

STUDENT ESSAY COMPETITION
WINNER

THE PHANTOM MENACE:
INVASIVE SPECIES

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Somewhere deep in the rainforests of Hawaii and Tahiti, an alien invader threatens to annihilate indigenous species and send the very land sliding into the sea. The invader is called *Miconia calvescens*, and though its origins are terrestrial, its journey from the distant continent of South America is anything but natural.¹ *Miconia* is an ornamental tree that private botanical collectors brought to Tahiti in 1937, and to Hawaii in 1961.² *Miconia*, a ruthless expansionist, has been likened by scientists to the fictitious doomsday material, Ice-9.³ It quickly escaped captivity and began to fill the airy canopies of the islands' rainforests, blotting out the sun and creating "biological deserts" below.⁴ Its shallow root system is insufficient to anchor the soil on steep island slopes and causes numerous landslides.⁵ Although efforts are currently underway to eradicate this invader, there is growing concern that these efforts may be too little, too late to save the

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¹ Leni R. Darrow, Introduced Species Summary Project, Velvet Tree or Miconia (Feb. 27, 2002), http://www.columbia.edu/itc/cerc/danoff-burg/invasion_bio/inv_spp_summ/Miconia_calvescens.html.

² *Id.*

³ According to one U.S. Geological Survey botanist, "In the Kurt Vonnegut book *Cat's Cradle*, there's this material called Ice-9 that binds water permanently and destroys the world. . . . Miconia is like Ice-9." Susan McGrath, *Attack of the Alien Invaders*, NAT'L GEOGRAPHIC, Mar. 2005, at 92, 102.

⁴ *Id.*

⁵ *Id.*

islands' native species.⁶

Miconia is but one of many organisms known as *invasive species*, "an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health."⁷ The explosion of invasive species has risen alongside globalization. With the aid of today's jet aircraft, a journey that once took millennia for a species to accomplish naturally can now be achieved in a matter of hours.⁸ Unlike most other forms of "pollution," the effects of an uncontrolled invasive species grow exponentially as it takes over a new ecosystem.⁹ What begins as a local problem can quickly spread across national borders and become an international problem similar to transboundary pollution. Similarly, a species in an isolated global commons area can grow to unmanageable proportions while responsibility for the introduction is debated.

Invasive species are introduced either intentionally (often under the belief that introduction will improve the environment or enhance local industries), or unintentionally, as stowaways in conveyances, containers, or the goods themselves.¹⁰ Under either scenario, the common pathway is international commerce, and therefore effective control of invasive species requires international laws to regulate these activities.

This article addresses how international law may best approach the problem of invasive species. Section I begins by examining historical approaches to controlling invasive species under international law. Section II analyzes current international efforts to control ships' ballast water, a particularly hazardous vector for unintentional transfers of invasive species. Section III then looks into the future of international law and proposes provisions for a future general treaty to control invasive species under international law.

⁶ *See id.*

⁷ Exec. Order No. 13,112, 3 C.F.R. 160 (1999), reprinted in 42 U.S.C. § 4321 (2000).

⁸ Sarah McGee, *Proposals for Ballast Water Regulation: Biosecurity in an Insecure World*, 2001 COLO. J. INT'L ENVTL. L. & POL'Y 141, 144.

⁹ *See* McGrath, *supra* note 3, at 107.

¹⁰ *See id.* at 96-97.

I. HISTORICAL INTERNATIONAL APPROACHES TO INVASIVE SPECIES

Although invasive species have only recently gained center stage in international environmental law debates, the problem has been a concern of international law for over a half-century.¹¹ Invasive species should be governed under international law, as they are a threat to common resources and a form of either transboundary pollution or international trade. The response to invasive species under international law arose out of concerns about the damage caused by transplanted plant pests.¹² In 1951, the International Plant Protection Convention (“IPPC”) created the first international regime seeking to prevent the introduction and spread of non-indigenous plant pests via packing materials, storage places, and transportation facilities.¹³ For the following decade, international law continued to focus almost entirely on pests that could threaten plant life and agriculture.¹⁴ This trend changed in 1964, when increased human activity in the delicate Antarctic environment prompted adoption of the Agreed Measures for the Conservation of Antarctic Fauna and Flora.¹⁵ This agreement broadly prohibited the introduction of any alien species into the Antarctic unless specifically exempted.¹⁶ The subsequent decades

¹¹ See Nat’l Invasive Species Info. Ctr., USDA, International Laws and Regulations: Global Conventions, <http://www.invasivespecies.gov/laws/intlglobalconv.shtml> (last visited Mar. 21, 2006) [hereinafter Global Conventions].

¹² See *id.* (noting that treaties concerning plant pests were the first international agreements dealing with invasive species).

¹³ International Plant Protection Convention arts. I(1), II(2), Dec. 6, 1951, 23 U.S.T. 2767, 149 U.N.T.S. 67 [hereinafter IPPC]. The IPPC has seen several revisions since its adoption in 1951. The most recent version was adopted in 1997. S. TREATY DOC. NO. 106-23, at V (2000).

¹⁴ See Nat’l Invasive Species Info. Ctr., USDA, International Laws and Regulations: Regional Conventions, <http://www.invasivespecies.gov/laws/intlregconv.shtml> (last visited Mar. 21, 2006) [hereinafter Regional Conventions]; see also Agreement Concerning Cooperation in the Quarantine of Plants and Their Protection Against Pests and Diseases, Dec. 14, 1959, 422 U.N.T.S. 42.

¹⁵ Agreement on Antarctica: Measures in Furtherance of Principles and Objectives of the Antarctic Treaty, June 2–13, 1964, Appendix: Agreed Measures for the Conservation of Antarctic Flora and Fauna, 17 U.S.T. 991, 996.

¹⁶ *Id.* art. IX(1). The Agreed Measures exempt species used for food, or those species used for research or transportation if a permit is obtained in advance from a participating government. *Id.* art. IX(2)–(3), annex C. Controls on species introduced into the Antarctic were later expanded under the Convention on the Conservation of Antarctic Marine Living Resources art. II(3)(c), May 20, 1980, 33 U.S.T. 3476, 19 I.L.M. 841, and the Protocol on

saw a proliferation of regional agreements similar to the Antarctic framework.¹⁷

In addition to these regional efforts, major international environmental conventions throughout the 1970s, 80s, and 90s included limited supplementary provisions on invasive species.¹⁸ While the IPPC and Antarctica treaties establish specific, mandatory controls on invasive species,¹⁹ most of these later conventions contain only vague aspirational statements.²⁰ As a result, most regulation of invasive species has taken place at the national level through domestic maritime and customs laws. With the exceptions of Australia and New Zealand, these municipal restrictions are often limited to a list of prohibited organisms that have been identified as “noxious weeds or injurious wildlife.”²¹ Thus, a government may neglect to list a harmful species if it lacks sufficient information on its effects.²² National efforts can be frustrated further when the task of identifying organisms is divided among several administrative entities.²³ In the U.S., for example, the Department of Agriculture (“USDA”) has sole responsibility for the nation’s “noxious weed list,” which specifies living plant pests that are prohibited from importation.²⁴ But the USDA’s lack of expertise on wild plants—generally the purview of the Department of the Interior—often allows invasive wild plants to slip through unrecognized.²⁵ These problems with information

Environmental Protection to the Antarctic Treaty art. 4, Oct. 4, 1991, S. TREATY Doc. No. 102-22 (1992), 30 I.L.M. 1461, (extending controls to the surrounding seas).

