected by eutrophication; 2) a Baltic Sea with life undisturbed by hazardous substances; 3) a Baltic Sea with its biodiversity in favorable status; and 4) a Baltic Sea where maritime activities are carried out in an environmentally friendly way.

On the basis of the decided ecological objectives, HELCOM is now working to develop concrete actions with timetables that will eventually fulfill the strategic goals and overall

vision for the Baltic Sea. Identifying the most cost-efficient ways to reach the goals is essential. All in all, this is an ambitious task; the political importance of which is shown by the fact that the HELCOM Baltic Sea Action Plan will be adopted on November 15, 2007 by the environmental and agricultural ministers from all the Baltic coastal countries.

## CONCLUSION

For over three decades, HELCOM has demonstrated the value of tailor-made solutions for addressing regional activities that affect the marine environment. This is even more important in an enlarged EU, where eight out of nine of the Baltic coastal countries are now both members of the EU and have ratified the Helsinki Convention.

As HELCOM follows Johannesburg's prescription of the ecosystem approach, with the current and future status of the Baltic Sea at the core, the need for the Helsinki Convention is greater than ever. Not only does HELCOM possess information on pollution loads and the status of and trends in the sea, but it has also monitored the effects of previously-implemented regulatory measures. This knowledge, together with common objectives for a shared sea, should be the basis for future joint initiatives and actions in other international fora.



## Endnotes: Case Study

<sup>1</sup> Convention on the Protection of the Marine Environment of the Baltic Sea Area, Apr. 9, 1992, 2099 U.N.T.S. 197 (defining the Baltic Sea Area as: "the Baltic Sea and the entrance to the Baltic Sea bounded by the parallel of the Skaw in the Skagerrak at 57 44.43'N").

<sup>2</sup> Denmark, Finland, East and West Germany, Poland, Sweden and the Soviet Union. After the fall of the Soviet Union the Baltic Republics Estonia, Latvia and Lithuania, together with the Russian Federation, also participated in the cooperation.

<sup>3</sup> Convention on the Protection of the Marine Environment of the Baltic Sea Area, Mar. 22, 1974, 13 I.L.M. 546 [hereinafter Helsinki Convention].

<sup>4</sup> HELCOM Recommendation 3/3 concerning protection of seals in the Baltic Sea Area, was adopted February 17, 1982. More than two hundred HELCOM recommendations have been adopted, and are available at [http://www.helcom.fi/Recommendations/en\\_GB/front/](http://www.helcom.fi/Recommendations/en_GB/front/) (last visited Sept. 30, 2006).

<sup>5</sup> The International Maritime Organization ("IMO") is one of the specialized agencies of the United Nations.

<sup>6</sup> HELCOM countries have joined forces within the IMO to achieve a special area status which requires stricter ship discharge regulations in the Baltic Sea. This has been effectively implemented by the HELCOM Baltic Strategy. Furthermore, HELCOM has based on IMO regulations requiring certain ships to be equipped with Automatic Identification Systems, established a Baltic traffic monitoring system surveilling ships in real time while they navigate in the Baltic Sea. The implementation of specific regulations for navigation in ice conditions, the first of its kind in the world, is another example of the regional cooperation.

<sup>6</sup> The Convention on the Protection of the Marine Environment of the Baltic Sea Area, *supra* note 1, at art. 1.

<sup>7</sup> Helsinki Convention, *supra* note 3 ("A Contracting Party shall, at the time of the deposit of the instrument of ratification, approval or accession, inform the Depositary of the designation of its internal waters for the purposes of this Convention.").

<sup>8</sup> Helsinki Convention, *supra* note 3, at art. 6, § 1 of the Helsinki Convention ("The relevant measures to this end shall be taken by each Contracting Party in the catchment area of the Baltic Sea without prejudice to its sovereignty.").

<sup>9</sup> From the beginning, 132 pollution "hot spots" were designated. This approach has been successful; today more than half of the "hot spots" in the region have been eliminated.

<sup>10</sup> Belarus has the fifth largest catchment area to the Baltic Sea. Recent studies by HELCOM have shown that the nutrient and heavy metals input from Belarus, Ukraine and the Czech Republic to the Baltic Sea are significant. *Evaluation of Transboundary Pollution Loads*, Helsinki Commission (2005), [http://www.helcom.fi/stc/files/Publications/OtherPublications/Transboundary\\_Poll\\_Loads.pdf](http://www.helcom.fi/stc/files/Publications/OtherPublications/Transboundary_Poll_Loads.pdf) (last visited Sept. 30, 2006).

<sup>11</sup> Communication from the Commission to the Council and the European Parliament, COM (2005) 504 with a proposal for an associated Directive now being discussed. COM (2005) 505, 24 October 2005.

# CONSERVING MARINE HABITATS

by Eric A. Bilsky\*

## INTRODUCTION

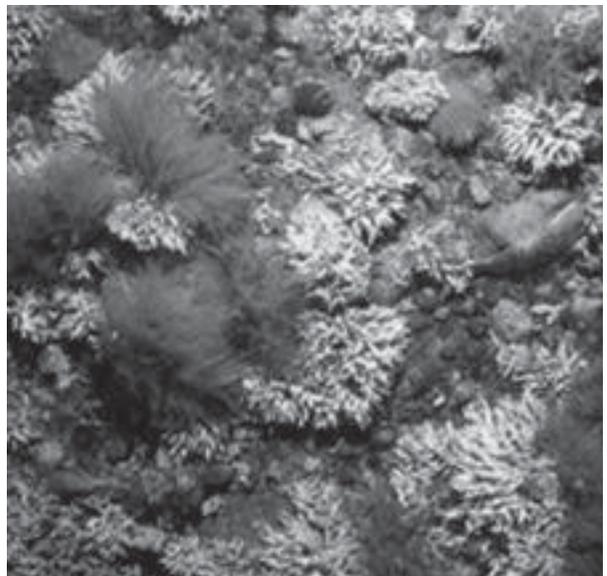
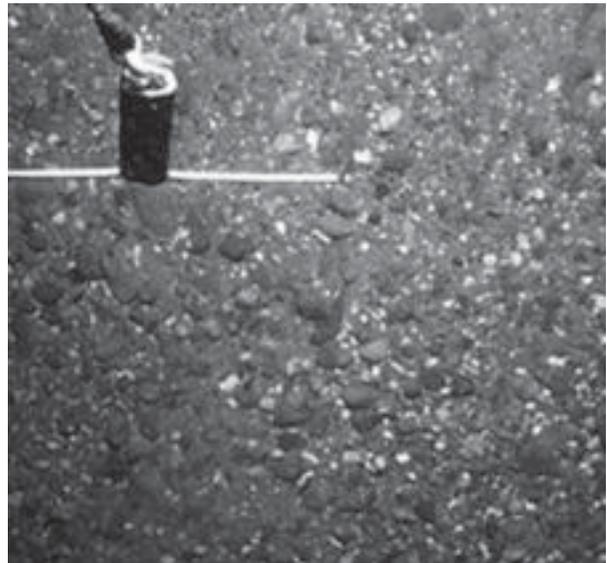
While the oceans are mostly out of sight, and therefore mostly out of mind, they make up the majority of our environment.<sup>1</sup> They are a place where industrial food production relies on hunting rather than farming. But industrial food production relies on industrial equipment such as massive bottom trawl nets and scallop dredges that scrape across the seafloor. The use of these destructive tools has been compared to using bulldozers for hunting squirrels in the forest.<sup>2</sup> The resulting impact is comparable to clear-cutting forests — but could be far more devastating.<sup>3</sup> In 1998, scientists estimated that every two years, destructive trawlers sweep an area equivalent to the entire world's continental shelf.<sup>4</sup> This article examines one route among many leading to the goal of conserving marine habitat: using the statutory mandate directing regional fishery management councils to protect essential fish habitat (“EFH”).

## CONGRESS PUTS HABITAT INTO THE MAGNUSON-STEVENS ACT

When Congress enacted the Magnuson-Stevens Fishery Conservation and Management Act in 1976, conservation was not the concern. Congress wanted to “Americanize the fisheries,” by kicking foreign fishing vessels out of United States waters.<sup>5</sup> To regulate the newly Americanized fisheries, the Act created eight regional fishery management councils composed of fisheries stakeholders.<sup>6</sup> The regional councils develop fishery management plans and implementing regulations to manage the fisheries.<sup>7</sup> These plans and regulations are subject to only limited federal oversight — the National Marine Fisheries Service may disapprove a plan or regulation if it finds that the measure violates the law.<sup>8</sup>

From the beginning, the Magnuson-Stevens Act gave councils the authority to “designate zones where, and periods when, fishing shall be limited, or shall not be permitted, or shall be permitted only by specified types of fishing vessels or with specified types and quantities of fishing gear.”<sup>9</sup> This authority granted to the councils all the power that they needed to protect marine habitat. A council could prohibit all fishing in a sensitive habitat zone or forbid all destructive fishing gears from fishing in that zone. But most councils stood idle as the threat from destructive trawling and other destructive fishing gear became apparent over the years.<sup>10</sup>

From 1976 to 1996, the councils and the federal government, aided and abetted by the fishing community, embarked on an erratic series of policies that forced the marine ecosystem and fishing communities through a cycle of environmental and economic boom and bust.<sup>11</sup> First, government subsidies would bloat fishing capacity to an unsustainable level, after which regulations would belatedly, but abruptly, pull the plug on fishing, leav-



U.S. Geological Survey

Seafloor off New England (Georges Bank): trawled and untrawled areas.

ing environmental and economic chaos in their wake.<sup>12</sup> By 1994, with the collapse of the New England groundfish fishery,<sup>13</sup> reform was politically possible.

Two years later, in October 1996, Congress enacted the Sustainable Fisheries Act Amendments of 1996 to the Magnuson-Stevens Act (“SFA”).<sup>14</sup> The amendments required, *inter alia*, that the regional councils incorporate habitat conservation measures into their fishery management plans.<sup>15</sup> The intent of Congress seemed plain, to take the “may protect habitat” already in the Magnuson-Stevens Act, and change it to a “must.”

\* Eric A. Bilsky is a Senior Attorney at Oceana. The author wishes to thank David Allison, Phil Kline, and the Stop Destructive Trawling campaign at Oceana. This article reflects the personal opinion of the author; it does not necessarily reflect the views of Oceana.

## OVERDUE GUIDANCE IGNORED BY REGIONAL COUNCILS

### THE FISHERIES SERVICE PROVIDES GUIDANCE

While the habitat provisions of the bill appeared strong, vague language and lack of institutional reform sowed the seeds of future problems. First, the bill protected EFH from “adverse effects,” but did not define the term. Second, the bill qualified its mandate, directing councils to “minimize” adverse effects “to the extent practicable,” without explaining what “minimize” or “practicable” meant. Third, and most damaging, the bill gave the task of protecting habitat to the very institutions that had not done it in the past: the regional councils.

Nevertheless, the law mandated actions and set deadlines. It required the Fisheries Service to issue EFH guidance within six months of enactment.<sup>16</sup> In addition, the SFA required the Fisheries Service to provide specific EFH information and recommendations to each council.<sup>17</sup> The SFA also required the councils to amend their fishery management plans within 24 months to designate and protect EFH.<sup>18</sup>

The Fisheries Service termed its guidance, issued half a year late, an “interim final rule.”<sup>19</sup> The interim guidance spoke directly to the key issues identified above. It broadly interpreted the term “adverse effect” to include “any impact which reduces quality and/or quantity of EFH.”<sup>20</sup> The definition made clear that “adverse effects” included direct physical disruption to habitat<sup>21</sup> — seemingly guaranteeing that destructive trawling and dredging would be deemed to have adverse effects.

In addition, the interim guidance included a completely unhelpful, if not actively counter-productive, discussion of the term “practicable.”<sup>22</sup> The Fisheries Service advised that in considering practicability, councils should consider the adverse effects of the fishing activity, the long and short-term costs to the fishery and its EFH, and other appropriate factors, including the statutory command that regulations should, where “practicable,” minimize costs and unnecessary duplication.<sup>23</sup> Thus, the agency told the councils to consider everything, but provided no guidance on how to make a decision.

To further fulfill its mandate to provide guidance to the councils, the agency commissioned a review of the scientific literature on the effects of fishing gear on habitat.<sup>24</sup> The review found that “[f]ishing is one of the most widespread human impacts to the marine environment.”<sup>25</sup> More disturbingly, the study also found that “systems are being fished to the point where *recovery is delayed so long that the economic consequences are devastating.*”<sup>26</sup> We are currently seeing this pattern in many fisheries around the world. Mindful of the eventual eco-

nomical and ecological cost of destroying the habitat on which commercial fishing depends, the review advised that “managers bear the responsibility of adopting a precautionary approach when considering the environmental consequences of fishing rather than assuming that the extraction of fish has no ecological price and therefore no feedback loop to our non-ecologically based economic system.”<sup>27</sup>

### THE COUNCILS DENY ADVERSE EFFECTS

While the Fisheries Service was initially responsive to the Congressional mandate, the regional councils rejected it. One council contended that it had already addressed all habitat problems and refused to take any new steps.<sup>28</sup> Two other councils determined that they would defer actually protecting habitat to the future, rather than complying with the Congressional 24-month deadline.<sup>29</sup> None of the six councils that had neglected habitat in the past adopted new management measures in response to the new legislative command.<sup>30</sup> In an interesting twist, even though the interim guidance contained a strong definition of “adverse effect” and a weak discussion of “practicability,” the councils justified their failure to promulgate new management measures by the alleged inability to establish that there were any adverse effects.<sup>31</sup>

The Fisheries Service approved all but one of the plainly deficient fishery management plan amendments submitted by the councils.<sup>32</sup> Marine conservation and fishing groups filed suit concerning the five regions where plans were approved.<sup>33</sup> In an initial blow to the enforceability of the new EFH provisions, the District Court did not heed the indis-

putable evidence that destructive gears physically disrupt the seafloor, causing adverse effects as defined by the interim guidance.<sup>34</sup> Instead, the District Court deferred to the council conclusions that there was not enough evidence to determine the effects of trawling and dredging on habitat.<sup>35</sup> But the District Court did not let the Government off the hook. Instead, it ruled that under the National Environmental Policy Act, the Government was required to develop the information necessary to determine whether there were adverse effects.<sup>36</sup> As a result of the ruling, the Government agreed to develop environmental impact statements (“EISs”) around the country to reevaluate protecting EFH from fishing gear.<sup>37</sup>

### IN THE INTERIM — THE COURTS PUNT

Neither fishing nor the issuance of new fisheries regulations stopped while the EISs were under development. Conservation groups brought cases concerning the Atlantic sea scallop fishery and the golden tilefish fishery in the Mid-Atlantic to protect EFH during the interim. Both cases presented strong facts, but ran

---

*Scientists estimated that every two years, destructive trawlers sweep an area equivalent to the entire world's continental shelf.*

---

afoul of the judicial reluctance to give weight to the crucial words of the EFH provision.

The golden tilefish case, *NRDC v. Evans*, concerned the impacts of destructive trawling on seafloor habitat, as golden tilefish live in burrows in the seafloor,<sup>38</sup> presenting an ideal example of a species in need of protection. Moreover, there was undisputed evidence that bottom trawls physically disrupted seafloor habitat by plowing over tilefish burrows and by leaving scars on the seafloor.<sup>39</sup> Yet the Mid-Atlantic Council refused to adopt any protective measures, arguing accurately that there was no scientific study one way or another as to the impacts on tilefish of having their burrows buried.<sup>40</sup> *NRDC v. Evans* thus repeated on a smaller scale the argument in the initial EFH case as to whether a showing of physical disruption, as specified in the interim guidelines, was enough to show an adverse effect, or whether courts could not act unless conservationists could produce scientific evidence linking impact on habitat to injury to a commercially-fished species. This is what has been called the “dead body” standard. The tilefish court followed *AOC v. Daley* and adopted the “dead body” standard over the physical disruption standard found in the agency’s regulations.<sup>41</sup> As a result, the litigation route to establishing adverse effects stalled.<sup>42</sup>

*Conservation Law Foundation v. U.S. Department of Commerce* was the principal case brought in the Atlantic sea scallop fishery. It concerned a rule governing scallop fishing for the 2001 and 2002 fishing seasons.<sup>43</sup> The New England Council considered three options for closing areas of the fishery to allow scallops to mature.<sup>44</sup> The Council’s analysis ranked the three options as to how well they protected EFH and evaluated their short-term cost and long-term cost to the fishery.<sup>45</sup> A closure in New England’s Great South Channel was ranked as having the greatest benefit to habitat, the highest short-term cost, but possibly the highest long-term benefit to the fishery.<sup>46</sup> The Council rejected that alternative.<sup>47</sup> Given the analysis, the case presented an opportunity to test the enforceability of the requirement to protect EFH “to the extent practicable.” Unfortunately, the First Circuit declined to attribute any force to the practicability requirement. Instead, the court declared: “We think by using the term ‘practicable’ Congress intended rather to allow for the application of agency expertise and discretion in determining how best to manage fishery resources.”<sup>48</sup>

### WINNING THE BATTLE ON ADVERSE EFFECTS

As the EISs and rulemakings recommenced, the councils and the Fisheries Service revisited the issue of adverse effects. This time, with relatively little struggle, the EISs documented the scientific consensus that destructive trawling and dredging adversely affect seafloor habitat. In fact, every single remand EIS found adverse effects.

Two events stand out. First, the Fisheries Service requested the National Academy of Sciences to investigate the effects of bottom trawling. The study unequivocally found adverse effects, concluding, for example, that “[t]rawling and dredging change the physical habitat and biologic structure of ecosystems and therefore can have potentially wide-ranging consequences.”<sup>49</sup>

Second, the North Pacific Council stood alone in issuing a draft EIS that refused to find adverse effects.<sup>50</sup> But a peer-review by independent scientists noted in polite academic language that it “is premature to conclude that the current level and pattern of fishing activity has minimal or temporary effects on the habitat . . .” and that in any case, the draft EIS was “at odds,” with the overall conclusion of the National Academy of Sciences report.<sup>51</sup> The peer review forced the North Pacific Council to reverse course. It appears that adverse effects will no longer be a battleground.