¹⁷ See Regional Conventions, *supra* note 14.

¹⁸ See, e.g., Convention on the Conservation of Migratory Species of Wild Animals art. III(4)(c), June 23, 1979, 1651 U.N.T.S. 361, 19 I.L.M. 15 (controlling invasive species that endanger migratory species); United Nations Convention on the Law of the Sea art. 196(1), Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS]; Convention on Biological Diversity art. 8(g)–(h), June 5, 1992, 1760 U.N.T.S. 143 [hereinafter CBD]; see also Convention on the Law of the Non-Navigational Uses of International Watercourses art. 22, U.N. Doc. A/51/869 (May 21, 1997), available at http://untreaty.un.org/ilc/texts/instruments/english/conventions/8_3_1997.pdf.

¹⁹ See *supra* notes 13, 16 and accompanying text.

²⁰ Cf. *supra* note 18 and accompanying text.

²¹ McGrath, *supra* note 3, at 106.

²² Cf. *id.* (highlighting lax entry restrictions in most countries).

²³ See *id.* at 107.

²⁴ 7 U.S.C. §§ 7702(14), 7712(f) (2000).

²⁵ See McGrath, *supra* note 3, at 107. The Department of the Interior’s Fish & Wildlife Service is responsible for the protection of wild flora and fauna, and

availability could be resolved under the international frameworks proposed later in this paper.

II. CURRENT APPROACHES TO INVASIVE SPECIES: BALLAST WATER

The introduction of harmful species to new aquatic environments has been recognized as one of the greatest threats to the world's oceans.²⁶ A significant vector for the spread of these invasive species is through the ballast water contained in trans-oceanic ships.²⁷ Ships pump ballast water into onboard tanks to improve stability by adjusting the vessel's depth and orientation in the sea.²⁸ This is typically done before departure, when the vessel is empty or carrying a light or unbalanced load.²⁹ When the ship enters a new port to take on cargo, it releases the water, which can contain numerous species from the ship's point of origin.³⁰ Large cargo vessels can carry as much as twenty million gallons of ballast water containing as many as 300 species.³¹ With more than 45,000 cargo ships operating on the high seas, a marine biologist

its National Park Service has extensive experience in the preservation and management of wild plants within the national park system. *Cf., e.g.*, U.S. Fish & Wildlife Serv., Environmental Quality Program: Invasive Species, <http://www.fws.gov/contaminants/Issues/InvasiveSpecies.cfm> (last visited Apr. 7, 2006); Nat'l Park Serv., U.S. Dept. of the Interior, Explore Biology: Invasive Species Management, <http://www.nature.nps.gov/biology/invasivespecies> (last visited Apr. 7, 2006).

²⁶ International Convention for the Control and Management of Ships' Ballast Water and Sediments, foreword, Feb. 13, 2004, *available at* <http://svs-uneipibmdb.net/?q=node/178> [hereinafter Ballast Water Convention].

²⁷ *Cf. id.* (noting that the management of ballast water is a major challenge for those working to eliminate the threat posed by non-native aquatic organisms). The term *vector* is used here to designate the means or medium by which an invasive species is transported into a new ecosystem. This is a derivation of the term's traditional use in medicine to describe an organism which conveys pathogens from one host to another, but does not cause the disease itself. See TABER'S CYCLOPEDIA MEDICAL DICTIONARY 2068 (Clayton L. Thomas ed., 18th ed. 1997).

²⁸ Lisa A. Brautigam, *Control of Aquatic Nuisance Species Introductions Via Ballast Water in the United States: Is the Exemption of Ballast Water Discharges from Clean Water Act Regulation a Valid Exercise of Authority by the Environmental Protection Agency?*, 6 OCEAN & COASTAL L.J. 33, 38-39 (2001).

²⁹ Brent C. Foster, *Pollutants Without Half-Lives: The Role of Federal Environmental Laws in Controlling Ballast Water Discharges of Exotic Species*, 30 ENVTL. L. 99, 102 (2000).

³⁰ *Id.*

³¹ McGrath, *supra* note 3, at 110.

estimated that up to 5,000 or more species could be in transit in ships' ballast water on any given day.³²

No species provides a better example of the vast economic and environmental threats posed by unregulated ballast water than the zebra mussel (*Dreissena polymorpha*). Native to the Caspian Sea, these finger-sized bivalves are able to attach themselves to many types of surfaces, including each other, to form dense colonies up to a foot thick.³³ The tiny pest can wreak havoc upon water-intake pipes, impossibly clogging them and threatening the water supplies of cities, power plants, and factories.³⁴ These mussels were discovered in Lake St. Clair near Detroit in 1988, and it is widely believed that they were transported there in ships' ballast water.³⁵ In its natural range, the zebra mussel is kept in check by strong-jawed fish capable of cracking its hard shell,³⁶ but with no comparable predators in the Great Lakes, the mussel has expanded exponentially.³⁷ Sixteen years after its initial discovery, it has spread throughout the Great Lakes and Mississippi River drainage basin and now stands poised to invade the rivers and water supply systems of the western U.S.³⁸ Today, the U.S. and Canada lose approximately \$140 million per year to the mussels,³⁹ and the U.S. Fish and Wildlife Service estimates that by 2010 the economic impact on the Great Lakes region alone will be approximately \$5 billion.⁴⁰

Despite the tremendous economic damage caused by the zebra mussel, it is but one of many harmful species that can be transported via ships' ballast water. Others include the comb

³² *Id.* (quoting Jim Carlton of Williams College).

³³ U.S. GEOLOGICAL SURVEY, U.S. DEPT. OF THE INTERIOR, ZEBRA MUSSELS CAUSE ECONOMIC AND ECOLOGICAL DAMAGE IN THE GREAT LAKES 1 (2000), available at http://www.glsc.usgs.gov/_files/factsheets/2000-6%20Zebra%20Mussels.pdf.

³⁴ *Id.*

³⁵ Great Lakes Info. Network, Zebra Mussels in the Great Lakes Region, <http://www.great-lakes.net/envt/flora-fauna/invasive/zebra.html> (last visited Mar. 22, 2006).

³⁶ Sci. Museum of Minn., Zebra Mussels, <http://www.smm.org/boghopper/zebramussels.html> (last visited Mar. 22, 2006).

³⁷ *Id.*

³⁸ U.S. Army Corps of Eng'rs, Zebra Mussel Research Program: Program Information, <http://el.erdc.usace.army.mil/zebra/zmrpinfo.html> (last visited Mar. 22, 2006).

³⁹ McGrath, *supra* note 3, at 98.

⁴⁰ U.S. GEOLOGICAL SURVEY, *supra* note 33, at 1.

jellyfish,⁴¹ microscopic ‘red tide’ dinoflagellates,⁴² and *Vibrio cholerae*, the bacterium that causes cholera.⁴³ In the San Francisco Bay, home to one of the world’s busiest international ports, it is estimated that ninety percent of the species are non-native.⁴⁴

The World Health Organization first recognized the potential for transmission of harmful invasive species via ballast water in the early 1970s following an outbreak of cholera in Peru.⁴⁵ Although invasive species were acknowledged by the world community in the 1982 Convention on the Law of the Sea (“UNCLOS”),⁴⁶ their threat was largely ignored by the international community until 1990.⁴⁷ It was in this year that Canada first reported harm from the zebra mussel to the International Maritime Organization (“IMO”) of the United Nations.⁴⁸ The Marine Environment Protection Committee (“MEPC”) within the IMO responded by drafting a set of voluntary guidelines to control and prevent the introduction of invasive species via ballast water and sediments.⁴⁹ In 1993, the IMO’s Governing Assembly adopted the new MEPC guidelines in accordance with the direction of the 1992 United Nations

⁴¹ In the Black Sea, the North American comb jellyfish has depleted native plankton stocks to such an extent that it has contributed to the collapse of entire Black Sea commercial fisheries. Global Ballast Water Mgmt. Programme, The Problem, <http://globallast.imo.org/index.asp?page=problem.htm&menu=true> (last visited Mar. 22, 2006).

⁴² Toxic dinoflagellates, which are absorbed by filter-feeding shellfish such as oysters, may cause paralysis or death when contaminated shellfish are consumed by humans. *Id.*

⁴³ In 1991, an Asian strain of cholera was discharged into Peruvian waters, sparking an epidemic that killed 10,000 people. McGrath, *supra* note 3, at 110; *see also* DORLAND’S ILLUSTRATED MEDICAL DICTIONARY 1823 (28th ed. 1994) (defining *V. cholerae* as the etiologic agent of human Asiatic cholera).

⁴⁴ McGrath, *supra* note 3, at 110.

⁴⁵ CATO C. TEN HALLERS-TJABBES, PREVENTION: MARINE BIODIVERSITY THREATENED BY BALLAST WATER TRANSPORTED BY SHIPS; CURBING THE THREAT 1 (2004), *available at* <http://congress.iucn.org/congress/documents/outputs/biodiversity-loss/prevention-cato.pdf>.

⁴⁶ UNCLOS, *supra* note 18, art. 196(1) (“States shall take all measures necessary to prevent, reduce and control pollution of the marine environment resulting from . . . the intentional or accidental introduction of species, alien or new, to a particular part of the marine environment, which may cause significant and harmful changes thereto.”).

⁴⁷ TEN HALLERS-TJABBES, *supra* note 45, at 1.

⁴⁸ Ballast Water Convention, *supra* note 26, foreword.

⁴⁹ *Id.*

Conference on the Environment and Development.⁵⁰

In 1997, the IMO replaced the MEPC guidelines with a more comprehensive version.⁵¹ These latest guidelines suggest several precautionary practices and ballast-management options for states to selectively adopt through national legislation.⁵² However, these voluntary guidelines resulted in differing rules among jurisdictions, complicating the shipping industry's efforts at compliance.⁵³ Cognizant of the need for a uniform set of regulations for all ports, in 1999, the Ballast Water Working Group of the MEPC began to draft a new global treaty for the control of ballast water.⁵⁴ Five years later, their work culminated in the proposed International Convention for the Control and Management of Ships' Ballast Water and Sediments ("Ballast Water Convention" or "Convention"), adopted at the International Conference on Ballast Water Management for Ships on February 9–13, 2004.⁵⁵ The treaty is currently being circulated among the IMO member-states for signature. It will enter into effect one year after ratification by at least thirty states with a combined merchant fleet of at least thirty-five percent of the world's shipping tonnage.⁵⁶

⁵⁰ *Id.*; see Guidelines on the Enhanced Programme of Inspections During Surveys of Bulk Carriers and Oil Tankers, I.M.O. Res. A.744(18), U.N. IMO, 18th Sess. (Nov. 4, 1993). The report of the Rio Conference called for states to adopt "within the framework of IMO and other relevant international organizations . . . appropriate rules on ballast water discharge to prevent the spread of non-indigenous organisms." U.N. Conference on Environment and Development, June 3–14, 1992, *Protection of the Oceans, All Kinds of Seas, Including Enclosed and Semi-Enclosed Seas, and Coastal Areas and the Protection, Rational Use and Development of Their Living Resources*, ¶ 17.30(a)(vi), U.N. Doc. A/CONF.151/26 (Vol. II) (Aug. 13, 1992), available at http://www.un.org/depts/los/consultative_process/documents/A21-Ch17.htm.

⁵¹ Ballast Water Convention, *supra* note 26, foreword; see generally Guidelines for the Control and Management of Ships' Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens, I.M.O. Res. A.868(20), U.N. IMO, 20th Sess. (Nov. 27, 1997) [hereinafter MEPC Guidelines].

⁵² MEPC Guidelines, *supra* note 51, chs. 9, 11.1–11.2.

⁵³ McGee, *supra* note 8, at 153–54.

⁵⁴ See Ballast Water Convention, *supra* note 26, foreword.

⁵⁵ *Id.*

⁵⁶ *Id.*, art. 18(1). As of March 31, 2006, six states representing 0.62% of the world's shipping tonnage have ratified the Convention. Int'l Mar. Org., Summary of Status of Conventions as at 31 March 2006, http://www.imo.org/Conventions/mainframe.asp?topic_id=247 (last visited Apr. 23, 2006). Although an active participant in the drafting of the Convention, the

The Ballast Water Convention is the first treaty seeking to establish binding standards for the minimization and eventual elimination of the threats posed by untreated ballast water. The Convention creates a mandatory regime for the management of ballast water based on both the precautionary principle and the principle of sustainable development.⁵⁷ This convention, which is applicable to all ships flying the flags of ratifying states or operating under their authority,⁵⁸ sets forth in its annex specific procedures and requirements for ballast water discharge.⁵⁹ Under the Convention, vessels must exchange their ballast water in waters at least 200 meters deep and at least fifty nautical miles from the nearest land,⁶⁰ unless (1) there is a threat to the safety or stability of the ship, (2) compliance would cause deviation or delay, or (3) geography does not allow for compliance.⁶¹ Scientists generally agree that water drawn from deep locations does not contain significant numbers of invasive species, and that

U.S. has not yet ratified the treaty. U.N. Env'tl. Programme, IMO Ballast Water Convention: Parties, <http://svs-uneplibmdb.net/?q=node/329> (last visited Mar. 30, 2006).

⁵⁷ Ballast Water Convention, *supra* note 26, pmb1. The precautionary approach states that “[w]here 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.” U.N. Conference on Environment and Development, June 3–14, 1992, *Rio Declaration on Environment and Development*, annex I, princ. 15, U.N. Doc. A/CONF/151.26 (Vol. I) (Aug. 12, 1992), available at <http://www.un.org/documents/ga/conf151/acconf15126-1annex1.htm>. The principle of sustainable use states that nations must exercise their sovereign “right to development” in a manner that equitably meets the “developmental and environmental needs of present and future generations.” *Id.* princ. 3.

⁵⁸ Ballast Water Convention, *supra* note 26, art. 3(1). Although the Convention is not applicable in non-ratifying states, the vessels of these non-parties will nevertheless be subject to the Convention’s requirements whenever they call on ports in party-states. *Ballast Water Management: New International Standards and National Invasive Species Act Reauthorization: Joint Hearing Before the Subcomm. on Coast Guard and Maritime Transportation and the Subcomm. on Water Resources and Environment*, 108th Cong. (2004), available at <http://www.house.gov/transportation/cgmt/03-25-04/03-25-04memo.html>.

⁵⁹ See generally Ballast Water Convention, *supra* note 26, annex.

⁶⁰ *Id.* reg. B-4(1.2). Whenever possible, the convention requires exchanges to take place at least 200 nautical miles from land. *Id.* reg. B-4(1.1). To be effective, “exchange” requires either a ninety-five percent volumetric exchange or three times the volume of the ballast tanks be pumped through. *Id.* reg. D-1.