### TRYING TO PROTECT HABITAT THAT IS BEING FISHED

As mentioned earlier, the political impetus for the conservation reforms that established EFH came out of the collapse of the

New England groundfish fishery. More than ten years later, cod is still in severely bad shape. Over the years, scientists have thoroughly documented the dependence of young cod on a certain kind of rocky or gravelly seafloor habitat with living structure such as sponges.<sup>52</sup> This habitat is continually pounded by destructive trawling. Oceana and other conservation groups vigorously worked to include alternatives for protecting cod habitat in the New England

EISs. Unfortunately, the political situation was not yet ripe. The EISs did not take a scientific approach to identifying alternatives, but instead only examined alternatives based on historical closures enacted for other reasons.<sup>53</sup> As a result, these alternatives left most cod habitat unprotected.

Eventually, the New England Council adopted one of the alternatives — a small step forward in recognizing the necessity of closures to protect habitat, but not enough to protect groundfish.<sup>54</sup> Oceana sued, seeking to compel the Council to consider more scientifically designed and more protective alternatives.<sup>55</sup> The court denied the claims, relying heavily on the First Circuit’s holding that the EFH provision gave the Government vast discretion.<sup>56</sup>

But the process continues as the evidence grows and the philosophy and composition of the councils evolve. The New England Council is now seriously considering a proposal to protect juvenile cod EFH in the Great South Channel — the same area whose protection it earlier rejected.

---

*Advocates with Oceana developed the innovative, although controversial, idea of taking the path of least resistance.*

---

## FREEZING THE FOOTPRINT OF BOTTOM TRAWLING: PROTECTING HABITAT THAT IS NOT YET BEING FISHED

As the New England example shows, advocating that fishermen stay out of areas that they already fish is difficult. Advocates with Oceana developed the innovative, although controversial, idea of taking the path of least resistance.<sup>57</sup> To understand the new strategy, it is necessary to understand that fishing is not a static activity. If one area is fished out because it is overexploited, vessels explore and move to new areas.<sup>58</sup> So although it is very important to protect areas that are already subject to fishing, it is also valuable to protect areas that no one is fishing yet.

Acting on this insight, Oceana and other conservation groups in Alaska and the Pacific coast began gathering data on where vessels fished, and where they did not. Their enterprise was further bolstered by the discovery in 2001 of astonishingly beautiful gardens of deep-sea coral off Alaska's Aleutian

Islands.<sup>59</sup> Conservation groups also identified other special areas off Alaska and in the Pacific, including deep-sea underwater mountains, or seamounts, that also supported special and beautiful ecological communities. Proposals based on restricting the expansion of destructive fishing and protecting special places succeeded in protecting submarine canyons in the Atlantic,<sup>60</sup> more than half a million square miles<sup>61</sup> of marine habitat off the Aleutian Islands<sup>62</sup> and in the Pacific<sup>63</sup>.

### CONCLUSION

The work to protect marine habitat from destructive trawling continues. Oceana is developing a comprehensive approach to halting the expansion of destructive trawling in the Atlantic. In the meantime, Oceana is advancing specific proposals to protect more deep-sea canyons and seamounts to the New England Council and Oceana is supporting the South Atlantic Council's development of a broad-based ecosystem management plan that will protect areas of coral from North Carolina to Florida. 

## Endnotes: Conserving Marine Habitats

<sup>1</sup> NASA Oceanography, *The Living Ocean* (Oct. 5, 2006), available at <http://science.hq.nasa.gov/oceans/living/index.html> (last visited Oct. 12, 2006) (stating that oceans cover about 70% of the Earth's surface and constitute 99% of the habitable space on the planet).

<sup>2</sup> Sylvia Earle, <http://www.flmnh.ufl.edu/fish/sharks/innews/sharkparks2006.html> (last visited Oct. 30, 2006) (comparing bottom trawling to using a bulldozer in a forest to hunt squirrels).

<sup>3</sup> Les Watling & Elliott A. Norse, *Disturbance of the Seabed by Mobile Fishing Gear: A Comparison to Forest Clearcutting*, 12 CONSERVATION BIOLOGY 1180 (1998).

<sup>4</sup> Watling & Norse, *id.* at 1190.

<sup>5</sup> See, e.g., H.R. 94-445 (Aug. 20, 1975) at 43-44, reprinted in 1976 U.S.C.A.N. 593, 611-612 ("technologically sophisticated and very efficient foreign fishing vessels in waters off United States coasts" are depleting fish populations and "if such fishing pressure is not regulated and reduced immediately, irreversible damage may well be done . . .").

<sup>6</sup> 16 U.S.C. § 1852(a) (regional councils); 16 U.S.C. § 1854(a)-(c) (federal supervision).

<sup>7</sup> 16 U.S.C. § 1852(h); 16 U.S.C. § 1853.

<sup>8</sup> 16 U.S.C. § 1854(a)(3); 16 U.S.C. § 1854(b)(1).

<sup>9</sup> Pub. L. 94-265, §303(b)(2), 90 Stat. 351 (April 13, 1976), codified at 16 U.S.C. § 1853(b)(2).

<sup>10</sup> Two Councils were exceptions. Even prior to the 1996 amendments discussed below, the South Atlantic and the West Pacific (Hawaii and Pacific Islands) Councils had largely restricted destructive trawling. See Amy Mathews Amos, MARINE FISH CONSERVATION NETWORK, RAY OF HOPE: SUCCESSSES AND SHORTCOMINGS IN PROTECTING ESSENTIAL FISH HABITAT, 10, 15 (2006) available at [http://www.conservefish.org/site/pubs/network\\_reports/efh\\_rayofhope\\_lowres.pdf](http://www.conservefish.org/site/pubs/network_reports/efh_rayofhope_lowres.pdf) (last visited October 30, 2006).

<sup>11</sup> See, e.g., Eugene H. Buck, *Overcapitalization in the U.S. Commercial Fishing Industry*, at 1 (Feb. 22, 1995) available at <http://ncseonline.org/NLE/CRS/reports/Marine/mar-6.cfm> (last visited Oct. 12, 2006) (discussing how causes including government assistance led to substantial expansion of United States fishing capacity after 1976 and depleted state of many fish populations); see also GAO/RCED-00-120, *Entry Limits Benefits of Buyback Programs*, 9 (June 2000) (explaining that the Government spent \$24.4 million to remove 79 vessels from New England fishery, but allowed 62 new vessels to become active).

<sup>12</sup> See, e.g., Glenn Martin & Carol Ness, *Sea of Anxiety Over Rockfish Ban: Fishermen, Distributors, Coastal Towns Brace for Hard Times as Species Recovers*, available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2002/06/21/MN11519.DTL> (last visited Oct. 30, 2006) (commenting on the fact that

groundfishing closed off most of California coast).

<sup>13</sup> *Conservation Law Foundation v. Evans*, 209 F. Supp. 2d 1, 7 (D.D.C. 2001) (citing SFA legislative history discussing collapse of New England groundfish fisheries); *Conservation Law Foundation v. Mineta*, 131 F. Supp. 2d 19, 22 (D.D.C. 2001) (stating that 1994 collapse prompted closure of three fishing areas).

<sup>14</sup> Pub. L. 104-297, §§ 106, 108, 110 Stat. 3559 (Oct. 11, 1996).

<sup>15</sup> 16 U.S.C. §§ 1852(a), (h).

<sup>16</sup> 16 U.S.C. § 1855(b)(1)(A).

<sup>17</sup> 16 U.S.C. § 1855(b)(1)(B).

<sup>18</sup> Pub. L. 104-297, *supra* note 14, at § 108(b), 110 Stat. 3575.

<sup>19</sup> Interim Final Rule, 62 Fed. Reg. 66,531 (Dec. 19, 1997).

<sup>20</sup> 62 Fed. Reg. 66551, promulgating 50 C.F.R. § 600.810(a).

<sup>21</sup> 62 Fed. Reg., *id.*

<sup>22</sup> 62 Fed. Reg., *id.* at 66553, promulgating 50 C.F.R. § 600.815(a)(3)(iv).

<sup>23</sup> 62 Fed. Reg., *id.* at 66553.

<sup>24</sup> Peter J. Auster & Richard W. Langton, *The Effects of Fishing on Fish Habitat*, 22 American Fisheries Society Symposium 150-187 (1999).

<sup>25</sup> Auster & Langton, *id.* at 181.

<sup>26</sup> Auster & Langton, *id.* at 181-82 (emphasis added).

<sup>27</sup> Auster & Langton, *id.* at 182.

<sup>28</sup> Letter, Chair Gulf of Mexico Fishery Management Council to Acting Director Office of Habitat Conservation, Feb. 3, 1997, at 3, cited in *American Oceans Campaign v. Daley*, 183 F. Supp. 2d 1, 6 (D.D.C. 2000).

<sup>29</sup> *Daley*, *id.* at 7-8.

<sup>30</sup> *Daley*, *id.*

<sup>31</sup> *Daley*, *id.*

<sup>32</sup> *Daley*, *supra* note 28 at 7-8; Mathews Amos, *supra* note 10, at 8 (Mid-Atlantic measures disapproved).

<sup>33</sup> See generally, *Daley*, *supra* note 28.

<sup>34</sup> *American Oceans Campaign v. Daley*, 183 F. Supp. 2d, at 12-18.

<sup>35</sup> *Daley*, *id.* at 20.

<sup>36</sup> *Daley*, *id.*

<sup>37</sup> *Oceana v. Evans*, 2005 WL 555416 \*9 (D.D.C. March 9, 2005).

<sup>38</sup> *NRDC v. Evans*, 254 F. Supp. 2d 434 (S.D.N.Y. 2003) at 437-38 ("Unquestionably, from submersible vessel research, there are trawl door patterns observed in areas with tilefish burrows . . .").

# LITIGATION UPDATE

## THE URUGUAY PAPER PULP MILL DISPUTE: HIGHLIGHTING THE GROWING IMPORTANCE OF NGOs AND PUBLIC PROTEST IN THE ENFORCEMENT OF INTERNATIONAL ENVIRONMENTAL LAW

by Michael K. Lee\*

### INTRODUCTION

For the past two years the governments and the affected peoples of Argentina and Uruguay have been in conflict over the potential environmental hazards that the construction of two mega paper pulp mills would bring to the Uruguay River and neighboring area. Pursuant to a jurisdiction provision in a treaty bearing on the matter, Argentina filed suit in the International Court of Justice (“ICJ”) to resolve the dispute and requested that the construction of the mills be enjoined until a decision was rendered.

On July 13, 2006, the ICJ denied Argentina’s request for provisional measures without prejudice to the decision on the merits.

Nonetheless, with construction on one mill abandoned and the other mill temporarily suspended, Argentina may get its way regardless of the outcome on the merits of the ICJ case because of heavy public protests, political pressure, and the tenacious public-interest litigation of a non-government organization (“NGO”) called Center for Human Rights and Environment (“CEDHA” by its Spanish acronym).

### LEGAL BRIEF: INTERNATIONAL COURT OF JUSTICE CASE

According to Argentina, Uruguay authorized the Spanish company ENCE to construct a pulp mill project near the city of Fray Bentos in October of 2003. In February of 2005, Uruguay sanctioned yet another paper pulp mill, this time to be operated by a Finnish company Oy Metsä-Botnia AB (“Botnia”), also near Fray Bentos. Argentina claims that both mills were authorized without complying with the procedure prescribed by the

1975 Statute of the River Uruguay. Argentina further argued that the two mills were being built in the “worst imaginable” place in terms of protection of the river, that there is “a very serious probability” of environmental damage, and that the damage would be “irreparable.”<sup>1</sup> Uruguay replied that the mills will apply the “highest and the most appropriate international standards of pollution control” and will meet its obligations under the 1975 Statute.<sup>2</sup>

On July 13, 2006, the ICJ denied Argentina’s request for provisional measures without prejudice on the merits. In its

decision, the Court focused on the fact that provisional measures may be granted only if Argentina can prove that “the construction of the mills poses an *imminent* threat of *irreparable* damage to the aquatic environment of the River Uruguay or to the economic and social interest of the riparian inhabitants of the Argentine side of the river,”<sup>3</sup> [emphasis added]. The Court then reasoned that Argentina did not persuade the Court that mere construction of the mills would cause imminent

or irreparable harm the environment. None of the prior ICJ cases involved a request to shut down or halt the construction of an industrial project.<sup>4</sup>

While a decision on the merits is scheduled to be rendered in August 2007 for the Botnia mill and June 2008 for the ENCE mill,<sup>5</sup> the combination of protests, roadblocks, diplomatic pressure, and legal action may make the decision on the merits moot.

---

*Argentina claims that both mills were authorized without complying with the procedure prescribed by the 1975 Statute of the River Uruguay.*

---

\* Michael K. Lee is an LLM candidate, 2006, at American University, Washington College of Law.

On September 21, 2006, ENCE's president, Juan Luis Arrigui, announced that construction would not continue, explaining that "there cannot be two [cellulose] plants in Fray Bentos."<sup>6</sup> Mr. Arrigui did add, however, that there are plans to move the plant to another part of Uruguay.<sup>7</sup> And, as for Botnia mill project, while the project is in more advanced stages and employs approximately 4,500 workers, the management decided to temporarily suspend construction "due to lack of guarantees... and until the conditions required for the development of this project are re-established."<sup>8</sup>

### PROTESTS, ROADBLOCKS, & POLITICS

Large-scale protests were essential in speeding diplomatic and litigation efforts surrounding the paper mills. On April 30, 2005, a protest rally of forty thousand participants, mostly residents of the Argentine city of Gualeguaychú, blocked the Libertador General San Martín Bridge, the main bridge between Gualeguaychú and Uruguayan city of Fray Bentos.<sup>9</sup> On February 3, 2006, members of an environmentalist group called Gualeguaychú Environmental Assembly led a long-term blockade of Route 136. On February 16, 2006, the Colón Environmental Assembly started a long term blockade of Route 135 and the bridge that links Colón (which lies approximately one hundred miles north of Gualeguaychú) to the Uruguayan city of Paysandú.<sup>10</sup> Nearly continuous road blocks persisted on Route 135 and 136 until May of 2006. On April 30, 2006, nearly 100,000 people participated in a protest on the Libertador General San Martín Bridge.<sup>11</sup> After nearly a four-month lull, large public protests stirred again on September 11, 2006 and September 25, 2006.<sup>13</sup>

Uruguay felt the economic impact of the roadblocks. As early as December 26, 2005, the Uruguayan Chancellor publicly announced that the blockades were a violation of the Mercosur Trade Agreement and brought a formal complaint against Argentina on August 9, 2006 to the Ad Hoc Tribunal created through Mercosur.<sup>14</sup> Uruguay requested an award of U.S. \$400 million for Argentina's failure to remove citizen roadblocks, but on September 7, 2006, the Ad Hoc Tribunal rejected Uruguay's claim because it found Argentina acted in good faith to dissuade road blocks.<sup>15</sup>

The protest soon moved politicians into action and escalated diplomatic efforts. From May of 2005, the governor of Entre Rios, the province in which the proposed mills are to be located, stated his support for the protesters. In July of 2005, Argentine Chancellor Rafael Biela traveled to Gualeguaychú to meet with residents there. Despite these efforts, the matter escalated and on January 25, 2006, Jorge Busti, governor of Entre Rios, and Nestor Kichner, president of Argentina, announced that Argentina would be filing an ICJ complaint, which would be filed March 4, 2006.<sup>16</sup>

### CEDHA'S PUBLIC-INTEREST LITIGATION

While the effectiveness of the public protests, roadblocks, and diplomacy should not be underestimated, the NGOs, particularly CEDHA were just as critical to the campaign against the pulp mills in Uruguay. Founded in 1999, CEDHA has a permanent staff of just ten persons. However, its founder Romina Picolotti not only served as the legal advisor to the Gualeguaychú Citizens' Assembly<sup>17</sup> but lead CEDHA on a tenacious cutting-edge public-interest litigation campaign against the paper pulp mills.<sup>18</sup>

A large measure of the nearly two billion in financing was to come from the World Bank Group and through its members, the International Finance Corporation ("IFC") and the Multilateral Investment Guarantee Agency ("MIGA").<sup>19</sup> CEDHA petitioned the Compliance Advisor Ombudsman ("CAO"), the organization responsible for compliance review of IFC/MIGA, and the CAO agreed to conduct a "compliance audit" of the IFC's studies.<sup>20</sup> Eventually, the IFC decided to conduct another Cumulative Impact Study ("CIS") in June of 2006 an act which tacitly acknowledges the deficiency of prior studies.<sup>21</sup> At present, the

IFC is still processing the loan requests for the mills with a decision scheduled for October 2006,<sup>22</sup> making the mill owners nervous.<sup>23</sup>

Concurrently, CEDHA also launched a campaign against the co-financiers of the mills by filing what CEDHA calls "Equator Principles Compliance Complaints." The Equator Principles are a voluntary initiative promoted worldwide by the IFC.<sup>24</sup> By adopting the Principles, financial institutions undertake

---

*Large-scale protests were essential in speeding diplomatic and litigation efforts surrounding the paper mills.*

---

to finance only those projects whose environmental and social risk comply with the criteria.<sup>25</sup> These Principles, however, are not legally binding restraints on financial institutions, rather they are a species of "soft law" that is prevalent in the area of international environmental law. Soft law is based on international diplomacy, customs, and principles such as those espoused in the 1992 Rio Declaration. It is dependent on moral suasion or fear of diplomatic retribution rather than legal action. Because governments and corporations dislike negative publicity, one soft law stratagem favored by activists is the so-called "name and shame game." For instance, CEDHA used the Equator Principles to send detailed and technical complaint letters that read like a civil complaints to finance companies ING Group of the Netherlands and BBVA of Spain. Subsequently, the ING Group sent a letter to CEDHA on April 12, 2006, stating that it would withdraw its finance consideration of the mills.<sup>26</sup> Similarly, CEDHA also filed a series of Organization of Economic Co-operation and Development ("OECD") specific instance complaints against corporations Finnvera, Nordea, and Botnia — companies that

would build and operate the mills — for alleged violation of OECD Guidelines for Multinational Enterprises.<sup>27</sup>

## CONCLUSION

When discussing the enforcement of international environmental laws, the World Bank notes that “NGOs often play the role of self-appointed ‘watchdogs’ over national governments, and can thus help in the enforcement of international law through political means or public-interest litigation, to ensure that governments maintain their environmental commitments. The individual in the international arena also deserves mention. With the increasing emphasis on public participation and provi-

sion of access to environmental information in international discourse, the individual’s role in ensuring international environmental compliance is becoming increasingly relevant.”<sup>28</sup> The muted tones and the technical language used by that World Bank makes one wonder to what extent the statements are, in fact, true. The enforcement of law is quintessentially a state function. However, recent events highlighted in the Uruguay paper pulp mills dispute point to the growing importance of NGOs and individual participants in the enforcement and, possibly, the creation of customary international environmental law.