⁶¹ *Id.* reg. B-4(2)–(4). The port state may then designate an area for ballast exchange after consulting with adjacent states. *Id.* reg. B-4(2).

any species discharged into this environment will not survive.⁶² To ensure compliance with these regulations, the Convention creates a binding obligation on parties to implement a system of inspection and certification for vessels⁶³ and requires parties to take other “effective measures” as needed.⁶⁴ Any ballast discharge must be logged in a Ballast Water record book kept on board and made available for inspection by authorities.⁶⁵

In addition to the restrictions on ballast exchange, the Convention also sets an absolute limit on the maximum concentration of viable organisms allowed in ballast discharges.⁶⁶ These standards are instituted on a rolling basis according to the size of the vessel and the date that it was constructed, becoming mandatory for all ships’ ballast systems by 2016.⁶⁷

Under Article 10 of the Convention, parties are required to cooperate in detecting violations and enforcing the provisions of the Convention.⁶⁸ Technical cooperation is a significant component of the Ballast Water Convention⁶⁹ and may help to alleviate some of the costs of testing and enforcement. To enforce compliance with the Convention, parties are authorized to inspect a vessel’s Ballast Water certificate and record book and take a sampling of the ship’s ballast water.⁷⁰ The authority to test ballast

⁶² See McGee, *supra* note 8, at 157–58. Ballast exchange regulations focus on discharge rather than intake because the intake of ballast water is necessary from the outset of a journey to ensure the stability and maneuverability of the ship and thus cannot be easily regulated.

⁶³ Ballast Water Convention, *supra* note 26, art. 7(1).

⁶⁴ *Id.* art. 4(1).

⁶⁵ *Id.* annex, reg. B-2.

⁶⁶ *Id.* annex, reg. D-2.

⁶⁷ *Id.* annex, reg. B-3.

⁶⁸ *Id.* art. 10(1).

⁶⁹ *Cf. id.* art. 13 (encouraging technical assistance and regional cooperation in training personnel and making necessary technology, equipment, and facilities available).

⁷⁰ *Id.* art. 9(1). Unlike previous international instruments such as UNCLOS and the United Nations Fish Stocks Agreement, the Ballast Water Convention gives port states (rather than flag states) significant power to decide enforcement issues (i.e., the scope of the exceptions to ballast exchange). Compare *id.* art. 8(2) with UNCLOS, *supra* note 18, arts. 218, 220, 226 and 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 arts. 21–23, *adopted* Aug. 4, 1995, S. TREATY DOC. NO. 104-24 (1996), 2167 U.N.T.S. 88. This increase of power to port states may demonstrate growing international emphasis on biodiversity protection (a port state interest) approaching the importance of

water is a significant step beyond mere paper examinations and should enhance compliance with the Convention's provisions.⁷¹ Sanctions for violations will be established by the state under whose authority the ship is operating and enforced through the state's own domestic courts.⁷² These sanctions will probably resemble the civil and criminal penalties currently imposed by states which already have mandatory domestic programs.⁷³ In addition to sanctions, the Convention allows the port state to warn, detain, or exclude the ship, or to prohibit any unsafe ballast discharges,⁷⁴ which is already accepted practice in states with mandatory domestic regimes, including the U.S.⁷⁵ and Australia.⁷⁶

In addition to the controls on vessels, the Convention urges states to promote scientific and technological developments in ballast water management, monitor the effectiveness of controls in their individual territories, and share their findings with other parties.⁷⁷ The MEPC's GloBallast Programme, which works to aid parties in the execution of the Convention's provisions,⁷⁸ has begun developing thirteen sets of technical guidelines for identifying "active substances" and approving ballast water management systems.⁷⁹ It also promotes the development and monitoring provisions of the Convention by holding periodic research and development symposiums, establishing communication networks, sharing technical information, and

crew safety (a flag state interest). Jeremy Firestone & James J. Corbett, *Coastal and Port Environments: International Legal and Policy Responses to Reduce Ballast Water Introductions of Potentially Invasive Species*, 36 OCEAN DEV. & INT'L L. 291, 308 (2005).

⁷¹ Firestone & Corbett, *supra* note 70, at 297.

⁷² See Ballast Water Convention, *supra* note 26, art. 8(1).

⁷³ In the U.S., violators may be fined up to \$25,000, and a knowing violation is punishable as a class C felony. 16 U.S.C. § 4711(g)(1)–(2) (2000).

⁷⁴ Ballast Water Convention, *supra* note 26, art. 10(2)–(3).

⁷⁵ See 16 U.S.C. § 4711(g)(3).

⁷⁶ See AUSTL. QUARANTINE & INSPECTION SERV., DEP'T OF AGRIC., FISHERIES & FORESTRY, AUSTRALIAN BALLAST WATER MANAGEMENT REQUIREMENTS 7 (2001), available at http://www.affa.gov.au/corporate_docs/publications/html/quarantine/ballast_water/Australian_BW_Requirements.pdf.

⁷⁷ Ballast Water Convention, *supra* note 26, art. 6.

⁷⁸ Global Ballast Water Mgmt. Programme, The GloBallast Programme, http://globallast.imo.org/index.asp?page=gef_interw_project.htm&menu=true (last visited Mar. 23, 2006).

⁷⁹ *Harmful Aquatic Organisms in Ballast Water*, MARINELOG.COM, Oct. 8, 2004, <http://www.marinelog.com/DOCS/NEWSMMIV/MMIVOct08b.html>.

tracking ballast controls in several pilot countries.⁸⁰ As discussed above, it is hoped that the technical cooperation engendered by the Convention and through the GloBallast Programme will help to provide developing states with the resources needed to enforce the Convention's mechanisms.⁸¹

A closer look at the Ballast Water Convention's potential effectiveness yields mixed results. Ballast exchange, currently the favored means for neutralizing invasive species in ballast water,⁸² may be rendered ineffective by the Convention's exceptions for the impracticalities of geography, deviation, or delay. Most shipping takes place within the continental shelf zones, sweeping in a large number of vessels under these exclusions.⁸³ Many of these vessels enter the continental shelf as No-Ballast-On-Board ships ("NOBOBs"), fully loaded with cargo and containing only un-pumpable residual water and sediments that can carry hundreds of species.⁸⁴ After the cargo is unloaded, new ballast water is drawn in before departure, mixing with residual materials.⁸⁵ The vessel then proceeds to another port without leaving the continental shelf, discharging its ballast in the port's waters when cargo is loaded and releasing the organisms contained in the residual material.⁸⁶ Therefore, under fairly common circumstances, the Convention's ballast exchange provisions may prove to be ineffective at preventing the spread of invasive species.

Perhaps in response to the NOBOB scenario, the Convention also creates ballast treatment standards that prescribe the number of harmful organisms permitted in ballast discharges.⁸⁷ Compliance with these standards should have a direct substantive effect on whether ballast water discharges contain invasive

⁸⁰ Global Ballast Water Mgmt. Programme, *supra* note 78.

⁸¹ See *supra* text accompanying notes 68–69, 80.

⁸² See Ballast Water Management for Vessels Entering the Great Lakes That Declare No Ballast Onboard, 70 Fed. Reg. 51,831, 51,835 (Aug. 31, 2005).

⁸³ TEN HALLERS-TJABBES, *supra* note 45, at 2.

⁸⁴ David Reid, Nat'l Oceanic and Atmospheric Admin., NOBOB-A: Assessment of Transoceanic NOBOB Vessels and Low-Salinity Ballast Water as Vectors for Nonindigenous Species Introductions to the Great Lakes, http://www.glerl.noaa.gov/res/Task_rpts/2001/nsreid10-1.html (last visited Mar. 23, 2006) (noting that the issue of NOBOB vessel operations in the Great Lakes has become a major concern in the last decade).

⁸⁵ *Id.*

⁸⁶ *Id.*

⁸⁷ Ballast Water Convention, *supra* note 26, annex, reg. D-2.

species. However, the practicality of attaining these targets remains questionable. The technology required to meet the Convention's standards is currently only in the evaluation stage, although international experts at the 2005 MEPC meeting agreed that the necessary systems should be ready for use by 2008.⁸⁸ The Convention requires the IMO to conduct a review in 2006 to determine whether there are appropriate technologies available to achieve the standards.⁸⁹ Given the ambiguous technological situation, it is unclear whether the IMO will need to revise the Convention's ballast treatment standards at this year's meeting. Even if the new technologies are deemed ready for use by 2009,⁹⁰ they may prove too expensive or burdensome for vessel owners to adopt, seriously affecting the level of compliance and becoming an obstacle to the Convention's effectiveness.

The treaty is a huge step in the right direction, particularly in providing uniformity to the shipping industry. The Ballast Water Convention obliges states to bring existing vessels into compliance with specific technical standards and enforces these obligations through a mandated system for monitoring and certification of all commercial vessels under the parties' authority. Thus, the treaty demands behavioral change, as opposed to the previous voluntary guidelines.

Another strength of the treaty is that it is legally binding, as opposed to mere recommendations or statements of political intent or "soft law." The heart of the Convention, the ballast water controls on exchange and treatment, is stated in binding terms,

⁸⁸ Int'l Mar. Org., *supra* note 55. Potential ballast treatment options include mechanical filtration and separation, chemical treatment, and physical treatments such as sterilization by ozone, ultra-violet light, electricity, or heat. Global Ballast Water Mgmt. Programme, Treatment Technology, http://globallast.imo.org/index.asp?page=ballastw_treatm.htm&menu=true (last visited Mar. 23, 2006). The U.S. Coast Guard is encouraging the development of several of these technologies through its Shipboard Technology Evaluation Program ("STEP"), established in January 2004. Ballast Water Management for Vessels Entering Great Lakes That Declare No Ballast Onboard, 70 Fed. Reg. 51,831, 51,834 (Aug. 31, 2005); *see also* Shipboard Technology Evaluation Program, 69 Fed. Reg. 1,082 (Jan. 7, 2004).

⁸⁹ Ballast Water Convention, *supra* note 26, annex, reg. D-5.

⁹⁰ It is widely expected that the Ballast Water Treaty will enter into force worldwide by 2009. *Ballast Water Warning*, MARITIME GLOBAL NET, Jan. 29, 2006, <http://www.mgn.com/news/dailystorydetails.cfm?storyid=6217&type=2>. The analogous U.S. Ballast Water Management Act of 2005 should take effect at the approximately the same time. *Id.*

giving them greater effect compared to earlier non-binding MEPC guidelines. Indeed, the section on ballast treatment does not even provide for grandfathering in older vessels,⁹¹ forcing the entire fleet to shift technologies or practices. However, the exceptions discussed above (particularly for “deviation or delay”) may limit the effectiveness of these binding provisions, as they create a sizeable loophole for vessel owners to claim that they are not bound to the exchange requirements.

The treaty is also an improvement over previous regimes in that it is not merely aspirational but includes specific targets and timetables,⁹² which should be less susceptible to multiple meanings and are therefore less likely to be weakened by later interpretations. The Convention provides detailed requirements for ballast exchange and permissible discharge concentrations,⁹³ as well as a specific timetable for implementation of the treatment standards.⁹⁴ Provided that the parties will be technically and financially capable of implementing enforcement of the standards in accordance with the stated timetables, these highly specific provisions are likely to result in a very durable framework.

A final strength of the treaty is that it is differentiated, meaning that it provides separate requirements for differently situated parties in recognition of their disparate political, historical, or economic circumstances.⁹⁵ Differentiation results in more efficient implementation and a fairer overall agreement,⁹⁶ which in turn contributes to a treaty’s overall effectiveness, as both states and individuals are more likely to comply with agreements that are perceived as just. The Ballast Water Convention’s differentiation includes different timetables for compliance with discharge requirements designed to mitigate the burden on states with large fleets that must be retrofitted with new ballast systems.⁹⁷ By providing more time to bring these vessels into compliance, the

⁹¹ Thus, these provisions will be particularly binding, provided that the standards remain unaltered following the IMO’s 2006 review. *See supra* text accompanying note 89.

⁹² *See* Ballast Water Convention, *supra* note 26, annex, regs. B-4, B-5, D-2 (subject to IMO review in 2006).

⁹³ *Id.*

⁹⁴ *Id.* reg. B-3.

⁹⁵ JØRGEN WETTESTAD, DESIGNING EFFECTIVE ENVIRONMENTAL REGIMES 10 (1999).

⁹⁶ *Cf. id.*

⁹⁷ *See* Ballast Water Convention, *supra* note 26, annex, reg. B-3.

Convention takes these parties' disparate situations into account and should contribute to a perception that the Convention's requirements are fair and ought to be followed.

While these strengths exist, some significant hurdles may mitigate the Convention's effectiveness. First, there is the significant shortcoming of ballast exchange in the NOBOB scenario, although this effect may be neutralized by the introduction of treatment standards. In addition, the strength of the treaty may be reduced to the degree it depends on ballast treatment standards, as the outcome of the 2006 review of those standards is uncertain. Finally, the costs of compliance and enforcement mechanisms are unknown, especially in developing countries, which must rely upon the technical assistance of GloBallast and other party-states. Thus, the future effectiveness of the ballast water treaty remains murky at best. Nevertheless, the treaty is an important step toward stronger controls on the invasive species contained in ballast water. It represents the first stand-alone agreement on this vector, as well as the first serious attempt to spur advances in ballast treatment technology and provide uniform ballast water standards for the shipping industry.

III. TOWARD A COMPREHENSIVE TREATY ON INVASIVE SPECIES

Although the Ballast Water Convention is an important step in controlling the spread of invasive species, the best solution to invasive species under international environmental law would be a comprehensive framework convention governing all of the means by which invasive species are spread throughout the world.

Some efforts are already underway to expand existing treaties in this direction. The Conference of the Parties to the Convention on Biological Diversity ("CBD") recently issued the "Guiding Principles for the Prevention, Introduction and Mitigation of Impacts of Alien Species that Threaten Ecosystems, Habitats or Species."⁹⁸ This document sets forth non-binding guidelines for developing comprehensive strategies against invasive species

⁹⁸ Conference of the Parties to the Convention on Biological Diversity, The Hague, Neth., Apr. 7–19, 2002, *Report of the Sixth Meeting of the Conference of the Parties to the Convention on Biological Diversity*, annex, dec. VI/23, U.N. Doc. UNEP/CBD/COP/6/20 (May 27, 2002), available at <http://www.biodiv.org/doc/meetings/cop/cop-06/official/cop-06-20-en.pdf> [hereinafter Decision VI/23].

under the CBD,⁹⁹ including suggestions for preventing intentional and unintentional introductions of non-indigenous species,¹⁰⁰ proposed measures for mitigating the impact of these species,¹⁰¹ and a commitment to the precautionary approach.¹⁰² The Conference of the Parties also acknowledged several gaps and inconsistencies in the current international framework and has subsequently called for greater collaboration among states and international organizations to address these deficiencies.¹⁰³ One effective way to solve these problems is to combine disparate international controls into a comprehensive regulatory framework for fighting invasive species. The following section will propose what substantive requirements such a framework convention should provide.