## Endnotes: Litigation Update

<sup>1</sup> INTERNATIONAL COURT OF JUSTICE, SUMMARY OF THE ORDER OF 13 JULY 2006: PULP MILLS ON THE RIVER URUGUAY (ARGENTINA V. URUGUAY) 4, available at <http://www.icj-cij.org/icjwww/idocket/iau/iauframe.htm> (last visited Sept. 25, 2006).

<sup>2</sup> INTERNATIONAL COURT OF JUSTICE, *id.* at 5.

<sup>3</sup> INTERNATIONAL COURT OF JUSTICE, *id.* at 8.

<sup>4</sup> ASIL Insight, *Argentina-Uruguay Environmental Border Dispute Before the World Court* (May 16, 2006), available at <http://www.asil.org/insights/2006/05/insights060516.html> (last visited Sept. 26, 2006).

<sup>5</sup> INTERNATIONAL COURT OF JUSTICE, *supra* note 1, at 4.

<sup>6</sup> Press Conference by Luis Arregui, Office of the President of Uruguay, ENCE Stays; Plant Relocation Studies, available at [http://www.presidencia.gub.uy/\\_web/noticias/2006/09/2006092109.htm](http://www.presidencia.gub.uy/_web/noticias/2006/09/2006092109.htm) (last visited Oct. 25, 2006) [hereinafter ENCE Stays]; see also CEDHA, *ENCA Announce Withdraw from Conflictual [sic] Paper Mill Investment in Fray Bentos, Uruguay* (Sept. 21, 2006), [http://www.cedha.org.ar/en/more\\_information/ence-withdrawal-papermill.php](http://www.cedha.org.ar/en/more_information/ence-withdrawal-papermill.php) (last visited Sept. 28, 2006).

<sup>7</sup> ENCE Stays, *id.*

<sup>8</sup> *Botina Announces it Will Suspend Works*, LA NACION, Mar. 22, 2006, [http://www.lanacion.com.ar/politica/nota.asp?nota\\_id=792196](http://www.lanacion.com.ar/politica/nota.asp?nota_id=792196) (last visited Oct. 29, 2006); Botina, *Uruguay Project Overview*, <http://www.metsabotnia.com/en/default.asp?path=204;212;1364;1385&voucher=39FA6816-4ADF-4744-A754-8721A19E2DE9> (last visited Oct. 29, 2006).

<sup>9</sup> See Center for Human Rights and Environment, *Argentina and Bank Track, Holland, Botnia and ENCE Pulp Paper Mills Uruguay*, <http://www.cedha.org.ar/docs/press-kit-celulosa.doc> (last visited Oct. 25, 2006).

<sup>10</sup> *The Environmentalist Redouble Their Pressure and Block Two Roads to Uruguay*, Clarin, (Feb. 16, 2006) <http://www.clarin.com/diario/2006/02/16/um/m-01143037.htm> (last visited Oct. 25, 2006).

<sup>11</sup> CEDHA, *100,000 Peacefully March on Uruguayan Paper Mills* (April 30, 2006), [http://www.cedha.org.ar/en/more\\_information/100000-march-uruguay.php](http://www.cedha.org.ar/en/more_information/100000-march-uruguay.php) (last visited Sept. 27, 2006).

<sup>12</sup> CEDHA, *Stakeholder Communities Increase Pressure and Plan New Marches to Oppose Uruguayan Paper Mills* (Sept. 11, 2006), [http://www.cedha.org.ar/en/more\\_information/stakeholder-communities-oppose-pulp-mills.php](http://www.cedha.org.ar/en/more_information/stakeholder-communities-oppose-pulp-mills.php) (last visited Sept. 27, 2006).

<sup>13</sup> CEDHA, *Residents Take to Bridge Again Against Uruguayan Papermills, Botnia Ignores Resistance* (Sept. 25, 2006), [http://www.cedha.org.ar/en/more\\_information/residents-take-bridge-papermills.php](http://www.cedha.org.ar/en/more_information/residents-take-bridge-papermills.php) (last visited Sept. 28, 2006).

<sup>14</sup> *The Issue of Blocked Roads Reaches the Court*, LA NACION <https://www.lanacion.com> [registration required].

<sup>15</sup> CEDHA, *MERCOSUR Tribunal Recognizes Gualaguaychu Assembly Legitimacy in Struggle Against Paper Mill Investments* (Sept. 7, 2006), [http://www.cedha.org.ar/en/more\\_information/mercosur-recognizes-legitimacy.php](http://www.cedha.org.ar/en/more_information/mercosur-recognizes-legitimacy.php) (last visited Sept. 27, 2006).

<sup>16</sup> CEDHA, *Argentina to Send Uruguayan Papermill Case to the Hague* (Jan. 26, 2006), [http://www.cedha.org.ar/en/more\\_information/argentina\\_to\\_send\\_uruguayan\\_papermill\\_case\\_to\\_the\\_hague.php](http://www.cedha.org.ar/en/more_information/argentina_to_send_uruguayan_papermill_case_to_the_hague.php) (last visited Sept. 28, 2006).

<sup>17</sup> Greenaccord.org, *Environment, Diplomacy, Science, and Art — The Conflict for the Uruguay River Paper Mills* (Apr. 8, 2006), <http://www.greenaccord.org/portale/articolo.asp?id=197> (last visited Oct. 05, 2006).

<sup>18</sup> See generally The Center for Human Rights and Environment website, <http://www.cedha.org.ar/en/> (last visited Sept. 27, 2006).

<sup>19</sup> CEDHA, *The CAO Ombudsman (CAO) Triggers Audit of Uruguayan Paper Mill Projects and Expands Investigation to Proceedings of MIGA* (Nov. 9, 2005), [http://www.cedha.org.ar/en/more\\_information/compliance-audit-ifcmiga.php](http://www.cedha.org.ar/en/more_information/compliance-audit-ifcmiga.php) (last visited Sept. 27, 2006).

<sup>20</sup> See generally The Center for Human Rights and Environment website, *supra* note 18; see also [http://www.cedha.org.ar/en/initiatives/paper\\_pulp\\_mills/](http://www.cedha.org.ar/en/initiatives/paper_pulp_mills/) (last visited Sept. 29, 2006).

<sup>21</sup> See generally Compliance Advisor Ombudsman (“CAO”) website, [www.cao-ombudsman.org](http://www.cao-ombudsman.org) (last visited Sept. 27, 2006).

<sup>22</sup> Alertnet.org, *Uruguay Pulp Mill Impact Study Due in Weeks — IFC* (Sept. 18, 2006), <http://www.alertnet.org/thenews/newsdesk/SGB000080.htm> (last visited Sept. 28, 2006).

<sup>23</sup> See generally INTERNATIONAL FINANCE CORPORATION, SUMMARY OF PROJECT INFORMATION (SPI), <http://www.ifc.org/ifcext/spiwebsite1.nsf/2bc34f011b50ff6e85256a550073ff1c/4208c72853e61df785257045006f993f?opendocument> (last visited Sept. 27, 2006).

<sup>24</sup> See generally Equator-Principles.com website, <http://www.equator-principles.com/principles.shtml> (last visited Sept. 29, 2006).

<sup>25</sup> See generally Equator-Principles.com, *id.*

<sup>26</sup> CEDHA, *ING Group of Netherlands Pulls Out of Controversial Papermill while World Bank Postpones Loans Following Critical Review of Environmental Impact Studies* (Apr. 12, 2006), [http://www.cedha.org.ar/en/more\\_information/ing-postpones-loans.php](http://www.cedha.org.ar/en/more_information/ing-postpones-loans.php) (last visited Oct. 5, 2006).

<sup>27</sup> See generally The Center for Human Rights and Environment website, *supra* note 18 <http://www.cedha.org.ar/en/> (last visited Sept. 27, 2006); see also [http://www.cedha.org.ar/en/initiatives/paper\\_pulp\\_mills/](http://www.cedha.org.ar/en/initiatives/paper_pulp_mills/), *supra* note 20.

<sup>28</sup> THE WORLD BANK GROUP, INTERNATIONAL ENVIRONMENTAL LAW: CONCEPTS AND ISSUES, [http://www4.worldbank.org/legal/legen\\_iel.html](http://www4.worldbank.org/legal/legen_iel.html) (last visited Sept. 26, 2006).

# BOOK REVIEW

## REGULATORY FRAMEWORKS FOR WATER RESOURCES MANAGEMENT: A COMPARATIVE STUDY

by Salman M.A. Salman & David D. Bradlow  
The World Bank, 2006

Reviewed by Julie Yeagle\*

Given the increasing scarcity of water resources, compounded by environmental degradation, urbanization, and industrialization, the need to rethink water resources management has been pushed to the top of national and global agendas. Cognizant of this trend, Salman M. A. Salman and Daniel D. Bradlow recently released a book entitled *Regulatory Frameworks for Water Resources Management: A Comparative Study* that aims to provide a toolkit for countries that are preparing water legislation or revising existing legislation. To accomplish this goal, the authors present a description of the regulatory frameworks of sixteen countries and examine how each addresses the use, development, management, allocation, and protection of water resources. Drawing from these regional practices, as well as from declarations and resolutions of international conferences, the authors provide policymakers and experts with a list of elements the authors consider essential to the creation of effective regulatory frameworks.

Salman and Bradlow begin by observing that as water has become an increasingly scarce resource, many states have started to adopt legislation to address a variety of issues facing the water sector. Based on a state's legislative response, the authors place it into one of three categories: (1) countries that have adopted comprehensive water statutes; (2) countries that are struggling to agree on a comprehensive statute; and (3) countries that have addressed water issues in provisions that are scattered throughout different laws and regulations. Despite their

supreme position in the hierarchy, the authors note that even countries in the first category have a tendency to give insufficient attention to major water resources issues like ownership, protection, and accessibility.

Salman and Bradlow note many reasons for this failure. First, existing legislation is often complex and permits an undesirable fragmentation of responsibilities between different enti-

ties within the government. Second, water legislation tends to lag behind modern management practices. Additionally, the authors consider legislation adopted not flexible enough to accommodate future changes in priorities and perspectives. In order to cure these problems, the authors offer a roadmap for experts and policymakers to follow when creating or revising water legislation. The authors suggest that the first step in the legislative process be a review of existing rules and regulations to ascertain areas of weaknesses and strengths. Next, they recom-

mend the creation of a paper outlining the main policies, principles, and procedures to be included in the draft law. As conceived by Salman and Bradlow, this paper and the resulting legislation should address a number of basic principles, such as ownership of water resources, underlying principles and priorities, regulation of water uses and water infrastructure, protec-

---

*Rather than follow a specified model form or blueprint, the authors provide an exhaustive list of issues for experts and policymakers to consider.*

---

\*Julie Yeagle is JD candidate, May 2008, at American University, Washington College of Law.

tion of water resources, institutional and financial arrangements, enforcement of regulations, and dispute settlement.

Salman and Bradlow expound upon these basic principals in their book. For example, the authors advocate that when legislators consider the principle of water ownership, they weigh the benefits of state ownership of surface and groundwater versus the benefits of awarding rights based on the historical doctrines of riparian rights and prior appropriation. Under the same basic principle, they urge legislators to devise a clear licensing scheme that would allow individuals or entities to establish water systems or to dig wells. Correspondingly, the authors stress the need for governments to devise rules for the transfer, suspension, and revocation of licenses. Finally, Salman and Bradlow remind legislators to discuss how they might verify and regularize water uses that existed before the legislation was revised or created.

In regards to the basic principle of institutional arrangements, the authors encourage legislators to specify which entity has the explicit responsibility of regulating and managing water to avoid duplication and overlapping of responsibilities. They also devote a significant amount of text to the notion that institu-

tional arrangements should reflect decentralization of decision making and public participation. Salman and Bradlow suggest two ways to accomplish this goal: (1) to appoint river basin authorities to play a role in the management of water, and (2) to provide for water user associations to represent the interests of users.

Though Salman and Bradlow emphasize that regulatory frameworks need to take into account the socioeconomic and cultural setting of each state, rather than follow a specified model form or blueprint, the authors provide such an exhaustive list of issues for experts and policymakers to consider. It is not inconceivable that a government could successfully draw up a legislative template using the book's many concepts. For this reason, *Regulatory Frameworks for Water Resources Management: A Comparative Study* is an excellent resource for readers who wish to understand the relevance and importance of water legislation to the proper management and protection of water resources.



---

## ENDNOTES: FISH STOCKS TREATY *continued from page 9*

and Related Agreements, United Nations Division of Ocean Affairs and Law of the Sea website, [www.un.org/Depts/los/convention\\_agreements/review\\_conf\\_fish\\_stocks.htm](http://www.un.org/Depts/los/convention_agreements/review_conf_fish_stocks.htm) (last visited Sept. 11, 2006).

<sup>7</sup> Review Conference on the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks ("Review Conference"), May 22-26, 2006, *Report of the Review Conference*, ¶ 136, U.N. Doc. A/CONF.210/2006/15 (July 3, 2006), available at [http://www.un.org/Depts/los/convention\\_agreements/review\\_conf\\_fish\\_stocks.htm](http://www.un.org/Depts/los/convention_agreements/review_conf_fish_stocks.htm) (last visited Sept. 11, 2006) [hereinafter Conference Report].

<sup>8</sup> Conference Report, *id.* at ¶ 32.

<sup>9</sup> Review Conference, May 22-26, 2006, *Organization of work*, Item 9, U.N. Doc. A/CONF.210/2006/4 (March 28, 2006), available at [http://www.un.org/Depts/los/convention\\_agreements/review\\_conf\\_fish\\_stocks.htm](http://www.un.org/Depts/los/convention_agreements/review_conf_fish_stocks.htm) (last visited Sept. 11, 2006).

<sup>10</sup> Review Conference, May 22-26, 2006, *Elements for assessing the adequacy and effectiveness of the Agreement*, ¶ 136, U.N. Doc. A/CONF.210/2006/5 (March 29, 2006), available at [http://www.un.org/Depts/los/convention\\_agreements/review\\_conf\\_fish\\_stocks.htm](http://www.un.org/Depts/los/convention_agreements/review_conf_fish_stocks.htm) (last visited Sept. 11, 2006).

<sup>11</sup> G.A. Res. 47/1, ¶ 25, U.N. Doc. A/RES/60/31 (Nov. 29, 2005), available at [www.un.org/Depts/los/general\\_assembly/general\\_assembly\\_resolutions.htm](http://www.un.org/Depts/los/general_assembly/general_assembly_resolutions.htm) (last visited Sept. 11, 2006).

<sup>12</sup> Conference Report, *supra* note 7, at ¶ 13.

<sup>13</sup> Several non-parties have for years raised concerns about Articles 7, 21 and 22 of the UNFSA and have called for re-negotiation or statements of interpretation of these provisions before agreeing to accede to the Agreement. However, States Parties generally believe that such steps would upset the delicate balance on those complex and sensitive issues that was achieved during the negotiation of the UNFSA.

<sup>14</sup> For an alternative perspective on the Review Conference process, as well as its outcomes, a useful resource is the daily reporting by the Earth Negotiations Bulletin, a non-profit organization that provides independent and on-going reporting of international environmental negotiations worldwide. See Earth Negotiations Bulletin, *UNFSA Review Conference Ends in Consensus* (May 26, 2006), [www.iisd.ca/oceans/sfsrc/](http://www.iisd.ca/oceans/sfsrc/) (last visited Sept. 11, 2006).

<sup>15</sup> The Report of the Review Conference, which includes all agreed outcomes, can be found at United Nations, A/CONF.210/2006/15; [www.un.org/Depts/los/convention\\_agreements/review\\_conf\\_fish\\_stocks.htm](http://www.un.org/Depts/los/convention_agreements/review_conf_fish_stocks.htm) (last visited Oct. 30, 2006).

<sup>16</sup> Conference Report, *supra* note 7, at ¶ 43.

<sup>17</sup> Conference Report, *supra* note 7, at ¶ 51.

<sup>18</sup> Conference Report, *supra* note 7, at ¶ 62.

<sup>19</sup> Conference Report, *supra* note 7, at ¶ 72-75.

<sup>20</sup> Conference Report, *supra* note 7, at ¶ 76.

<sup>21</sup> Among the States Parties is the European Commission, as well as 16 Member States of the European Union. During the course of the Review Conference, the delegation of Austria, in its capacity as President of the European Union, indicated that the nine EU Member States that had not yet adhered to the UNFSA would do so in the near term.

<sup>22</sup> There are 61 States Parties to the UNFSA as of October 26, 2006. A list of parties is available at [http://www.un.org/Depts/los/reference\\_files/chronological\\_lists\\_of\\_ratifications.htm](http://www.un.org/Depts/los/reference_files/chronological_lists_of_ratifications.htm) (last visited Oct. 26, 2006).

<sup>23</sup> Seventh Session of the UN Informal Consultations on Oceans and the Law of the Sea, June 12-16, 2006, *Report on the work of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea at its seventh meeting*, ¶ 4, U.N. Doc. A/61/156 (July 17, 2006), available at [http://www.un.org/Depts/los/consultative\\_process/consultative\\_process\\_info.htm](http://www.un.org/Depts/los/consultative_process/consultative_process_info.htm) (last visited Sept. 11, 2006).

<sup>24</sup> The five RFMOs in question are: the Commission for the Conservation of Southern Bluefin Tuna, the Indian Ocean Tuna Commission, the Inter-American Tropic Tuna Commission, the International Commission for the Conservation of Atlantic Tunas and the Western.

# WORLD NEWS

by Scott Johnson, Cari Shiffman,  
Daniel Winokur \*

## ASIA

### CHINESE PROVINCIAL REPORT HIGHLIGHTS WIDESPREAD POLLUTION IN MAJOR FISHERY

An August 2006 report by China's Zhejiang Provincial Environmental Bureau ("ZPEB") highlights continuing damage from petrochemical waste, heavy metals pollution, and overfishing to the Zhoushan fishery in the East China Sea.<sup>1</sup> The Zhoushan fishery is among the largest in the East China Sea,<sup>2</sup> and home to more than three hundred fish species, more than eighty shrimp and crab species, and more than 125 varieties of algae.<sup>3</sup> The fishery accounts for ten percent of China's total annual fish catches<sup>4</sup> and fifty percent of total catches for the Zhejiang Province.<sup>5</sup> The ZPEB study indicates that 81 percent of the 20,800 km<sup>2</sup> Zhoushan fishery earned a category four pollution rating, with a highest pollution rating of five, up from 53 percent in 2000.<sup>6</sup> During approximately the same period, from 2001 to 2005, total catches in the Zhoushan fishery decreased from 1.3 million tons to 0.98 million tons,<sup>7</sup> with a concurrent decrease in the quality of fish caught.<sup>8</sup> China has been the world's largest producer of fish since 1990, with total production reaching approximately 40 million tons in 1999, accounting for thirty percent of the world total.<sup>9</sup> Despite the continued growth of aquaculture, which has, in fact, replaced capture fishing as China's major fishery activity,<sup>10</sup> a continued environmental decline of the Zhoushan fishery may have various significant implications to China's food security and the economic viability of its fishing industry for domestic consumption as well as export.

## AMERICAS

### WAL-MART INTRODUCES SUSTAINABLE SEAFOOD LABEL

On August 31, 2006, Wal-Mart announced the immediate availability of ten fish products certified as sustainable by the Marine Stewardship Council ("MSC"),<sup>11</sup> a UK-based fishing advocacy group founded by the multinational corporation Unilever and the conservation organization World Wildlife Fund ("WWF").<sup>12</sup> Identified by the blue MSC logo, the MSC certification indicates that a source fishery is "well-managed and sustainable,"<sup>13</sup> judged by the condition of fish stocks, the impact of the fishery on the environment, and fishery management systems.<sup>14</sup>

The move received considerable attention from sustainability-oriented news outlets.<sup>15,16</sup> While organizations such as Greenpeace have questioned MSC certification criteria,<sup>17</sup> MSC Chief Executive Rupert Howes believes the move will "encourage other fisheries to join the MSC. . . and provide a powerful new route for consumers to support sustainable fishing."<sup>18</sup> Even Wal-Mart Watch, a group aiming to "reform" the world's largest retailer, voiced support, calling the announcement a "positive move."<sup>19</sup>

Wal-Mart Watch also suggests that Wal-Mart go even further, calling for the retailer to "source and label the origin of. . . sustainable products, including meat and poultry."<sup>20</sup> Wal-Mart may in fact go this route, as Wal-Mart Seafood's vice president, Peter Redmond, claims that this move is but a part of "Wal-Mart's continued commitment to offering sustainable products at affordable prices to our customers."<sup>21</sup>

## AFRICA

### DEADLY TOXIC WASTE DUMPING IN IVORY COAST

In what one reporter dubbed "a dark tale of globalization,"<sup>22</sup> a tanker dumped waste materials, apparently containing hydrogen sulfide, around the city of Abidjan, Ivory Coast causing several deaths and tens of thousands of injuries.<sup>23</sup> The ship is Greek-owned, flagged by Panama, and leased by Trafigura Beeher BV ("Trafigura"), a private Dutch oil trading company.<sup>24</sup> Violent protests erupted throughout Abidjan as thousands sought medical attention for ailments connected to the toxic sludge and "noxious fumes" that saturated the air.<sup>25</sup> The toxic dumping and ensuing violent protests forced the Ivory Coast cabinet to resign, save a few key ministers, though most cabinet members were reinstated a few days later.<sup>26</sup> Analysts estimate that the waste could have been disposed of safely in Europe for approximately U.S. \$300,000.<sup>27</sup>

Trafigura insists that the gasoline waste dumped in Abidjan did not contain any toxic hydrogen sulfide and was only regular "chemical slops."<sup>28</sup> However, U.N. tests of waste found in Abidjan revealed "toxic levels of hydrogen sulfide," though this waste was not conclusively the Trafigura waste.<sup>29</sup> Trafigura additionally maintains that it gave the cargo of the ship to Compagnie Tommy ("Tommy"), a local waste disposal company, to safely

---

\* Scott Johnson is a JD candidate, May 2010, at American University, Washington College of Law. Cari Shiffman is a JD and MA candidate (International Affairs), 2007, at American University, Washington College of Law and School of International Service. Daniel Winokur is a JD candidate, May 2009, at American University, Washington College of Law.

remove the “chemical slops.”<sup>30</sup> Before the ship sailed to the Ivory Coast, Amsterdam Port Services, the waste processing company that originally handled the waste, found inconsistencies between the waste amount Trafigura said was on the ship and the amount actually on the tanker.<sup>31</sup> Amsterdam Port Services additionally reported that a number of its workers complained of illnesses.<sup>32</sup>

Ivory Coast authorities arrested ten persons in connection with the dumping, including two Trafigura executives who entered the country to assist in the cleanup process.<sup>33</sup> While the Ivory Coast sought to have the responsible tanker detained by Estonian officials, environmental activists blockaded the ship, preventing it from leaving an Estonian port.<sup>34</sup> Following detainment of the tanker, slop sample tests from the ship revealed trace amounts of “environmentally dangerous, poisonous chemicals.”<sup>35</sup> In Amsterdam, Greenpeace has begun filing complaints against Trafigura, Amsterdam Port Services, and Dutch environmental authorities in connection with the dumping.<sup>36</sup> Experts have expressed further concerns about possible long-term effects in the Ivory Coast from the toxic waste.<sup>37</sup> In reaction to these ongoing events, Trafigura reported that it has begun legal proceedings against Tommy in connection with Tommy’s involvement with the “slops.”<sup>38</sup>

## EUROPE

### MEDITERRANEAN BLUEFIN TUNA POPULATION DECLINING

In September 2006, the World Wildlife Fund (“WWF”) presented data to the European Parliament’s Fisheries Committee, which is responsible for, among other things, conservation of EU fishery resources,<sup>39</sup> noting dramatic decreases in wild bluefin tuna populations in the Mediterranean Sea.<sup>40</sup> Declines were particularly striking in the western Mediterranean near Spain’s Balearic Islands.<sup>41</sup> The report, prepared for WWF by the independent consultancy Advanced Tuna Ranching Technologies, SL (“ATRT”), indicates recent bluefin tuna catches in the Balearic Islands area amounted to only fifteen percent of catches ten years ago, decreasing from approximately 14,700 metric tons in 1995<sup>42</sup> to 2,270 metric tons in 2006.<sup>43</sup> The WWF alleges the decrease has been caused, in part, by significant illegal, unregulated, and/or unreported bluefin catches in the Mediterranean and Eastern Atlantic, in some cases perpetrated by prominent contracting parties to the International Commission for Conservation of Atlantic Tunas,<sup>44</sup> including France, Libya, and Turkey.<sup>45</sup> ATRT alleges that those parties may be “greatly exceeding . . . quotas and deliberately failing to report much of their massive catches.”<sup>46</sup> Tuna farming, the process of catching, confining, and fattening wild bluefin tuna in net cages,<sup>47</sup> driven primarily by Japanese market demand for sushi,<sup>48</sup> puts additional pressure on the already strained Mediterranean stock because juvenile fish sometimes are farmed, preventing them from breeding to replace the wild population.<sup>49</sup> WWF also notes that increased farming capacity encourages industrial fleets to

extract even more bluefin tuna,<sup>50</sup> and that farming may spread disease from exotic feed fish, posing an additional threat to the already strained wild bluefin tuna population.<sup>51</sup>

## MIDDLE EAST

### DAMAGES DEMANDED AFTER SUEZ CANAL OIL SPILLS

In the aftermath of recent oil spills in the Suez Canal, the Egyptian government is pursuing monetary compensation from the responsible tankers for damages caused.<sup>52</sup> The government released an impounded Liberian tanker, the *Grigoroussa I*, which spilled 3,000 tonnes of oil into the canal in February, after the tanker’s owners agreed to a stipulated payment of U.S. \$3.4 million in compensation damages.<sup>53</sup> Two million dollars of the damages will be paid to the canal, one million dollars will go to the Egyptian environmental agency, and four hundred thousand dollars will be issued to businesses affected by the spill.<sup>54</sup> The *Grigoroussa I* will further be required to pay U.S. \$1.39 million to reimburse maritime services that were provided to the tanker.<sup>55</sup> In connection with an oil spill that occurred in September, the Egyptian environmental agency, local fishermen, and affected businesses are asking for over U.S. \$8.7 million in damages from the responsible Liberian tanker, the *Anna P.C.*<sup>56</sup> The *Anna* leaked over 600 tonnes of oil into the canal when it hit the canal bank attempting to avoid hitting another tanker that had run aground.<sup>57</sup> In addition to the oil spills, several other accidents involving ships have occurred recently at the Suez Canal, including the one that led to the *Anna* discharging crude oil, calling into question the safety measures in place at the canal.<sup>58</sup>

## Endnotes: World News

- <sup>1</sup> Chinadaily.com, *Pollution, Overfishing Destroying E. China Sea Fishery* (Aug. 16, 2006), available at [http://www.chinadaily.com.cn/china/2006-08/16/content\\_666168.htm](http://www.chinadaily.com.cn/china/2006-08/16/content_666168.htm) (last visited Oct. 24, 2006) [hereinafter *Pollution*].
- <sup>2</sup> National Ocean and Atmospheric Administration (“NOAA”), *China Fishery Statistics* (Table 2), <http://www.lib.noaa.gov/china/archi/statistics.htm> (last visited Oct. 24, 2006).
- <sup>3</sup> People’s Government of Zhejiang Province, *Brief Introduction of Zhoushan*, <http://www.zhejiang.gov.cn/gb/zjnew/node428/node511/node2076/userobject1ai559.html> (last visited Sept. 24, 2006) [hereinafter *Zhejiang*].
- <sup>4</sup> *Zhejiang, id.*; *Pollution, supra* note 1.
- <sup>5</sup> *Zhejiang, supra* note 3.
- <sup>6</sup> *Pollution, supra* note 1.
- <sup>7</sup> *Pollution, supra* note 1.
- <sup>8</sup> *Pollution, supra* note 1.
- <sup>9</sup> NOAA, *supra* note 2.
- <sup>10</sup> FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INLAND WATER RESOURCES AND AQUACULTURE SERVICE, NATIONAL AQUACULTURE SECTOR OVERVIEW — CHINA, available at [http://www.fao.org/figis/servlet/static?dom=countrysector&xml=naso\\_china.xml](http://www.fao.org/figis/servlet/static?dom=countrysector&xml=naso_china.xml) (last visited Oct. 24, 2006).
- <sup>11</sup> WalMartFacts.com, Wal-Mart Stores Inc., *Introduces New Label to Distinguish Sustainable Seafood*, <http://www.walmartfacts.com/articles/4425.aspx> (last visited Oct. 24, 2006).

Endnotes: World News continued on page 84

# BIBLIOGRAPHY

Compiled by Catherine Verdier\*

## BOOKS

1. DAVID D. CARON & HARRY N. SCHEIBER, EDs., *BRINGING NEW LAW TO OCEAN WATERS: PUBLICATIONS ON OCEAN DEVELOPMENT* (Martinus Nijhoff 2004).
2. GUIFANG XUE, *CHINA AND INTERNATIONAL FISHERIES LAW AND POLICY* (Martinus Nijhoff 2005).
3. MYRON H. NORDQUIST, JOHN NORTON MOORE, & TOMAS H. HEIDAR, *LEGAL AND SCIENTIFIC ASPECTS OF CONTINENTAL SHELF LIMITS* (Brill Academic 2004).
4. SHIGERU ODA, *FIFTY YEARS OF THE LAW OF THE SEA: WITH A SPECIAL SECTION ON THE INTERNATIONAL COURTS OF JUSTICE* (Kluwer Law International 2003).
5. U.N. GUPTA, *THE LAW OF THE SEA* (Atlantic Books 2005).

## CONVENTIONS

6. UNITED NATIONS DIVISION FOR OCEAN AFFAIRS AND THE LAW OF THE SEA, *THE UNITED NATIONS CONVENTION OF THE LAW OF THE SEA: A HISTORICAL PERSPECTIVE* (1998), available at [http://www.un.org/Depts/los/convention\\_agreements/convention\\_historical\\_perspective.htm](http://www.un.org/Depts/los/convention_agreements/convention_historical_perspective.htm) (last visited Sept. 19, 2006).
7. United Nations Educational, Scientific, and Cultural Organization [UNESCO], *Convention on the Protection of the Underwater Cultural Heritage* (Nov. 2001), available at [http://www.unesco.org/culture/laws/underwater/html\\_eng/convention.shtml](http://www.unesco.org/culture/laws/underwater/html_eng/convention.shtml) (last visited Sep. 18, 2006).

## JOURNALS

8. David Osborn & Anjan Datta, *Institutional and Policy Cocktails for Protecting Coastal and Marine Environments From Land-Based Sources of Pollution*, 49 *OCEAN & COASTAL MGMT.* 576 (2006).
9. J. David Allan, Robin Abell, Zeb Hogan et al. *Overfishing of Inland Waters*, 55 *BIOSCIENCE* 1041 (2005).
10. John K. Pinnegar, Trevor P. Hutton & Vincenzo Placenti. *What Relative Seafood Prices Can Tell Us About the Status of Stocks*, 7 *FISH & FISHERIES* 219 (2006).
11. José G.B. Derraik, *The Pollution of the Marine Environment by Plastic Debris: A Review*, 44 *MARINE POLLUTION BULL.* 842 (2005).

## LAW REVIEW ARTICLES

12. Christophe A.G. Tulou, *Forward: Changing Tides in Ocean Management*, 28 *VT. L. REV.* 491 (2004).
13. David Fidler, *The Indian Ocean Tsunami and International Law*, *INT'L FISHERIES L. & POL'Y REV.* 26 (2005).
14. Doug Obegi, *Is There a Constitutional Right to Fish in a*

*Marine Protected Area?*, 12 *HASTINGS W-NW. J. ENVTL. L. & POL'Y* 103 (2005).

15. Malgorzata Anna Nesterowicz, *European Union Legal Measures in Response to the Oil Pollution of the Sea*, 29 *TUL. MAR. L.J.* 29 (2004).
16. Philip A. Burr, *The International Seabed Authority*, 29 *SUFFOLK TRANSNAT'L L. REV.* 271 (2006).
17. Thomas A. Telesca, *Sovereignty or the Precautionary Principle: Which Will Save Our Fish?*, 12 *SE. ENVTL. L.J.* 23 (2003).

## REPORTS

18. Annick van Houtte, Food and Agriculture Organization of the United Nations [FAO], *Legal Aspects in the Management of Shared Fish Stocks — A Review* (Oct. 2002), available at <http://www.fao.org/DOCREP/006/Y4652E/y4652e04.htm> (last visited Sept. 22, 2006).
19. GLOBAL INTERNATIONAL WATERS ASSESSMENT [GIWA], *CHALLENGES TO INTERNATIONAL WATERS: REGIONAL ASSESSMENTS IN A GLOBAL PERSPECTIVE* (Feb. 2006), available at <http://www.giwa.net/publications/finalreport/> (last visited Sept. 18, 2006).
20. NATIONAL MARINE FISHERIES SERVICE, *FISHERIES AND THE WORLD SUMMIT ON SUSTAINABLE DEVELOPMENT* (2002), available at [http://www.nmfs.noaa.gov/sfa/international/Reportcard\\_final.pdf](http://www.nmfs.noaa.gov/sfa/international/Reportcard_final.pdf) (last visited Sept. 19, 2006).
21. NMFS, *MARINE ENVIRONMENTAL IMPACTS OF HURRICANE KATRINA* (2005), available at [http://www.st.nmfs.gov/hurricane\\_katrina/](http://www.st.nmfs.gov/hurricane_katrina/) (last visited Sept. 21, 2006).
22. P. Cacaud, M. Kuruc, & M. Spreij, Food and Agriculture Organization of the United Nations [FAO], *The State of World Fisheries And Aquaculture* (2004), available at <http://www.fao.org/docrep/006/Y5063E/Y5063E00.htm> (last visited Sept. 18, 2006).
23. PEW OCEANS COMMISSION, *AMERICA'S OCEANS: CHARTING A COURSE FOR SEA CHANGE* (June 2003), available at [http://www.pewtrusts.org/ideas/ideas\\_item.cfm?content\\_item\\_id=1635&content\\_type\\_id=8&issue\\_name=Protecting%20ocean%20life&issue=16&page=8&name=Grantee%20Reports](http://www.pewtrusts.org/ideas/ideas_item.cfm?content_item_id=1635&content_type_id=8&issue_name=Protecting%20ocean%20life&issue=16&page=8&name=Grantee%20Reports) (last visited Sept. 18, 2006).
24. Seifanaia Nawadra, South Pacific Regional Environment Programme, *Addressing Shipping Related Marine Pollution in the Pacific Islands Region* (Feb. 2004), available at <http://www.spc.int/piocean/forum/Info%20papers/14%20>

\*Catherine Verdier is a JD candidate, 2008, at American University, Washington College of Law.