A. *Intentional Introduction*

A comprehensive treaty on invasive species needs to address both intentional and unintentional methods of introduction. Intentional introductions are easier to control, because these organisms can be easily identified and intercepted prior to transfer. These introductions might be conducted in the course of agribusiness, the pet trade, or attempts at ecological engineering.¹⁰⁴ While some intentionally-introduced species have been enormously beneficial to human industry with negligible effects on the environment,¹⁰⁵ many others have had disastrous consequences

⁹⁹ See *id.* at 247. The CBD requires that parties take all appropriate measures to “[p]revent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.” CBD, *supra* note 18, art. 8(h).

¹⁰⁰ Decision VI/23, *supra* note 98, annex, §§ B–C.

¹⁰¹ *Id.* annex, § D.

¹⁰² *Id.* annex, princ. 1.

¹⁰³ *Id.* arts. III–IV; see also Conference of the Parties to the Convention on Biological Diversity, Kuala Lumpur, Malay., Feb. 9–20, 2004, *Report of the Seventh Meeting of the Conference of the Parties to the Convention on Biological Diversity*, annex, dec. VII/13 ¶¶ 4–5, 7, U.N. Doc. UNEP/CBD/COP/7/21 (Apr. 13, 2004), available at <http://www.biodiv.org/doc/meetings/cop/cop-07/official/cop-07-21-part2-en.pdf>.

¹⁰⁴ McGrath, *supra* note 3, at 96–97. Invasive species have been introduced for such diverse purposes as camouflaging airfields, feeding colonial settlements, controlling pests, replenishing oyster beds, and preventing erosion. *Id.* at 94, 97, 98, 114–16.

¹⁰⁵ Most of North America’s agricultural plants and animals are non-native species brought from Europe, South America, or elsewhere. *Id.* at 97. Non-native species have been used to successfully replenish depleted shellfish populations. Lori H. Peoples, *A Call for Uniform Regulation of Intentional*

on the ecological balance despite the responsible party's good intentions.¹⁰⁶

The proposed treaty must therefore use environmental impact assessment methodology to weigh the benefits of a prospective transfer against the potential harms, with a rebuttable presumption of harm in accordance with the precautionary principle. In addition, the proposed treaty should include a mechanism to determine the specific species to be controlled in order to focus on a number of limited, identifiable targets, rather than a vague threat from an indeterminate source. Some models for accomplishing these aims include the Convention on International Trade in Endangered Species of Wild Flora and Fauna ("CITES")¹⁰⁷ and the Cartagena Protocol on Biosafety to the Convention on Biological Diversity ("Cartagena Protocol").¹⁰⁸

CITES regulates the trade in endangered species by identifying and grouping species in accordance with their relative risk of extinction.¹⁰⁹ Species at greater risk are accorded greater restrictions on their transfer.¹¹⁰ An invasive species treaty could similarly categorize organisms based on their perceived risk to new ecosystems. The most dangerous organisms would presumably be those with the fastest reproduction rates or greatest consumption rates, or those that are the most difficult to eradicate. Species that are already recognized as invasive could be listed in an annex to the convention. Following the convention's entry into

Introductions of Non-Indigenous Species: The Suminoe Oyster, 81 N.C. L. REV. 2433, 2434 (2003). One out of every six oysters harvested in the U.S. is a transplanted Pacific oyster. MICHAEL DE ALESSI, COMPETITIVE ENTER. INST., OYSTERS AND WILLAPA BAY (1996), <http://www.cei.org/utills/printer.cfm?AID=4419>.

¹⁰⁶ In Micronesia, the monitor lizard was introduced to control the spread of another invasive species, the rat. *Strange Days on Planet Earth: Invaders* (PBS television broadcast Apr. 20, 2005) [hereinafter *Strange Days*]. Officials discovered too late that lizards are diurnal creatures, whereas rats are primarily nocturnal. *Id.* The two species rarely met, and instead of eliminating the rats, the lizards began harassing local poultry. *Id.* The cane toad was introduced as an alternative food source for the lizards, but the cane toad turned out to be poisonous and it killed the lizards. *Id.* It also killed another invasive species, the islanders' cats, leading to an explosion in the island's rat population. *Id.*

¹⁰⁷ Convention on International Trade in Endangered Species of Wild Flora and Fauna, Mar. 3 1973, 27 U.S.T. 1087, 993 U.N.T.S. 243 [hereinafter CITES].

¹⁰⁸ Cartagena Protocol on Biosafety to the Convention on Biological Diversity, Jan. 29, 2000, 39 I.L.M. 1027 [hereinafter Cartagena Protocol].

¹⁰⁹ See CITES, *supra* note 107, art. II.

¹¹⁰ Compare *id.* art. III with *id.* arts. IV–V.

force, importing states would then be authorized by the convention to list additional species due to their superior knowledge of their domestic ecosystems. This type of regime has already been implemented on a limited basis by individual states through their import and customs controls on particular types of organisms.¹¹¹

However, applying this scheme internationally with importer-driven classifications may encounter significant obstacles. The effects of a particular species can vary widely depending upon the ecosystem into which it is introduced, complicating any attempt to compile a universal list of restricted species. In addition, determining the effect of a non-native organism is a highly speculative exercise,¹¹² so some species may be inadvertently misclassified or omitted from the list.

Thus, the invasive species treaty should use the Cartagena Protocol as a model. The Cartagena Protocol regulates, by notice and informed consent importing requirements, the transboundary movement of genetically modified organisms (“GMOs”) pursuant to the CBD’s goal of protecting global biodiversity.¹¹³ GMOs and invasive species present very similar issues, as both carry potential economic benefits but also present uncertain risks to the environment and human health.¹¹⁴ This type of dilemma is best managed through case-by-case risk assessment using a precautionary approach.

The Cartagena Protocol establishes such a procedure, whereby the exporting party must obtain prior informed consent from the importing party before transferring a “living modified organism” (“LMO”) that will be released into the environment.¹¹⁵ In making its decision, the importing party balances the risks to its native ecosystem against the benefits it hopes to gain through importation.¹¹⁶ The resulting decision must be reached in a “scientifically sound manner” in accordance with “recognized risk

¹¹¹ See *supra* text accompanying notes 19–21.

¹¹² See McGee, *supra* note 8, at 144.

¹¹³ Convention on Biological Diversity, Cartagena Protocol on Biosafety: Background, <http://www.biodiv.org/biosafety/background2.aspx> (last visited Mar. 23, 2006).

¹¹⁴ Compare *supra* notes 105–06 and accompanying text with DAVID HUNTER ET AL., INTERNATIONAL ENVIRONMENTAL LAW AND POLICY 962–63 (2d ed. 2002).

¹¹⁵ Cartagena Protocol, *supra* note 108, arts. 7, 8–10, 12.

¹¹⁶ See *id.*

assessment techniques,”¹¹⁷ incorporating the precautionary principle by allowing a decision even where scientific uncertainty exists.¹¹⁸ Due to the similarities between LMOs and invasive species, adapting the Cartagena system to the importation of invasive species is a fairly straightforward process. A framework based on environmental impact assessment, risk management, and the precautionary principle provides a reasonable balance between the interests of importing and exporting states, while minimizing the number of inadvertently harmful introductions. By placing decision-making power in the hands of the importing state, the proposed framework convention ensures that the interests of the state facing the greatest risk of loss are given the greatest weight.