- Shipping%20relate%20marine%20pollution%20-%20Sefanaia%20Nawadra.pdf (last visited Sept. 21, 2006).
25. UNITED NATIONS ENVIRONMENT PROGRAMME, FISH AND SHELLFISH FARMING IN MARINE ECOSYSTEMS (2006), available at <http://www.unep.org/geo/yearbook/yb2006/069.asp> (last visited Sept. 18, 2006).
26. UNITED STATES COMMISSION ON OCEAN POLICY, AN OCEAN BLUEPRINT FOR THE 21ST CENTURY (Sept. 2004), available at [http://www.oceancommission.gov/documents/full\\_color\\_rpt/welcome.html](http://www.oceancommission.gov/documents/full_color_rpt/welcome.html) (last visited Sept. 21, 2006).
27. WORLD BANK, CORAL REEFS AND FISHERIES ARE BECOM-
- ING A NEW FRONT IN THE FIGHT AGAINST POVERTY (Jun. 4, 2004), available at <http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:20208716~menuPK:34457~pagePK:34370~piPK:34424~theSitePK:4607,00.html> (last visited Sept. 18, 2006).
28. WORLD BANK, SAVING FISH AND FISHERS: TOWARD SUSTAINABLE AND EQUITABLE GOVERNANCE OF THE GLOBAL FISHING SECTOR (2004), available at <http://siteresources.worldbank.org/INTARD/Resources/SavingFishandFishers.pdf> (last visited Sept. 18, 2006).

## ENDNOTES: UNSUSTAINABLE MARINE FISHERIES

continued from page 12

- Trends*, 414 NATURE 534, 534-36 (2001).
- <sup>6</sup> Daniel Pauly et al., *The Future for Fisheries*, 302 SCIENCE 1359, 1359-61 (2003).
- <sup>7</sup> DIETRICH SARHAGE & JOHANNES LUNDBECK, A HISTORY OF FISHING (Springer-Verlag 1992).
- <sup>8</sup> See generally, J.B.C. Jackson et al., *Historical Overfishing and the Recent Collapse of Coastal Ecosystems*, 293 SCIENCE 629, 629-38 (2001).
- <sup>9</sup> SARHAGE & LUNBECK, *supra* note 7.
- <sup>10</sup> RAYMOND J. H. BEVERTON & SIDNEY J. HOLT, ON THE DYNAMICS OF EXPLOITED FISH POPULATIONS (Blackburn Press 2004) (1957).
- <sup>11</sup> MILNER BAILY SCHAEFER, SOME ASPECTS OF THE DYNAMICS OF POPULATIONS IMPORTANT TO THE MANAGEMENT OF THE COMMERCIAL MARINE FISHERIES 27 (Inter-American Tropical Tuna Commission 1954).
- <sup>12</sup> See generally, *Towards Sustainability*, *supra* note 1.
- <sup>13</sup> See generally, Telmo Morato et al., *Fishing Down the Deep*, 7 FISH & FISHERIES 24 (2006).
- <sup>14</sup> Daniel Pauly et al., *Global Trends in World Fisheries: Impacts on Marine Ecosystems and Food Security*, 360 PHIL. TRANSACTIONS ROYAL SOC'Y: BIOLOGICAL SCI. 5 (2005).
- <sup>15</sup> See generally, *Towards Sustainability*, *supra* note 1.
- <sup>16</sup> S. Castillo & J. Mendo, *Estimation of Unregistered Peruvian Anchoveta (Engraulis ringens) in Official Catch Statistics, 1951-1982*, in THE PERUVIAN ANCHOVETA AND ITS UPWELLING ECOSYSTEM: THREE DECADES OF CHANGES 109 (D. Pauly & I. Tsukayama eds., ICLARM Studies and Reviews 1987).
- <sup>17</sup> DANIEL PAULY & JAY MACLEAN, IN A PERFECT OCEAN: THE STATE OF FISHERIES AND ECOSYSTEMS IN THE NORTH ATLANTIC OCEAN (Island Press 2003).
- <sup>18</sup> Carl Walters & Jean-Jacques Maguire, *Lessons for Stock Assessment from the Northern Stock Collapse*, 6 REV. FISH BIOLOGY & FISHERIES, 125 (1996).
- <sup>19</sup> R.J.R. Grainger & S.M. Garcia, *Chronicle of Marine Fisheries Landings (1950-1994)*, in [TREND ANALYSIS AND FISHERIES POTENTIAL, FAO FISHERIES TECHNICAL PAPER] 359 (FAO 1996).
- <sup>20</sup> See generally, Nicholas K. Dulvy et al., *Extinction Vulnerability in Marine Populations*, 4 FISH & FISHERIES 25 (2003).
- <sup>21</sup> See generally, *Towards Sustainability*, *supra* note 1.
- <sup>22</sup> Daniel Pauly et al., *Fishing Down Marine Food Webs*, 279 SCIENCE 860, 860-63 (1998).
- <sup>23</sup> See generally, Daniel Pauly & Reg Watson, *Background and Interpretation of the 'Marine Trophic Index' as a Measure of Biodiversity*, 360 PHIL. TRANSACTIONS ROYAL SOC.: BIOLOGICAL SCI. 415 (2005).
- <sup>24</sup> See J.F. Caddy et al., *How Pervasive is "Fishing Down Marine Food Webs?"*, 282 SCIENCE 183 (1998); see also Daniel Pauly et al., *How Pervasive is Fishing Down Marine Food Webs: Response to Caddy et al.*, 282 SCIENCE 183 (refuting the arguments made in Caddy et al.).
- <sup>25</sup> See Kristin Kaschner & Daniel Pauly, *Competition Between Marine Mammals and Fisheries: Food For Thought*, in THE STATE OF ANIMALS III 95-117 (D. J. Salem & A. N. Rowan eds., 2005), available at [http://www.seaaroundus.org/report/marine\\_mammals\\_fisheries.pdf](http://www.seaaroundus.org/report/marine_mammals_fisheries.pdf) (last visited Oct. 12, 2006).
- <sup>26</sup> Michael L. Pace et al., *Trophic Cascades Revealed in Diverse Ecosystems*, 14 TRENDS ECOLOGY & EVOLUTION 483, 483-88 (1999), available at [http://www.nd.edu/~underc/east/publications/documents/Pace\\_99TREE.pdf](http://www.nd.edu/~underc/east/publications/documents/Pace_99TREE.pdf) (last visited Oct. 11, 2006).
- <sup>27</sup> See generally, Claudia E. Mills, *Jellyfish Blooms: Are Populations Increasing Globally in Response to Changing Ocean Conditions?* 451 HYDROBIOLOGIA 55 (2001).
- <sup>28</sup> Frances M. Van Dolah et al., *Health and Ecological Impacts of Harmful Algal Blooms: Risk Assessment Needs*, 7 HUMAN & ECOLOGICAL RISK ASSESSMENT 1329 (2001).
- <sup>29</sup> Ratana Chuenpagdee et al., *Shifting Gears: Assessing Collateral Impacts of Fishing Methods in the U.S. Waters*, 10 FRONTIERS ECOLOGY & ENV'T 517, 517-24 (2003).
- <sup>30</sup> L. Watling & E.A. Norse, *Disturbance of the Seabed by Mobile Fishing Gear: A Comparison to Forest Clearcutting*, 12 CONSERVATION BIOLOGY 1180 (1998).
- <sup>31</sup> James B. Lindholm et al., *Habitat-mediated Survivorship of Juvenile (0-year) Atlantic Cod Gadus morhua*, 180 MARINE ECOLOGY PROGRESS SERIES 247 (1999).
- <sup>32</sup> Sea Around Us Project, available at [www.seaaroundus.org](http://www.seaaroundus.org) (devoting efforts to documenting and mitigating the impact of fisheries on the world's oceans — the author's theory and similar assertions on catch trends can be verified for any country or region of the world ocean by visiting this site).
- <sup>33</sup> See generally, *Towards Sustainability*, *supra* note 1.
- <sup>34</sup> See generally, ENVIRONMENT AND AQUACULTURE IN DEVELOPING COUNTRIES. PROCEEDINGS OF THE 31ST INTERNATIONAL CENTER FOR LIVING AQUATIC RESOURCES MANAGEMENT CONFERENCE (R.S.V. Pullin et al. eds., 1993).
- <sup>35</sup> Lee Feigon, *A Harbinger of the Problems Confronting China's Economy and Environment: The Great Chinese Shrimp Disaster of 1993*, 9 J. CONTEMP. CHINA 323 (2000).
- <sup>36</sup> Rosamond L. Naylor et al., *Effect of Aquaculture on World Fish Supplies*, 405 NATURE 1017 (2000).
- <sup>37</sup> CATCHING MORE BAIT: A BOTTOM-UP RE-ESTIMATION OF GLOBAL FISHERIES SUBSIDIES (Ussif Rashid Sumaila & Daniel Pauly, eds., Fisheries Centre Research Reports 2006), available at [www.fisheries.ubc.ca/publications/reports/fcrr.php](http://www.fisheries.ubc.ca/publications/reports/fcrr.php) (last visited Oct. 12, 2006).
- <sup>38</sup> M. MILAZZO, SUBSIDIES IN WORLD FISHERIES: A RE-EXAMINATION (WORLD BANK TECHNICAL PAPER No. 406) (The World Bank 2006).
- <sup>39</sup> Peter Tyedmers et al., *Fueling Global Fishing Fleets*, 34 AMBIO: J. HUMAN ENV'T 635, 635-38 (2005).
- <sup>40</sup> Daniel Pauly, *Anecdotes and the Shifting Baseline Syndrome of Fisheries*, 10 TRENDS ECOLOGY & EVOLUTION 430 (1995).
- <sup>41</sup> See generally, *Towards Sustainability*, *supra* note 1.
- <sup>42</sup> P.M. Mace, *Developing and Sustaining World Fisheries Resources: The State of the Science and Management*, in DEVELOPING AND SUSTAINING WORLD FISHERIES RESOURCES: PROCEEDINGS OF THE 2ND WORLD FISHERIES CONGRESS 1-20 (D.H. Hancock et al. eds.).
- <sup>43</sup> See generally, *supra* note 1 (developing this theme more fully).
- <sup>44</sup> Callum M. Robert et al., *Effects of Marine Reserves on Adjacent Fisheries*, 294 SCIENCE 1920, 1920-23 (2001).
- <sup>45</sup> Tony J. Pitcher, *Fisheries Managed to Rebuild Ecosystems?: Reconstructing the Past to Salvage the Future*, 11 ECOLOGICAL APPLICATIONS 601 (2001).

## ENDNOTES: CCAMLR AND ANTARCTIC KRILL

continued from page 16

- <sup>1</sup> Inigo Everson, *Introducing Krill in*, KRILL: BIOLOGY, ECOLOGY AND FISHERIES, 1 (Inigo Everson, ed., 2000).
- <sup>2</sup> Suzanne Alonzo, Paul Switzer, & Marc Mangel, *An Ecosystem-Based Approach to Management: Using Individual Behaviour to Predict the Indirect Effects of Antarctic Krill Fisheries on Penguin Foraging*, JOURNAL OF APPLIED ECOLOGY 693 (2003).
- <sup>3</sup> See Stephen Nicol, Andrew Constable & Timothy Pauly, *Estimates of circum-polar Antarctic Krill Abundance Based on Recent Acoustic Density Measurements*, CCAMLR SCIENCE, 2000, at 87.
- <sup>4</sup> See Inigo Everson, *Distribution and Standing Stock; The Southern Ocean*, in KRILL: BIOLOGY, ECOLOGY, AND FISHERIES (Inigo Everson ed., 2000).
- <sup>5</sup> Taro Ichii, *Krill Harvesting*, in KRILL: BIOLOGY, ECOLOGY AND FISHERIES 228 (Inigo Everson, ed., 2000).
- <sup>6</sup> Stephen Nicol & Yoshinari Endo, *Krill Fisheries: Development, Management and Ecosystem Implications*, AQUATIC LIVING RESOURCES, August 13, 1999, at 107, available at <http://www.edpsciences.org/articles/alr/abs/1999/02/alr9230/alr9230.html> (last visited Oct. 1, 2006).
- <sup>7</sup> Stephen Nicol & Jacqueline Foster, *Recent Trends in the Fishery for Antarctic Krill*, AQUATIC LIVING RESOURCES, April 29, 2003, at 43, available at <http://www.edpsciences.org/articles/alr/abs/2003/01/alr3065/alr3065.html> (last visited Oct. 1, 2006).
- <sup>8</sup> Andrew Constable, et al., *Managing Fisheries to Conserve the Antarctic Marine Ecosystem: Practical Implementation of the Convention on the Conservation of Antarctic Marine Living Resources* (CCAMLR), 57 ICES JOURNAL OF MARINE SCIENCE 789 (2000).
- <sup>9</sup> See, e.g., Howard Browman & Konstantinos Stergiou, *Perspectives on Ecosystem-Based Approaches to the Management of Marine Resources*, MARINE ECOLOGY PROGRESS SERIES, June 24, 2004, at 269, available at [www.seararoundus.org/Journal/Zeller&Paulyresource-policy.pdf](http://www.seararoundus.org/Journal/Zeller&Paulyresource-policy.pdf) (last visited Oct. 1, 2006); Howard I. Browman & Konstantinos I. Stergiou, *Politics and Socio-Economics of Ecosystem-Based Management of Marine Resources*, MARINE ECOLOGY PROGRESS SERIES, Sept. 16, 2005, at 241, available at <http://www.iwlearn.net/publications/misc/lmearticles.pdf/view> (last visited Oct. 1, 2006).
- <sup>10</sup> Ole Arve Misund & Hein Rune Skjoldal, *Implementing the Ecosystem Approach: Experiences From the North Sea, ICES, and the Institute of Marine Research*, NORWAY MARINE ECOLOGY PROGRESS SERIES, 2005, at 260; REPORT OF THE TWENTY-FIFTH SESSION OF THE COMMITTEE ON FISHERIES (FAO Fisheries Report No. 72, 2003).
- <sup>11</sup> Sergi Tudela & Katherine Short, *Paradigm Shifts, Gaps, Inertia, and Political Agendas in Ecosystem-Based Fisheries Management*, MARINE ECOLOGY PROGRESS SERIES, Sept. 16, 2005, at 282, available at [http://www.int-res.com/articles/meps\\_oa/m300p241.pdf](http://www.int-res.com/articles/meps_oa/m300p241.pdf) (last visited Oct. 1, 2006).
- <sup>12</sup> The text of Commission for the Conservation of Antarctic Marine Living Resources, 1982, available at [http://www.ccamlr.org/pu/e/e\\_pubs/bd/pt1.pdf](http://www.ccamlr.org/pu/e/e_pubs/bd/pt1.pdf) (last visited Oct. 1, 2006).
- <sup>13</sup> ANNA WILLOCK & MARY LACK, FOLLOW THE LEADER; LEARNING FROM EXPERIENCE AND BEST PRACTICE IN REGIONAL FISHERIES MANAGEMENT ORGANIZATIONS (WWF International and TRAFFIC International 2006), available at <http://assets.panda.org/downloads/rfmreport06.pdf> (last visited Oct. 1, 2006).
- <sup>14</sup> WILLOCK & LACK, *id.* at 18.
- <sup>15</sup> WILLOCK & LACK, *id.*
- <sup>16</sup> WILLOCK & LACK, *id.* at 16.
- <sup>17</sup> CCAMLR Ecosystem Monitoring Program, <http://www.ccamlr.org/pu/e/sc/cemp/intro.htm> (last visited Oct. 1, 2006).
- <sup>18</sup> Andrew Constable, *CCAMLR Ecosystem Monitoring and Management: Future Work*, CCAMLR SCIENCE, 2002, at 235.
- <sup>19</sup> See Denzil Miller, *Antarctic Krill and Ecosystem Management: From Seattle to Siena*, CCAMLR SCIENCE, 2002, at 175 (providing a description of CCAMLR's development of management approaches and models to establish Antarctic krill catch limits).
- <sup>20</sup> CCAMLR, Conservation Measure 51-01 (2002) (Subarea 48.1: 1,008 million tonnes; Subarea 48.2: 1,104 million tonnes; Subarea 48.3: 1,056 million tonnes; Subarea 48.4: 0.832 million tonnes).
- <sup>21</sup> CCAMLR, *Krill Synoptic Survey*, available at <http://www.ccamlr.org/pu/e/sc/kri-surv-intro.htm> (last visited Oct. 1, 2006).
- <sup>22</sup> CCAMLR, *Report of the Twenty-First Meeting of the Commission for the Conservation of Antarctic Marine Living Resources* (2002), at para. 4.27, available at [http://www.ccamlr.org/pu/E/e\\_pubs/sr/02/i1.pdf](http://www.ccamlr.org/pu/E/e_pubs/sr/02/i1.pdf) (last visited Oct. 1, 2006) [hereinafter Report of Twenty-First Meeting].
- <sup>23</sup> *Report of Twenty-First Meeting*, *id.* at para. 2.3, 6.11, and 6.12.
- <sup>24</sup> CCAMLR, Conservation Measure 10-04 (2005), available at [http://ccamlr.org/pu/E/e\\_pubs/cm/04-05/10-04.pdf](http://ccamlr.org/pu/E/e_pubs/cm/04-05/10-04.pdf) (last visited Oct. 1, 2006).
- <sup>25</sup> CCAMLR, *Report of the Twenty-Third Meeting of the Commission for the Conservation of Antarctic Marine Living Resources* (2004), at para. 10.10, available at [http://www.ccamlr.org/pu/E/e\\_pubs/cr/04/i01.pdf](http://www.ccamlr.org/pu/E/e_pubs/cr/04/i01.pdf) (last visited Oct. 1, 2006).
- <sup>26</sup> Nichol & Foster, *supra* note 7, at 42.
- <sup>27</sup> See Michael New & Ulf Wijkström, *Use of Fishmeal and Fish Oil in Aquafeeds: Further Thoughts on the Fishmeal Trap*, FAO FISHERIES CIRCULAR, No. 975, 2003, at Sec. 6, partially available at <http://www.fao.org/DOCREP/005/Y3781E/y3781e08.htm> (last visited Oct. 1, 2006).
- <sup>28</sup> Nichol & Foster, *supra* note 7, at 42.
- <sup>29</sup> Terje Engoe, *Little Krill to Make Big Profits for Fishery Tycoon*, FIS WORLD-NEWS, June 9, 2006, available at [http://www.asoc.org/info\\_news.htm](http://www.asoc.org/info_news.htm) (last visited Oct. 6, 2006).
- <sup>30</sup> See Andrew Constable & Stephen Nicol, *Defining Smaller-Scale Management Units to Further Develop the Ecosystem Approach in Managing Large-Scale Pelagic Krill Fisheries in Antarctica*, CCAMLR SCIENCE, 2002 at 117-131.
- <sup>31</sup> Constable & Nichol, *id.* at 122.
- <sup>32</sup> See Angus Atkinson, et. al., *Long-term Decline in Krill Stock and Increase in Salps Within the Southern Ocean*, 432 NATURE 100, 100-03 (2004).
- <sup>33</sup> CCAMLR, *Report of the Twenty-Second Meeting of the Scientific Committee for the Conservation of Antarctic Marine Living Resources* (2003), at para. 3.12, available at [http://www.ccamlr.org/pu/E/e\\_pubs/sr/03/i1.pdf](http://www.ccamlr.org/pu/E/e_pubs/sr/03/i1.pdf) (last visited Oct. 1, 2006).
- <sup>34</sup> *Report of the Twenty-Third Meeting*, *supra* note 25.
- <sup>35</sup> CCAMLR, *Report of the Twenty-Fourth Meeting of the Scientific Committee for the Conservation of Antarctic Marine Living Resources* (2005), at para. 3.16 - 3.22, available at [http://www.ccamlr.org/pu/E/e\\_pubs/sr/05/i01.pdf](http://www.ccamlr.org/pu/E/e_pubs/sr/05/i01.pdf) (last visited Oct. 1, 2006).
- <sup>36</sup> Roger Hewitt et. al., *Options for Allocating the Precautionary Catch Limit of Krill Among Small-Scale Management Units in the Scotia Sea*, CCAMLR SCIENCE, 2004, at 94.
- <sup>37</sup> Constable, et al, *supra* note 8, at 789.
- <sup>38</sup> Andrew Constable, *Managing Fisheries Effects on Marine Food Webs in Antarctica: Trade-offs Among Harvest Strategies, Monitoring, and Assessment in Achieving Conservation Objectives*, BULLETIN MARINE SCIENCE, May 2004, at 603.

## ENDNOTES: MARINE NATIONAL MONUMENTS

continued from page 31

- <sup>4</sup> PEW OCEANS COMMISSION, *supra* note 2, at 15-18; *see also* Robin Kundis Craig, *Taking Steps Toward Marine Wilderness Protection? Fishing and Coral Reef Marine Reserves in Florida and Hawaii*, 34 MCGEORGE L. REV. 155, 166-83 [hereinafter *Taking Steps?*]; Robin Kundis Craig, *Taking the Long View of Ocean Ecosystems: Historical Science, Marine Restoration, and the Oceans Act of 2000*, 29 ECOLOGY L. Q. 649, 673-88 (2002).
- <sup>5</sup> PEW OCEANS COMMISSION, *supra* note 2, at 15.
- <sup>6</sup> U.S. COMMISSION ON OCEAN POLICY, *supra* note 3, at 295-98.
- <sup>7</sup> U.S. COMMISSION ON OCEAN POLICY, *supra* note 3, at 105.
- <sup>8</sup> 16 U.S.C. §§ 431-433 (1906).
- <sup>9</sup> 16 U.S.C. §§ 1431-1434 (1972).
- <sup>10</sup> For example, Congress created the Florida Keys National Marine Sanctuary through directed legislation. Pub. L. No. 101-605, 104 Stat. 3089 (Nov. 16, 1990) (codified at 16 U.S.C. § 1433). This legislation, however, also provided that, after its creation, the new marine sanctuary would be managed in accordance with the MPRSA.
- <sup>11</sup> For information regarding the Antiquities Act designation of this marine reserve, visit the National Atmospheric and Oceanic Administration's Northwestern Hawaiian Islands Marine National Monument website at <http://www.hawaiireef.noaa.gov/> (last visited Sept. 25, 2006).
- <sup>12</sup> United Nations Convention on the Law of the Sea, Dec. 10, 1982, 183 U.N.T.S. 397 [hereinafter UNCLOS].
- <sup>13</sup> UNCLOS, *id.* at Art. 56.1.

- <sup>14</sup> *United States v. California*, 332 U.S. 19 (1947).
- <sup>15</sup> Submerged Lands Act of 1953, 43 U.S.C. §§ 1301-1303, 1311-1315 (2000).
- <sup>16</sup> Submerged Lands Act of 1953, *id.* at § 1314(a).
- <sup>17</sup> Exec. Order No. 1019, at 1 (Feb. 1909).
- <sup>18</sup> Exec. Order No. 13,089, 63 Fed. Reg. 32,701 (June 11, 1998).
- <sup>19</sup> Exec. Order No. 13,158, 65 Fed. Reg. 34,909 (May 26, 2000).
- <sup>20</sup> NATIONAL MARINE SANCTUARY AMENDMENTS ACT OF 2000, Pub. L. No. 106-513, § 6(g), 114 Stat. 2381 (Nov. 13, 2000).
- <sup>21</sup> Exec. Order No. 13,178, 65 Fed. Reg. 76,903 (Dec. 4, 2000).
- <sup>22</sup> Exec. Order No. 13,196, 66 Fed. Reg. 7,395 (Jan. 18, 2001).
- <sup>23</sup> 16 U.S.C. § 1801(a)(6) (1976).
- <sup>24</sup> 16 U.S.C. § 1433(a) (1972).
- <sup>25</sup> 42 U.S.C. § 4332 (1972).
- <sup>26</sup> *See* 71 Fed. Reg. 29,924, 29,926 (May 24, 2006).
- <sup>27</sup> *See* 71 Fed. Reg. 9,522 (Feb. 24, 2006) (announcing WestPac's public meeting regarding regulation of bottomfish and pelagics fisheries in the Northwestern Hawaiian Islands); 70 Fed. Reg. 57,858 (Oct. 4, 2005) (seeking to fill upcoming vacancies on the NWHI CRER Advisory Council).
- <sup>28</sup> 16 U.S.C. § 431-433 (1906).
- <sup>29</sup> Establishment of the Northwestern Hawaiian Islands Marine National Monument, *available at* <http://www.whitehouse.gov/news/releases/2006/06/print/20060615-18.html> (last visited Sept. 25, 2006).
- <sup>30</sup> Northwestern Hawaiian Islands Marine National Monument, 71 Fed. Reg. 51,134 (Aug. 29, 2006).

## ENDNOTES: HOW TO PROTECT A CORAL REEF

continued from page 35

- Multilateral Environmental Agreements, Programmes, Partnerships and Networks Relevant to the Protection and Conservation of Coral Reefs and the World Summit on Sustainable Development Plan of Implementation* (May 2003) *available at* [http://www.unep.org/PDF/Conventions\\_CoralReefs\\_optimized.pdf](http://www.unep.org/PDF/Conventions_CoralReefs_optimized.pdf) (last visited October 17, 2006) [hereinafter *Conventions and Coral Reefs*].
- <sup>3</sup> *See* Callum M. Roberts et al., *Marine Biodiversity Hotspots and Conservation Priorities for Tropical Reefs*, 295 SCIENCE 1280 (2002); *see also* Press Release, Conservation International, *The Ocean's Top 10 Coral Reef Hotspots Identified For First Time: Study Sounds Alarm for Extinctions of Marine Species*, Feb. 14, 2002, *available at* [http://www.conservation.org/xp/news/press\\_releases/2002/021402.xml](http://www.conservation.org/xp/news/press_releases/2002/021402.xml) (last visited Oct. 20, 2006).
- <sup>4</sup> Norman Myers et al., *Biodiversity Hotspots for Conservation Priorities*, 403 NATURE 853 (Feb. 24, 2004) (finding that 35 percent of four vertebrate groups are confined to 25 terrestrial hotspots comprising 1.4 percent of the world's land surface).
- <sup>5</sup> CLIVE WILKINSON, STATUS OF CORAL REEFS OF THE WORLD: 2004, Vol. 1 (Australian Institute of Marine Science 2004) *available at* <http://www.aims.gov.au/pages/research/coral-bleaching/scr2004/> (last visited Oct. 17, 2006).
- <sup>6</sup> *Conventions and Coral Reefs*, *supra* note 2, at foreword.
- <sup>7</sup> DIRK BRYANT ET AL., REEFS AT RISK: A MAP-BASED INDICATOR OF POTENTIAL THREATS TO THE WORLD'S CORAL REEFS 20 (World Resources Institute 1998), *available at* <http://pdf.wri.org/reefs.pdf> (last visited Oct. 20, 2006) [hereinafter *REEFS AT RISK*].
- <sup>8</sup> UNITED NATIONS ENVIRONMENT PROGRAMME WORLD CONSERVATION MONITORING CENTRE ("UNEP-WCMC"), IN THE FRONT LINE: SHORELINE PROTECTION AND OTHER ECOSYSTEM SERVICES FROM MANGROVES AND CORAL REEFS 5 (2006) *available at* [http://sea.unep-wcmc.org/resources/publications/UNEP\\_WCMC\\_bio\\_series/24.cfm](http://sea.unep-wcmc.org/resources/publications/UNEP_WCMC_bio_series/24.cfm) (last visited Oct. 20, 2006) [hereinafter *IN THE FRONT LINE*].
- <sup>9</sup> Assuming a three percent discount rate. WORLD WILDLIFE FUND, THE ECONOMICS OF WORLDWIDE CORAL REEF DEGRADATION (2003) *available at* (last visited Oct. 20, 2006) [hereinafter *REEF ECONOMICS*].
- <sup>10</sup> Fredrik Moberg & Carl Folke, *Ecological Goods and Services of Coral Reef Ecosystems*, 29 ECOLOGICAL ECONOMICS 215, 216 (1999).

- <sup>11</sup> NOAA, U.S. CORAL REEF TASK FORCE, IMPLEMENTATION OF THE NATIONAL CORAL REEF ACTION STRATEGY: REPORT ON THE U.S. CORAL REEF TASK FORCE ACTIVITIES FROM 2002-2003 (July 2005), *available at* [http://www.coris.noaa.gov/activities/reportcongress2005/Chap12\\_InternationalTrade.pdf](http://www.coris.noaa.gov/activities/reportcongress2005/Chap12_InternationalTrade.pdf) (last visited Oct. 20, 2006) (finding that "trade in coral reef species could provide jobs in predominantly rural, low-income coastal communities, thereby providing strong economic incentives for coral reef conservation in regions with few alternative sources of revenue.").
- <sup>12</sup> NOAA, WHAT ARE CORAL REEFS—AND WHY ARE THEY IN PERIL?, Dec. 3, 2001, <http://www.magazine.noaa.gov/stories/mag7.htm> (last visited Oct. 20, 2006).
- <sup>13</sup> Moberg & Folke, *supra* note 10, at 217.
- <sup>14</sup> Reef Economics, *supra* note 9, at 8.
- <sup>15</sup> GREAT BARRIER REEF MARINE PARK AUTHORITY, A REEF MANAGER'S GUIDE TO CORAL BLEACHING (2006) *available at* [www.coris.noaa.gov/activities/reef\\_managers\\_guide/welcome.html](http://www.coris.noaa.gov/activities/reef_managers_guide/welcome.html) (last visited Oct. 20, 2006) [hereinafter *REEF MANAGER'S GUIDE*].
- <sup>16</sup> REEF ECONOMICS, *supra* note 9, at 8.
- <sup>17</sup> Robin Kundis Craig, *Taking Steps Toward Marine Wilderness Protection? Fishing and Coral Reef Marine Reserves in Florida and Hawaii*, 34 MCGEORGE L. REV. 155, 160 (2003).
- <sup>18</sup> IN THE FRONT LINE *supra* note 8, at 5.
- <sup>19</sup> Moberg & Folke, *supra* note 10, at 220. 29 ECOLOGICAL ECONOMICS 215, 220 (1999).
- <sup>20</sup> WORLD WILDLIFE FUND-INTERNATIONAL, MONEY TALKS: ECONOMIC ASPECTS OF MARINE TURTLE USE AND CONSERVATION (2004) *available at* <http://worldwildlife.org/turtles/pubs/turtlereport4.pdf> (last visited Oct. 20, 2006).
- <sup>21</sup> Moberg & Folke, *supra* note 10, at 228.
- <sup>22</sup> IN THE FRONT LINE, *supra* note 8, at 5.
- <sup>23</sup> IN THE FRONT LINE, *supra* note 8, at 5-6.
- <sup>24</sup> CLIVE WILKINSON, STATUS OF THE CORAL REEFS OF THE WORLD: 2000 (Australian Institute of Marine Science 2000), *available at* <http://www.aims.gov.au/pages/research/coral-bleaching/scr2000/scr-00gcrmn-report.html> (last visited Oct. 20, 2006). *See generally* *Altered Oceans, A Five Part Series on the Crisis in the Seas*, LOS ANGELES TIMES, July-Aug., 2006, *available at* <http://www.latimes.com/news/local/oceans/la-oceans-series,0,7842752.special> (last visited

Oct. 17, 2006); *see also* U.S. COMMISSION ON OCEAN POLICY, AN OCEAN BLUE-PRINT FOR THE 21ST CENTURY: FINAL REPORT OF THE U.S. COMMISSION ON OCEAN POLICY (Sept. 2004), available at [http://oceancommission.gov/documents/full\\_color\\_rpt/000\\_ocean\\_full\\_report.pdf](http://oceancommission.gov/documents/full_color_rpt/000_ocean_full_report.pdf) (last visited Oct. 20, 2006) [hereinafter OCEAN COMMISSION REPORT]; PEW OCEANS COMMISSION, AMERICA'S LIVING OCEANS: CHARTING A COURSE FOR SEA CHANGE (2003), available at [http://www.pewtrusts.com/pdf/env\\_pew\\_oceans\\_final\\_report.pdf](http://www.pewtrusts.com/pdf/env_pew_oceans_final_report.pdf) (last visited Oct. 20, 2006) [hereinafter PEW COMMISSION REPORT]; *see also* PEW CENTER ON GLOBAL CLIMATE CHANGE, CORAL REEFS AND GLOBAL CLIMATE CHANGE: POTENTIAL CONTRIBUTIONS OF CLIMATE CHANGE TO STRESSES ON CORAL REEF ECOSYSTEMS (2004).

<sup>25</sup> WORLD WILDLIFE FUND, THE ECONOMICS OF WORLDWIDE CORAL REEF DEGRADATION 5 (2003) available at <http://www.eldis.org/static/DOC12720.htm> (last visited Oct. 20, 2006).

<sup>26</sup> *See generally* JOINT GROUP OF EXPERTS ON THE SCIENTIFIC ASPECTS OF MARINE ENVIRONMENTAL PROTECTION ("GESAMP"), PROTECTING THE OCEANS FROM LAND-BASED ACTIVITIES (2001) 18-26 available at <http://gesamp.imo.org/no71/index.htm> (last visited Oct. 20, 2006). *See also* T. P. Hughes et al., *Climate Change, Human Impacts, and the Resilience of Coral Reefs*, 301 SCIENCE 929, 929 (2003).

<sup>27</sup> *See generally* Felicia C. Coleman & Susan L. Williams, *Overexploiting Marine Ecosystem Engineers: Potential Consequences for Biodiversity*, 17 TRENDS IN ECOLOGY AND EVOLUTION 40 (2002), available at <http://www.bio.fsu.edu/mote/colemanTREE 01.02.pdf> (last visited Oct. 20, 2006).

<sup>28</sup> GLOBAL TRADE AND CONSUMER CHOICES, at 15.

<sup>29</sup> REEF MANAGER'S GUIDE, *supra* note 15, at 5.

<sup>30</sup> Press Release, NOAA, U.S. Coral Reef Task Force Announces New Conservation Initiatives, NOAA06-052 May 4, 2005[sic] available at [http://www.coralreef.gov/announcements/may\\_2006\\_press.pdf](http://www.coralreef.gov/announcements/may_2006_press.pdf) (last visited Oct. 12, 2006).

<sup>31</sup> WORLD WILDLIFE FUND ("WWF"), THE IMPLICATIONS OF CLIMATE CHANGE FOR AUSTRALIA'S GREAT BARRIER REEF (2004).

<sup>32</sup> H. CESAR ET AL., THE ECONOMICS OF WORLDWIDE CORAL REEF DEGRADATION, (Cesar Environmental Economics Consulting 2003), <http://www.icran.org/pdf/cesardegradationreport.pdf> (last visited Oct. 20, 2006).

<sup>33</sup> Camilo Mora et al., *Coral Reefs and the Global Network of Marine Protected Areas*, 312 SCIENCE 1750, 1750 (June 2006).

<sup>34</sup> *See* Josh Eagle, *Regional Ocean Governance: The Perils of Multiple-Use Management and the Promise of Agency Diversity*, 16 DUKE ENV L & POL'Y 143, 153 (2006).