The Cartagena Protocol also establishes a BioSafety Information Clearinghouse to facilitate decision-making and promote access to the relevant scientific and technical information.¹¹⁹ A similar institution would be very beneficial in the context of invasive species. To a limited degree, the GloBallast program mentioned earlier already acts in this role, and establishing such an institution on a world-wide basis for all invasive species should not pose significant problems.

One particular concern regarding the effectiveness of a Cartagena-type framework is how it would square with existing trade agreements, particularly the General Agreement on Tariffs and Trade (“GATT”).¹²⁰ Articles I and III of GATT prohibit discrimination among imported and domestic “like products.”¹²¹ What qualifies as a “like product” is determined on a case-by-case basis by analyzing four criteria established by the World Trade Organization’s Appellate Body in the *Asbestos* case:

- (i) the physical properties of the products; (ii) the extent to which the products are capable of serving the same or similar end-uses; (iii) the extent to which consumers perceive and treat the product as alternative means of performing particular functions in order to satisfy a particular want or demand; and (iv) the international classification of the products for tariff

¹¹⁷ *Id.* art. 15(1).

¹¹⁸ *Id.* arts. 10(6), 11(8).

¹¹⁹ *Id.* art. 20.

¹²⁰ General Agreement on Tariffs and Trade, Oct. 30, 1947, 61 Stat. A-11, 55 U.N.T.S. 194 [hereinafter GATT].

¹²¹ *Id.* arts. I, III.

purposes.¹²²

These criteria are not exhaustive; rather, the determination requires an examination of “*all* of the pertinent evidence.”¹²³ Although non-indigenous organisms may share characteristics similar to indigenous organisms under all four criteria, a critical difference is their harmful effect on the native ecosystem compared to native species. This should be a pertinent characteristic weighing in favor of permissibility under GATT.

Where there is insufficient evidence to prove harmfulness, a restriction on importation of non-native species could instead be based on a presumption of harmfulness under the precautionary approach. However, in this situation it may be difficult to prove that the imported species and similar domestic species are not “alike.” An alternative argument for permitting the restriction could focus on two of GATT’s exceptions. First, GATT permits discriminatory measures “necessary to protect human, animal or plant life or health.”¹²⁴ An invasive species restriction would fall under this exception, depending on the “necessity” of the measure. Necessity is determined via a balancing test, weighing the importance of the interests pursued against the existence of less restrictive alternatives that achieve the same ends.¹²⁵ In the case of a non-indigenous organism, whose harmfulness is uncertain but potentially catastrophic, this harm may outweigh the availability of alternative measures, resulting in a halt to the trade.¹²⁶

Alternatively, a restriction on an invasive species may be permitted under GATT through the second exception “relating to the conservation of exhaustible natural resources.”¹²⁷ The WTO Appellate Body has repeatedly found living resources to be included under this exception.¹²⁸ Most recently, the Appellate

¹²² Appellate Body Report, *European Communities—Measures Affecting Asbestos and Asbestos-Containing Products*, ¶ 101, WT/DS135/AB/R, 40 I.L.M. 1193 (Mar. 12, 2001).

¹²³ *Id.* ¶ 102 (emphasis in original).

¹²⁴ GATT, *supra* note 120, art. XX § I(b).

¹²⁵ HUNTER ET AL., *supra* note 114, at 1164–65.

¹²⁶ *Cf. id.* at 1165 (noting that the necessity exception has not yet been applied to an environmental case).

¹²⁷ GATT, *supra* note 120, art. XX § I(g).

¹²⁸ See, e.g., Appellate Body Report, *United States—Import Prohibition of Certain Shrimp and Shrimp Products*, ¶¶ 25, 127–34, WT/DS58/AB/R (Oct. 12, 1998) [hereinafter *Shrimp-Turtle*]; United States—Prohibition of Imports of Tuna and Tuna Products from Canada, Feb. 22, 1982, GATT B.I.S.D. (29th

Body found sea turtles qualify as exhaustible natural resources under GATT because many sea turtle species are endangered.¹²⁹ The Appellate Body noted that “living species, though in principle, capable of reproduction and, in that sense, ‘renewable,’ are in certain circumstances indeed susceptible of depletion, exhaustion, and extinction.”¹³⁰ Since one reason for the restrictions on invasive species is to prevent loss of endangered species, the restrictions relate to the conservation of species susceptible to exhaustion, and it is likely they would fall under the natural resources exception to GATT.

Under either exception, a regulation on invasive species must not be arbitrary, unjustified, or a disguised attempt to restrict trade.¹³¹ While the effects of this requirement remain to be seen, it should provide a measure of protection against the improper use of restrictions, thereby strengthening the validity of any restrictions of the convention.

A Cartagena-type framework convention for invasive species would likely be a successful approach to control intentionally-introduced invasive species. Its mechanisms would provide an effective risk assessment procedure for preventing intentional transfers of harmful organisms. Moreover, its focus on specific transactions rather than species lists would result in optimal specificity and differentiated treatment of signatories, contributing to the framework’s overall effectiveness. While there may be a legitimate concern that criteria could be applied inconsistently or in a malicious manner which violates free trade agreements, this concern should be outweighed by the necessity of protecting biodiversity.

B. *Unintentional Introductions of Invasive Species*

Unlike intentional transfers, unintentional transfers of invasive species are sometimes impossible to identify in advance. Ballast water is just one of many possible ways that an organism can be introduced unintentionally. Other past carriers have

Supp.) ¶ 4.9 (1983); Canada—Measures Affecting Exports of Unprocessed Herring and Salmon, Mar. 22, 1988, GATT B.I.S.D. (35th Supp.) ¶ 4.4 (1989).

¹²⁹ *Shrimp-Turtle*, *supra* note 128, ¶¶ 25, 127–34.

¹³⁰ *Shrimp-Turtle*, *supra* note 128, ¶ 128.

¹³¹ GATT, *supra* note 120, art. XX.

included used tires,¹³² wooden shipping crates¹³³ and military transports,¹³⁴ so there is risk from these and similar vectors in the future. A framework for controlling unintentional introductions of invasive species must therefore focus on feasible safeguards for likely vectors and encourage swift curative action when a non-indigenous species is discovered.

The Ballast Water Treaty discussed above serves as a model treaty, as it establishes practicable controls on likely vectors.¹³⁵ This type of agreement is carrier-specific and based on detailed technical requirements designed to limit the probability of an unintentional introduction. These levels of specificity may be very difficult to attain in a comprehensive treaty, which would cover an enormous number of technical issues and the introduction of invasive species via many different vectors. Controversy over a single point could potentially block adoption of the entire treaty or lead to reservations that would weaken the regime's effectiveness.¹³⁶ An effective alternative approach may be to focus on the most prevalent vectors for unintentional transfer. These could include food and household goods, packaging materials (including containers and pallets), hull fouling, aquarium materials, fisheries, tourism, and aircraft.¹³⁷ Establishing which of these vectors should be specifically included in the convention and how they may be best controlled is a highly technical question to be addressed by experts during preliminary treaty negotiations.¹³⁸ Vectors of lesser importance could be addressed by a provision

¹³² Asian tiger mosquitoes, known carriers of the West Nile Virus, were transported to North America in the 1980s in shipments of used tires. *Strange Days*, *supra* note 106.