<sup>35</sup> 71 FR 26852, 26858.

<sup>36</sup> 71 FR 26852, 26858.

<sup>37</sup> OCEAN COMMISSION REPORT, *supra* note 24, at 91.

<sup>38</sup> The U.N. Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397.

<sup>39</sup> *See generally* UNITED NATIONS ENVIRONMENTAL PROGRAMME ["UNEP"], CONVENTIONS AND CORAL REEFS: FOURTEEN MULTILATERAL ENVIRONMENTAL AGREEMENTS, PROGRAMMES, PARTNERSHIPS AND NETWORKS RELEVANT TO THE

PROTECTION AND CONSERVATION OF CORAL REEFS AND THE WORLD SUMMIT ON SUSTAINABLE DEVELOPMENT PLAN OF IMPLEMENTATION 12 (2003) [hereinafter CONVENTIONS AND CORAL REEFS].

<sup>40</sup> John Charles Kunich, *Losing Nemo: The Mass Extinction Now Threatening the World's Ocean Hotspots*, 30 COLUM. J. ENVTL. L. 1, 58 (2005).

<sup>41</sup> Camilo Mora et al., *Coral Reefs and the Global Network of Marine Protected Areas*, 312 SCIENCE 1750, 1750 (June 2006).

<sup>42</sup> *See* Doug Obegi, *Is There a Constitutional Right to Fish in a Marine Protected Area?*, 12 HASTINGS W—N.W. J. ENV. L. & POL'Y 103, 121 (2005).

<sup>43</sup> *Illinois Cent. R. Co. v. State of Illinois*, 146 U.S. 387, 435 (U.S. 1892).

<sup>44</sup> *Douglas v. Seacoast Products, Inc.*, 431 U.S. 265, 284-285 (U.S. 1977).

<sup>45</sup> *See generally* Carol M. Rose, *Joseph Sax and the Idea of the Public Trust*, 25 ECOLOGY L.Q. 351 (1998).

<sup>46</sup> Fla. Const., art. X, section 1 (1970) ("The title to lands under navigable waters...is held by the state ... in trust for all the people. ... Private use of portions lands may be authorized ... only when not contrary to the public interest."). Louisiana: ("The natural resources of the state, including air and water, and the healthful, scenic, historic, and aesthetic quality of the environment shall be protected, conserved, and replenished insofar as possible and consistent with the health, safety, and welfare of the people").

<sup>47</sup> *Phillips Petroleum Co. v. Miss.*, 484 U.S. 469, 475 (1988).

<sup>48</sup> Fla. Const., art. X, section 16(a) (1994).

<sup>49</sup> *Weden v. San Juan County*, 958 P.2d 273, 283-84 (Wash. 1998).

<sup>50</sup> Cal Fish & G Code § 2851.

<sup>51</sup> Executive Order 13158 (May 2000). There six categories of protection are: "Uniform Multiple-Use," "Zoned Multiple-Use," "Zoned with No-Take Area(s)," "No Take," "No Impact," and "No Access." *See generally* NOAA, *The U.S. Classification System: An Objective Approach for Understanding the Purpose and Effects of MPAs as an Ecosystem Management Tool*, [http://mpa.gov/pdf/helpful-resources/factsheets/class\\_system\\_0806.pdf](http://mpa.gov/pdf/helpful-resources/factsheets/class_system_0806.pdf) (last visited Oct. 20, 2006).

<sup>52</sup> NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION ("NOAA"), NATIONAL MARINE PROTECTED AREAS CENTER, NOAA PROGRESS REPORT: STATUS OF MPA EXECUTIVE ORDER 13158 ON MARINE PROTECTED AREAS, FISCAL YEAR 2006 (Sept. 2006) at 16, available at <http://mpa.gov/pdf/helpful-resources/mpa-prog-rpt-fy06.pdf> (last visited Oct. 20, 2006).

<sup>53</sup> REEFS AT RISK, *supra* note 7, at 44.

<sup>54</sup> Craig, *supra* note 17, at 168.

<sup>55</sup> REEFS AT RISK, *supra* note 7, at 44.

<sup>56</sup> REEFS AT RISK, *supra* note 7, at 44.

<sup>57</sup> REEFS AT RISK, *supra* note 7, at 44.

<sup>58</sup> Susan H. Bragdon, *National Sovereignty and Global Environmental Responsibility: Can the Tension Be Reconciled for the Conservation of Biological Diversity?*, 33 HARV. INT'L L.J. 381, 391 (1992).

---

## ENDNOTES: PORT STATE MEASURES TO COMBAT IUU FISHING *continued from page 43*

<sup>11</sup> *See* J. Swan, *International action and Responses by Regional Fishery Bodies or Arrangements to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing*, FAO Fisheries Circular no. 996, at 64 (2004).

<sup>12</sup> Paragraph 45.

<sup>13</sup> *See* L. Garibaldi & P. Kebe, *Discrepancies Between the FAO and ICCAT Databases for Tuna Catches in the Mediterranean*, SCRS/2004/081 col. vol. Sci. Pap. ICCAT, 58(2), at 644-661 (2005).

<sup>14</sup> *See* UN General Assembly, *Sustainable Fisheries, Including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention of the Law of the Sea of 10 December 1982, Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and Related Instruments*, U.N. Doc. A/RES/60/31 (Nov. 17, 1995).

<sup>15</sup> *See* Chatham House, *Report: Illegal, Unreported and Unregulated Fishing*,

*1st Chatham House Update and Stakeholder Consultation Meeting* (June 20, 2006), available at [http://www.illegal-fishing.info/item\\_single.php?item=document&item\\_id=91&approach\\_id=](http://www.illegal-fishing.info/item_single.php?item=document&item_id=91&approach_id=) (last visited Sept. 30, 2006).

<sup>16</sup> *See* High Seas Task Force website, Strengthen the International Monitoring, Control and Surveillance Network, [www.high-seas.org/docs/Media/B%20-%20International%20MCS%20Network.pdf](http://www.high-seas.org/docs/Media/B%20-%20International%20MCS%20Network.pdf). (last visited Sept. 30, 2006); *see also* Illegal Fishing info.com website, [www.illegal-fishing.info](http://www.illegal-fishing.info) (last visited Sept. 30, 2006).

<sup>17</sup> 2001 FAO International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing paras. 65–76, available at <http://www.fao.org/DOCREP/003/y1224e/y1224e00.HTM> (last visited Nov. 6, 2006) [hereinafter IPOA-IUU].

<sup>18</sup> *See* Swan, *supra* note 11, at 64.

<sup>19</sup> IPOA-IUU, *supra* note 17, at ¶ 66.

<sup>20</sup> *See* P. Miyake, Meeting of FAO and non-FAO Regional Bodies or Arrangements, Jan. 9–11, 2002, *Catch Certifications and Feasibility of Harmonizing Certifications among Regional Fisheries Management Bodies* (2002).

<sup>21</sup> The Act makes it unlawful for any person subject to the jurisdiction of the United States to “import, export, transport, sell, receive, acquire, or purchase ... any fish or wildlife taken, possessed, transported or sold in violation of any law or regulation of any State or in violation of any foreign law.” 16 U.S.C. 3371 et seq.

<sup>22</sup> See PAUL A. ORTIZ, AN OVERVIEW OF THE US LACEY ACT AMENDMENTS OF 1981 AND A PROPOSAL FOR A MODEL PORT STATE FISHERIES ENFORCEMENT ACT, PREPARED FOR THE MINISTERIALLY LED TASK FORCE ON ILLEGAL, UNREPORTED AND UNREGULATED FISHING ON THE HIGH SEAS, (November 2005), available at [http://www.high-seas.org/docs/Lacey\\_Act\\_Paper.pdf](http://www.high-seas.org/docs/Lacey_Act_Paper.pdf) (last visited Nov. 6, 2006).

<sup>23</sup> IPOA-IUU, *supra* note 17, at ¶ 73 & 74.

<sup>24</sup> See Communiqué from the 11th Conference of North Atlantic Fisheries Ministers held in Trondheim, Norway, June 8–9, 2006, available at <http://odin.dep.no/fkd/english/news/news/047041-990029/dok-bn.html> (last visited Sept. 30, 2006).

<sup>25</sup> ICCAT has undertaken activities in this regard. An example at national level is Iceland, which initiated a campaign to increase awareness of the IUU problem within the fisheries sector itself by writing letters to over a thousand companies that were involved in the fisheries sector. In the letters, the companies were encouraged to be alert to avoid getting involved in supporting IUU activities in any way. It is believed that almost all fisheries companies want to avoid being in any way linked to these illegal activities and welcome help in avoiding involvement. Speech delivered on behalf of the Icelandic Minister responsible for fisheries, see *supra* note 14.

<sup>26</sup> IPOA-IUU, *supra* note 17, at ¶ 56.

<sup>27</sup> See FAO, Fisheries Department Implementation of the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing, *FAO Technical Guidelines for Responsible Fisheries* (2002), at 122.

<sup>28</sup> See UN General Assembly, *Report on the Work of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea at its Sixth Meeting Letter dated 7 July 2005 from the Co-Chairpersons of the Consultative Process Addressed to the President of the General Assembly*, ¶ 9, U.N. Doc. A/60/99 (July 7, 2005).

<sup>29</sup> See UN General Assembly, *Sustainable Fisheries, Including Through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and Related Instruments*, U.N. Doc. A/RES/59/25 (Jan. 17, 2005).

<sup>30</sup> UN General Assembly, *Sustainable Fisheries, Including Through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments*, U.N. Doc. A/RES/60/31 (Nov. 17, 2005).

<sup>31</sup> See Fish Stocks Report, *supra* note 4, at Annex “Outcome of the Review Conference” at note 40.

<sup>32</sup> See Fish Stocks Report, *supra* note 4, at Annex “Outcome of the Review Conference” at note 43(d).

<sup>33</sup> See Fish Stocks Report, *supra* note 4, at ¶ I.c.v.

<sup>34</sup> See Report: Illegal, Unreported and Unregulated Fishing, 1st Chatham House Update and Stakeholder Consultation Meeting, Chatham House, 10 St. James’s Square, London SW, May 9, 2006, available at [http://www.illegal-fishing.info/uploads/Update\\_and\\_consultation\\_mtg090506.doc](http://www.illegal-fishing.info/uploads/Update_and_consultation_mtg090506.doc) (last visited Nov. 6, 2006).

<sup>35</sup> HIGH SEAS TASK FORCE (2006), CLOSING THE NET: STOPPING ILLEGAL FISHING ON THE HIGH SEAS (Governments of Australia, Canada, Chile, Namibia, New Zealand, and the United Kingdom, WWF, IUCN and the Earth Institute at Columbia University) (2006).

---

## ENDNOTES: COASTAL AND PORT ENVIRONMENTS

*continued from page 49*

<sup>22</sup> BWC *supra* note 1 at art. 9.1, 9.2; International Convention on the Control of Harmful Anti-Fouling Systems on Ships art. 11(1)(b), Oct. 18, 2001, 12 I.L.M. 1319 [hereinafter Anti-Fouling Convention], available at <http://www.uscg.mil/hq/g-m/mso/images/AFS-CONF-26%20Antifouling.pdf#search=%22AFS%2FCONF%2F26%22> (last visited Oct. 15, 2006); see generally International Maritime Organization, <http://www.imo.org/> (last visited Oct. 15, 2006).

<sup>23</sup> Compare BWC, *supra* note 1, at art. 9.1(c) and Anti-Fouling Convention, *supra* note 22, Article 11(1)(b) with International Convention for the Prevention of Pollution from Ships art. 5.2, Nov. 2, 1973, 12 I.L.M. 1319 available at <http://sedac.ciesin.columbia.edu/entri/texts/pollution.from.ships.1973.html> (last visited Oct. 15, 2006) [hereinafter MARPOL]. In a nod toward flag State prerogatives, the BWC does, however, provide that “the time required to analyze the samples shall not be used as a basis for unduly delaying the operation, movement or departure of the ship.” BWC, *supra* note 1, at art. 9.1(c).

<sup>24</sup> BWC, *supra* note 1, at art. 8.

<sup>25</sup> BWC, *supra* note 1 at art. 8.2.

<sup>26</sup> See MARPOL, *supra* note 23, at art. 4.2.

<sup>27</sup> United Nations Convention on the Law of the Sea, Dec. 10, 1982, 21 I.L.M. 1261 art. 218, 220, 226, available at [http://www.un.org/Depts/los/convention\\_agreements/texts/unclos/UNCLOS-TOC.htm](http://www.un.org/Depts/los/convention_agreements/texts/unclos/UNCLOS-TOC.htm) (last visited Oct. 15, 2006) [hereinafter UNCLOS].

<sup>28</sup> United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks art. 21–23, Dec. 4, 1995, 34 I.L.M. 1542.

<sup>29</sup> Jeremy Firestone & James Corbett, *Maritime Transportation: A Third Way for Port and Environmental Security*, 9 WIDENER L. SYMPOSIUM J. 419, 428–431 (2002–03). In any event, port States may in practice have other enforcement tools at their disposal. For example, in 1999, the Royal Caribbean Cruises, Ltd. agreed to plea guilty to twenty-one felonies and pay a \$18 million fine. Press Release, U.S. Dept. of Justice, Royal Caribbean to Pay Record \$18 Million Criminal Fine for Dumping Oil and Hazardous Chemicals, Making False Statements: Cruise Line Faces 21 Felony Counts in 6 Different U.S. Courts (July 21, 1999), available at <http://www.usdoj.gov/opa/pr/1999/July/316enr.htm> (last visited Sept. 22, 2006).

<sup>30</sup> BWC, *supra* note 1, at art. 1.8.

<sup>31</sup> M. Tomczak, Jr., *Defining Marine Pollution: A Comparison of Definitions used by International Conventions*, 8 MARINE POL’Y 311, 317–18 (1984).

<sup>32</sup> BWC, *supra* note 1, at pmbl.

<sup>33</sup> BWC, *supra* note 1, at pmbl.

<sup>34</sup> BWC, *supra* note 1, at arts. 2.5, 4.2.

<sup>35</sup> BWC, *supra* note 1, at art. 7.

<sup>36</sup> BWC, *supra* note 1, at reg. B-4.

<sup>37</sup> BWC, *supra* note 1, at reg. B-5.

<sup>38</sup> BWC, *supra* note 1, at reg. D-4.

<sup>39</sup> BWC, *supra* note 1, at reg. E-1(6), E-1(9).

<sup>40</sup> BWC, *supra* note 1, at reg. B-2.

<sup>41</sup> BWC, *supra* note 1, at reg. B-2, app. II.

<sup>42</sup> BWC, *supra* note 1, at regs. E-1.1(.1), E-1.1(.4).

<sup>43</sup> BWC, *supra* note 1, at reg. E-5.

<sup>44</sup> BWC, *supra* note 1, at reg. D-1.

<sup>45</sup> BWC, *supra* note 1, at art. 5.

<sup>46</sup> BWC, *supra* note 1, at regs. A-5, B-3.

<sup>47</sup> BWC, *supra* note 1, at reg. D-4.

<sup>48</sup> BWC, *supra* note 1, at reg. D-2.

<sup>49</sup> BWC, *supra* note 1, at reg. B-3.7

<sup>50</sup> BWC, *supra* note 1, at art. 2.3.

<sup>51</sup> 46 U.S.C. §3703 a(a).

<sup>52</sup> See e.g., 1996 Protocol to the London Dumping Convention of 1972 art. 3.4, 36 I.L.M. 1 (1997); UNCLOS, *supra* note 28, at art. 210(6).

<sup>53</sup> UNCLOS, *supra* note 27 at reg. D-5.1.

<sup>54</sup> IMO, FINAL ACT OF THE INTERNATIONAL CONFERENCE ON BALLAST WATER MANAGEMENT FOR SHIPS (2004).

<sup>55</sup> See generally ROBERT T. CLEMEN, MAKING HARD DECISIONS WITH DECISION TOOLS (1996).

<sup>56</sup> This model is presently being tested by the authors at two U.S. ports.

<sup>57</sup> James J. Winebrake et al., *Optimal Fleet-wide Emissions Reductions for Pas-*

senger Ferries: An Application of a Mixed-Integer Non-Linear Programming Model for the New York-New Jersey Harbor, 55 J. AIR & WASTE MGMT. ASS'N., 458 (2005).

<sup>58</sup> DARREN OEMCKE, PORTS CORPORATION OF QUEENSLAND, THE TREATMENT OF SHIP'S BALLAST WATER 42-43 (1999), available at [http://www.optimarin.com/PDF\\_Files/oemcke.pdf#search=%22%22The%20Treatment%20of%20Ship%20Ballast%20Water%22%20Oemcke%22](http://www.optimarin.com/PDF_Files/oemcke.pdf#search=%22%22The%20Treatment%20of%20Ship%20Ballast%20Water%22%20Oemcke%22) (last visited Oct. 31, 2006).

<sup>59</sup> S.363, 109th Cong. (2005).

<sup>60</sup> Allegra Cangelosi, Ballast Water Management Hearing: Testimony of Allegra Cangelosi, Senior Policy Analyst, Northeast-Midwest Institute before the

United States House of Representatives Committee on Transportation and Infrastructure Subcommittee on Coast Guard and Maritime Transportation Subcommittee on Water Resources and Environment (2004).

<sup>61</sup> Stephen Gollasch, *Hazard Analysis of Aquatic Species Invasions*, in INVASIVE AQUATIC SPECIES OF EUROPE, DISTRIBUTION, IMPACTS AND MANAGEMENT, 447-455 (Erkki Leppäkoski et al. eds., 2002).

<sup>62</sup> Cf. Anne M. Perrault & William Carroll Muffett, *Turning off the Tap: A Strategy to Address International Aspects of Invasive Alien Species*, 11 RECIEL 211, 212, 214 (2002).

<sup>63</sup> Perrault & Muffett, *id.* at 2.

---

## ENDNOTES: ISLANDS OF GARBAGE *continued from page 63*

<sup>4</sup> Weiss, *id.*

<sup>5</sup> *Prevention of Pollution by Garbage from Ships*, International Maritime Organization (2002), [http://www.imo.org/Environment/mainframe.asp?topic\\_id=297](http://www.imo.org/Environment/mainframe.asp?topic_id=297) (last visited Sept. 25, 2006).

<sup>6</sup> Weiss, *supra* note 1.

<sup>7</sup> Marine Debris Research, Prevention, and Reduction Act, H.R. 3692, 109th Cong. § 362 (2006) [hereinafter Marine Debris Research].

<sup>8</sup> Marine Debris Research, *id.*

<sup>9</sup> Marine Debris Research, *id.*

---

## ENDNOTES: CONSERVING MARINE HABITATS

*continued from page 70*

<sup>39</sup> NRDC, *id.*

<sup>40</sup> NRDC, *id.* at 437.

<sup>41</sup> NRDC, *id.* at 440-41.

<sup>42</sup> In a case involving a short-term rule for the Atlantic sea scallop fishery, conservationists tried to get at the adverse effect issue by claiming that the environmental assessment violated NEPA because it did not sufficiently analyze the effects of scallop dredging on groundfish habitat. *Conservation Law Foundation v. Mineta*, 131 F. Supp. 2d 19, 27 (D.D.C. 2001). The same court that decided *AOC v. Daley* decided this case, but the court did not repeat its favorable NEPA ruling. The court held that the agency's analysis was sufficient, but also noted that pursuant to the *AOC v. Daley* ruling, the agency would develop an EIS for the scallop fishery, exactly the relief the plaintiffs' requested: *Mineta*, 131 F. Supp. 2d at 30 and n. 27.

<sup>43</sup> *Conservation Law Foundation v. United States Dept. of Commerce*, 229 F. Supp. 2d 29, 31 (D. Mass. 2002), *aff'd sub nom. Conservation Law Foundation v. Evans*, 360 F.3d 21 (1st Cir. 2004).

<sup>44</sup> Decision Document, Final Meeting, Framework Adjustment 14, 2-3, Jan. 25, 2001, reproduced in Administrative Record 6302-03, *Conservation Law Foundation v. United States Dept. of Commerce*, 229 F. Supp. 2d 29 (D. Mass. 2002).

<sup>45</sup> Decision Document, *id.*

<sup>46</sup> Decision Document, *id.*

<sup>47</sup> *Conservation Law Foundation v. Evans*, 209 F. Supp. 2d, at 28.

<sup>48</sup> *Conservation Law Foundation v. Evans*, *id.*

<sup>49</sup> NATIONAL RESEARCH COUNCIL, EFFECTS OF TRAWLING AND DREDGING ON SEAFLOOR HABITAT at 29 (2002).

<sup>50</sup> KEN DRINKWATER, SUMMARY REPORT: REVIEW ON EVALUATION OF FISHING ACTIVITIES THAT MAY ADVERSELY AFFECT ESSENTIAL FISH HABITAT (EFH) IN ALASKA, 5 (2004), available at <http://www.fakr.noaa.gov/habitat/cie/reports/Drinkwatersummary.pdf> (last visited Oct. 12, 2006).

<sup>51</sup> DRINKWATER, *id.* at 23.

<sup>52</sup> See, e.g. *Oceana v. Evans*, 2005 WL 555416 at \*5.

<sup>53</sup> See, e.g. Amendment 13 Final Rule, 69 Fed. Reg. 22906, 22924 (April 27, 2004) (response to Comment 42: 81% of area of closure selected is within existing closure area).

<sup>54</sup> See, e.g., Amendment 13, *id.* at 22913.

<sup>55</sup> *Oceana v. Evans*, 2005 WL 555416 at \*5.

<sup>56</sup> *Oceana v. Evans*, *id.* at \*31.

<sup>57</sup> See, e.g., Mathews Amos, *supra* note 10, at 2 ("Councils need to move beyond adopting the easiest and most obvious measures . . .").

<sup>58</sup> See, e.g., William T. Hogarth, Ass't Administrator for Fisheries, NOAA, "Keeping Our Fisheries Sustainable," in AMERICAN FISHERIES SOCIETY SYMPOSIUM 41:11-17 (2005) ("As near-shore fisheries have declined, much of our fishing effort has moved further offshore and downslope to deeper, colder waters."); Santi Roberts and Michael Hirshfield, *Deep Sea Corals: Out of Sight but No Longer Out of Mind*, FRONT. ECOL. ENVIRON., April 2004 at 123, 126.

<sup>59</sup> See, e.g., Arctic Science Journeys Radio Script, <http://seagrant.uaf.edu/news/03ASJ/11.14.03coral-gardens.html> (last viewed Oct. 12, 2006).

<sup>60</sup> Final Rule, 70 Fed. Reg. 21927, 21929 (April 28, 2005).

<sup>61</sup> See, e.g., *A Beginning for Conservation*, USA TODAY, July 25, 2006, at A11.

<sup>62</sup> Aleutian Islands EFH Final Rule, 71 Fed. Reg. 36694 (June 28, 2006).

<sup>63</sup> Pacific Coast Groundfish EFH Final Rule, 71 Fed. Reg. 27408 (May 11, 2006).

---

## ENDNOTES: WORLD NEWS *continued from page 77*

<sup>12</sup> About MSC: Marine Stewardship Council website, <http://eng.msc.org/> (last visited Oct. 24, 2006).

<sup>13</sup> MSC, FLOW CHART OF MAIN STEPS IN FISHERY ASSESSMENT PROCESS, available at [http://www.msc.org/assets/docs/fishery\\_certification/Flow%20chart%20of%20Fishery%20Assessment%20Process.doc](http://www.msc.org/assets/docs/fishery_certification/Flow%20chart%20of%20Fishery%20Assessment%20Process.doc) (last visited Sept. 23, 2006).

<sup>14</sup> About MSC, *supra* note 12 (click on fisheries).

<sup>15</sup> GreenBiz News, *Wal-Mart Launches Sustainable Fisheries Labeling*, Sept. 6, 2006, [http://www.greenbiz.com/news/news\\_third.cfm?NewsID=33929&CFID=13660610&CFTOKEN=21973704](http://www.greenbiz.com/news/news_third.cfm?NewsID=33929&CFID=13660610&CFTOKEN=21973704) (last visited Oct. 23, 2006).

<sup>16</sup> Treehugger, *It's Getting Harder to Hate Wal-Mart* May 17, 2006, [http://www.treehugger.com/files/2006/05/its\\_getting\\_har.php](http://www.treehugger.com/files/2006/05/its_getting_har.php) (last visited Oct. 24, 2006).

<sup>17</sup> GREENPEACE, THE MARINE STEWARDSHIP COUNCIL — PRINCIPLES AND CRITERIA (DRAFT) (Feb. 2, 2004), available at <http://www.rcep.org.uk/fisheries/>

[p2evind/p2-Greenpeacecritique-MSCPprinciples.pdf#search=%22marine%20stewardship%20council%20critique%22](http://p2evind/p2-Greenpeacecritique-MSCPprinciples.pdf#search=%22marine%20stewardship%20council%20critique%22) (last visited Oct. 23, 2006).

<sup>18</sup> WalMartFacts.com, *supra* note 11.

<sup>19</sup> WalMartWatch.com, Wal-Mart begins selling MSC certified fish products, [http://walmartwatch.com/blog/archives/wal\\_mart\\_begins\\_selling\\_msc\\_certified\\_fish\\_products/](http://walmartwatch.com/blog/archives/wal_mart_begins_selling_msc_certified_fish_products/) (last visited Oct. 24, 2006).

<sup>20</sup> WalMartWatch.com, *id.*

<sup>21</sup> WalMartFacts.com, *supra* note 11.

<sup>22</sup> Lydia Polgreen & Marlise Simons, *Global Sludge Ends in Tragedy for Ivory Coast*, N.Y. TIMES, Oct. 2, 2006, at A1.

<sup>23</sup> Polgreen & Simons, *id.* 22; *Dutch Company Refutes Chemical Concerns*, ASSOCIATED PRESS, Sept. 25, 2006 [hereinafter *Dutch Company*].

<sup>24</sup> Polgreen & Simons, *supra* note 22; Ian Bickerton et al., *Dutch Probe Abidjan Dumping*, FIN. TIMES, Sept. 26, 2006, at 3 [hereinafter *Dutch Probe Dumping*]; *Dutch Company*, *supra* note 23.

<sup>25</sup> *New Government Formed in Ivory Coast After Toxic Waste Scandal*, N.Y. TIMES, Sept. 17, 2006, at A13 [hereinafter *New Government*].

<sup>26</sup> *Dutch Probe Dumping*, *supra* note 23; *New Government*, *supra* note 25.

<sup>27</sup> Polgreen & Simons, *supra* note 22.

<sup>28</sup> Polgreen & Simons, *supra* note 22; Loucoumane Coulibaly, *Ivory Coast Wants Toxic Ship Held, Death Toll Rises*, REUTERS, Sept. 26, 2006; *Dutch Company*, *supra* note 23.

<sup>29</sup> *Dutch Company*, *supra* note 23.

<sup>30</sup> Bickerton et al., *supra* note 24; Coulibaly, *supra* note 28.

<sup>31</sup> Polgreen & Simons, *supra* note 22.

<sup>32</sup> Polgreen & Simons, *supra* note 22.

<sup>33</sup> Coulibaly, *supra* note 28; *Dutch Company*, *supra* note 23.

<sup>34</sup> Coulibaly, *supra* note 28.

<sup>35</sup> Jari Tanner, *Estonia Holds Ship Linked to Waste Dump*, ASSOCIATED PRESS, Sept. 27, 2006.

<sup>36</sup> Coulibaly, *supra* note 28.

<sup>37</sup> Coulibaly, *supra* note 28.

<sup>38</sup> Letter to the Editor, Graham Sharp, *Sludge in Ivory Coast*, N.Y. TIMES, Oct. 9, 2006, at A16.

<sup>39</sup> PECH Committee on Fisheries, European Parliament website, <http://www.europarl.europa.eu/activities/expert/committees/presentation.do?committee=1245&language=EN> (last visited Oct. 24, 2006).

<sup>40</sup> Environment News Service ("ENS"), *Bluefin Tuna Disappearing from Mediterranean Sea*, Sept. 13, 2006, <http://www.ens-newswire.com/ens/sep2006/2006-09-13-02.asp> (last visited Oct. 24, 2006) [hereinafter ENS].

<sup>41</sup> WORLD WILDLIFE FUND ("WWF"), THE PLUNDER OF BLUEFIN TUNA IN THE MEDITERRANEAN AND EAST ATLANTIC IN 2004 AND 2005: UNCOVERING THE REAL STORY, available at [http://assets.panda.org/downloads/wwfbtreportfinalaeditionreducido\\_final.pdf](http://assets.panda.org/downloads/wwfbtreportfinalaeditionreducido_final.pdf) (last visited Oct. 24, 2006) [hereinafter PLUNDER].

<sup>42</sup> WWF, *Bluefin Tuna Overfished in the Mediterranean*, Sept. 12, 2006, [http://www.panda.org/news\\_facts/newsroom/index.cfm?uNewsID=80320](http://www.panda.org/news_facts/newsroom/index.cfm?uNewsID=80320) (last visited Oct. 24, 2006).

<sup>43</sup> ENS, *supra* note 40.

<sup>44</sup> PLUNDER, *supra* note 41.

<sup>45</sup> WWF, *Close It or Lose It: Bluefin Tuna Fishery Ravaged by Illegal Fishing*, July 5, 2006, [http://www.panda.org/about\\_wwf/what\\_we\\_do/marine/index.cfm?uNewsID=74320](http://www.panda.org/about_wwf/what_we_do/marine/index.cfm?uNewsID=74320) (last visited Oct. 24, 2006).

<sup>46</sup> WWF, *id.*

<sup>47</sup> ENS, *Mediterranean Tuna Farming Out of Control, WWF Says* (Mar. 2, 2004), <http://www.ens-newswire.com/ens/mar2004/2004-03-02-10.asp> (last visited Oct. 24, 2006) [hereinafter *Mediterranean Tuna*].

<sup>48</sup> WWF, *Mediterranean Bluefin Tuna Near Collapse*, May 18, 2006, [http://www.panda.org/about\\_wwf/where\\_we\\_work/mediterranean/index.cfm?uNewsID=69440](http://www.panda.org/about_wwf/where_we_work/mediterranean/index.cfm?uNewsID=69440) (last visited Oct. 24, 2006).

<sup>49</sup> *Mediterranean Tuna*, *supra* note 47.

<sup>50</sup> WWF, *supra* note 45.

<sup>51</sup> WWF MEDITERRANEAN PROGRAM, RISK ON LOCAL FISH POPULATIONS AND ECOSYSTEMS POSED BY THE USE OF IMPORTED FEED FISH BY THE TUNA FARMING INDUSTRY IN THE MEDITERRANEAN at 1 (Apr. 2005), available at [http://www.panda.org/downloads/europe/wwfonenvironmentalriskoftuna\\_farming.doc](http://www.panda.org/downloads/europe/wwfonenvironmentalriskoftuna_farming.doc) (last visited Oct. 24, 2006).

<sup>52</sup> *Egypt Demands More Compensation for Oil Spill*, REUTERS, Oct. 6, 2006 [hereinafter *Egypt Demands More Compensation*].

<sup>53</sup> *Egypt Demands More Compensation*, *id.*

<sup>54</sup> *Anna PC Owner Hit with \$1.7m Oil Spill Bill: But Evasive Action by Tanker Avoided Full Scale Disaster*, LLOYD'S LIST, Sept. 26, 2006, at 16 [hereinafter *Anna PC Owner*].

<sup>55</sup> *Anna PC Owner*, *id.*

<sup>56</sup> *Egypt Demands More Compensation*, *supra* note 52.

<sup>57</sup> *Egypt Demands More Compensation*, *supra* note 52; *Anna PC Owner*, *supra* note 54.

<sup>58</sup> *Tanker Groundings Raises Suez Canal Safety Concerns*, LLOYD'S LIST, Sept. 22, 2006, at 3.



## Environmental Law

### Washington College of Law

WCL is committed to preparing lawyers to meet the environmental and sustainable development challenges in the world today. Through our curriculum, experiential learning and faculty experts, WCL students master the full breadth of environmental law as it is practiced now and will be in the future.

#### Our program offers:

##### A COMPREHENSIVE CURRICULUM

- National and international environmental law courses
- Faculty with ties to environmental practitioners and institutions

##### HANDS-ON EXPERIENCE

- Externships
- Clinical programs
- Internships
- Student-run journal
- Environmental Law Society

##### SUMMER PROGRAMS

- Summer session May 29-June 15, 2007 on environmental law in Washington, D.C.
- Summer study-abroad program in London, Paris and Geneva.

##### For more information

Contact: David Hunter

Phone: 202.274.4415

E-mail: [environmentallaw@wcl.american.edu](mailto:environmentallaw@wcl.american.edu)

[www.wcl.american.edu/environment/summer](http://www.wcl.american.edu/environment/summer)

EO/AA University and Employer

# SUBSCRIPTION INFORMATION

*Sustainable Development Law & Policy* (ISSN 1552-3721) publishes articles and essays that focus on reconciling the tensions between environmental sustainability, economic development, and human welfare. The journal embraces an interdisciplinary focus to provide a fuller view of current legal, political, and social developments. Our mission is to serve as a valuable resource for practitioners, policy makers, and concerned citizens promoting sustainable development throughout the world.

Subscriptions are \$30.00 per year. Because our goal is to make *Sustainable Development Law & Policy* available to all practitioners in related fields, if a nonprofit organization or individual is unable to meet the subscription price, the publication is available at no cost upon request. All subscriptions will be renewed automatically unless timely notice of cancellation is provided.

To subscribe, please contact us by email (preferred) or at:

Managing Editor  
*Sustainable Development Law & Policy*  
4801 Massachusetts Ave., NW, Suite 631  
Washington, DC 20016  
Tel: (202)-274-4057  
Email: [sdlp@wcl.american.edu](mailto:sdlp@wcl.american.edu)

*Sustainable Development Law & Policy* is published three times per year; additionally, two international issues are produced. To purchase back issues please contact William S. Hein & Co. at [hol@wshein.com](mailto:hol@wshein.com). To view current and past issues of the publication please visit our website at <http://www.wcl.american.edu/org/sustainabledevelopment>. Current and past issues are also available online through HeinOnline, LexisNexis, vLex, and the H.W. Wilson Company.

Printed by HBP, Inc.

Volume I and Volume II, Issue 1 are published as *International and Comparative Environmental Law*.

# WCL's International Legal Studies Program. Where the World Meets to Study Law.



One of the top international LL.M. programs in the U.S., we offer a truly international setting and unparalleled resources in **WASHINGTON, D.C.**



- More than 45 international law courses each semester.
- A world-renowned faculty.
- A student body from over 70 countries and graduates from more than 100 nations.
- LL.M. research scholarships available.
- Also offering a Doctor of Juridical Science (S.J.D.) program.



AMERICAN  
UNIVERSITY

**LAW**  
WASHINGTON COLLEGE of LAW  
**LAW**



For information: **202.274.4110**

[www.wcl.american.edu/ilsp](http://www.wcl.american.edu/ilsp)

email: [llminfo@wcl.american.edu](mailto:llminfo@wcl.american.edu)

AU/EO

4801 Massachusetts Avenue, NW  
Washington, DC 20016-8189

## SDLP

AMERICAN UNIVERSITY  
WASHINGTON COLLEGE OF LAW  
4801 MASSACHUSETTS AVENUE, NW SUITE 631  
WASHINGTON, DC 20016-8181

RETURN POSTAGE GUARANTEED

FORWARDING SERVICE REQUESTED

Non-Profit  
U.S. Postage

**PAID**

Permit No. 93  
Hagerstown, MD