¹³³ Following World War II, Formosan subterranean termites were brought to New Orleans in the wood the Army used to construct shipping crates. *Id.*; see also Pub. Broad. Serv., *Strange Days on Planet Earth: Termites Invade New Orleans*, <http://www.pbs.org/strangedays/episodes/invaders/experts/termites.html> (last visited Mar. 23, 2006).

¹³⁴ Brown tree snakes invaded Guam by stowing away aboard military equipment following World War II. McGrath, *supra* note 3, at 97.

¹³⁵ See discussion *supra* Section II.

¹³⁶ See WETTESTAD, *supra* note 95, at 29.

¹³⁷ GLOBAL INVASIVE SPECIES PROGRAMME, INF. AC.16.12, GLOBAL STRATEGY ON INVASIVE ALIEN SPECIES ¶ 54 (2000), available at <http://www.cites.org/common/com/AC/16/E16-Inf-12.pdf>; see also Sixteenth Meeting of the Animals Comm., Conference of the Parties to the CITES, *Alien Species That Threaten Ecosystems, Habitats, or Species*, annex I, princ. 11, Inf. A.C.16.11, available at <http://www.cites.org/eng/com/AC/16/Inf16-11.pdf>.

¹³⁸ Cf. GLOBAL INVASIVE SPECIES PROGRAMME, *supra* note 137, ¶ 55.

calling on the parties to develop subsequent agreements or protocols, or separate annexes for particular types of vectors that might not require unanimous consent of the ratifying parties.¹³⁹ While this option would delay the full implementation of substantive controls, it should facilitate wider acceptance of the primary framework, contributing to the treaty's ultimate success.

It is imperative that the treaty also encourage rapid response to the introduction of an invasive organism before it can establish itself in a new ecosystem.¹⁴⁰ Rapid response is a particular concern where the introduction occurs in a global commons area or where responsibility for the species' introduction is in dispute. Such was the case when an aquarium species of algae known as *Caulerpa taxifolia* was discovered in the Mediterranean Sea beneath the Oceanographic Museum of Monaco.¹⁴¹ When the algae turned up in nearby French waters a year later, Monaco played down the threat and denied responsibility for the algae's presence.¹⁴² A response was delayed for several years while the algae's origin and potential harm was studied and debated.¹⁴³ Meanwhile, the algae rapidly expanded across the southern coast of France to areas off the coasts of Italy, Spain, Mallorca, and Croatia,¹⁴⁴ covering over 30,000 acres of Mediterranean seabed¹⁴⁵ and placing it well beyond any nation's ability to control. A successful eradication effort off the Californian coast has demonstrated that if France or Monaco had responded more quickly to the discovery, it is very likely that *Caulerpa* could have been contained and eradicated.¹⁴⁶

¹³⁹ The tactic of separate annexes was used under the Ozone Convention and Protocols. See, e.g., Vienna Convention for the Protection of the Ozone Layer arts. 6(4)(e)–(h), 8, 9(3)–(5), 10(2)–(3), done Mar. 22, 1985, T.I.A.S. No. 11,097, 1513 U.N.T.S. 324; Montreal Protocol on Substances That Deplete the Ozone Layer art. 2(9)(c)–(d), (10), Sept. 16, 1987, S. TREATY DOC. NO. 100-10 (1987), 1522 U.N.T.S. 29.

¹⁴⁰ Cf. Decision VI/23, *supra* note 98, annex, princ. 13 (“The best opportunity for eradicating invasive alien species is in the early stages of invasion . . .”).

¹⁴¹ NOVA, Deep Sea Invasion: Chronology of an Invasion, <http://www.pbs.org/wgbh/nova/algae/chronology.html> (last visited Mar. 23, 2006).

¹⁴² *Id.*

¹⁴³ *Id.*

¹⁴⁴ *Id.*

¹⁴⁵ McGrath, *supra* note 3, at 106.

¹⁴⁶ Following the discovery of a small patch of *Caulerpa* in waters northwest of San Diego, authorities' quick response was successful in isolating and

There were two key infirmities in the response to Mediterranean *Caulerpa* that allowed it time to gain the upper hand. First, containment efforts were unnecessarily delayed while parties tried to ascertain the origin and effects of *Caulerpa*. To avoid repeating this mistake, the invasive species treaty should incorporate a commitment to proactive, precautionary measures by parties in the event that a non-native invasive species is discovered in a party state. This approach would obligate a party to contain a non-indigenous species without delay under a presumption of harmfulness of an unintentionally introduced invasive species. An information clearinghouse will aid in this endeavor by providing information on how the species has behaved in similar circumstances and what measures may successfully bring it under control.

The second reason for the *Caulerpa* outbreak was Monaco's lack of candor when the species was initially detected. Monaco may have acted out of a belief that it would be saddled with substantial costs for containment and eradication, or liability for any resulting damages. Such concerns may serve as a strong deterrent to state action, particularly where responsibility for the introduction is unclear. A possible solution to this obstacle would be to provide some form of limited liability to parties that make a good faith effort to warn adjacent states of an unintentionally introduced invasive species in a timely manner and to contain the organism through feasible techniques.¹⁴⁷ This provision would encourage early containment efforts and promote more cooperative efforts by affected states. However, a significant disadvantage to this approach lies with the possibility that a reckless party may escape true responsibility for its wanton behavior. Therefore, such a provision would need to include some equitable safeguard that would withhold immunity from liability for damages and cleanup costs upon a showing of willful or gross negligence. Additionally, the provision must contain a mechanism to resolve disputes between parties and impose damages. Parties could agree in the convention to a binding arbitration of disputes, or to submit their disputes to an adjudicatory authority such as the International Court of Justice.

eradicating the outbreak. *Id.*

¹⁴⁷ Feasible techniques could include mechanical, biological, or chemical treatments, or integrated combinations of these approaches.

Another potential solution could focus on mitigating the costs of remedial efforts by establishing an international superfund funded by the parties, or encouraging parties to provide financial support for eradication efforts directly through grants or low interest loans. Where a danger is shared, it is reasonable to expect that the costs of avoidance will be apportioned as well. National borders cannot stop the spread of an invasive species, and while an alien species may begin as a domestic problem, the surrounding international community has a substantial interest in its remediation. This alternative would require the establishment of a governing body with authority to direct cleanup funds or compel financial cooperation. A standing body of the parties' representatives could be organized in a manner similar to international finance organizations such as the International Monetary Fund, with equal representation among all members but voting and control powers accorded in proportion to the parties' financial contributions.¹⁴⁸ This approach may be particularly suitable in global commons areas where it is unlikely that a single party will unilaterally assume the costs of cleanup.

IV. CONCLUSION

As the distances between the continents shrink with the rise of our global economy, invasive species will continue to be a pervasive threat to all nations and their ecosystems. It is only through a combined international effort that an effective response can be made against these invaders. This effort has already begun with the adoption of the Ballast Water Convention and other international agreements designed to control and eliminate the spread of non-indigenous species. Ultimately, the international community will need to adopt a comprehensive framework convention that addresses both intentional and unintentional means of introduction of invasive species, and that incorporates established principles of international law and effective regulatory design. This regime would facilitate effective risk assessment and information sharing, establish specific precautionary controls on potential vectors, and encourage timely responses to new invasions. It is only through these fundamental steps that the cataclysmic reshuffling of the world's species can be halted.

¹⁴⁸ See Articles of Agreement of the International Monetary Fund art. XII §§ 1-5, Dec. 27, 1945, 60 Stat. 1401, 2 U.N.T.S. 39.