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Caitlin Morray

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AN ILL WIND: AIR POLLUTION IN THE PEARL RIVER DELTA

Caitlin Morray[†]

Abstract: Marine transport is an efficient and cost-effective way to transport goods around the world; at least ninety percent of all global trade is served by the shipping industry and shipping trade is expected to triple in the next two decades. However, because of the poor quality of the fuel used by the shipping industry, ocean-going ships disproportionately impact the environment and human health. The shipping industry is presently estimated to generate almost thirty percent of the world's smog-forming nitrogen oxide emissions and nearly ten percent of sulfur dioxide emissions that cause acid rain and deadly fine particles. The Pearl River Delta on the Southern coast of China is home to some of the busiest sea ports in the world, including the ports of Hong Kong and East and West Shenzhen, and is therefore particularly vulnerable to the harmful effects of ship emissions.

The air pollution caused by ship emissions poses a serious and growing threat to the Pearl River Delta and its inhabitants, but the Chinese government has implemented very few initiatives to reduce its effects. The Chinese government must take a two-pronged approach to address the threat of ship emissions. First and most importantly, Chinese lawmakers should draft and implement national legislation that imposes emissions restrictions on ships while in and around the ports of the Pearl River Delta. Second, China should appeal to the International Maritime Organization to have the Pearl River Delta declared a Micro-Emissions Control Area, thereby significantly restricting the sulfur content of fuel permitted within the region.

I. INTRODUCTION

China's enormous population, its geographic location, and its ever-increasing influence on the global economy combine to make it one of the most important environmental actors in the world today. No region of China demonstrates this fact more plainly than the Pearl River Delta ("PRD") on the Southern coast of China.

The PRD consists of the former colonies of Hong Kong and Macau,¹ the West River Delta, the North River Delta and the East River Delta in the Guangdong Province.² The PDR covers over 110,000 square kilometers, includes fourteen counties,³ and connects the continent with the South China

[†] Juris Doctor expected in 2010, University of Washington School of Law. The author would like to thank Professor William Rodgers for his guidance, wisdom, and encouragement. The author would also like to thank the editorial staff of the *Pacific Rim Law & Policy Journal* for their support and friendship.

¹ David G. Streets et al., *Modeling Study of Air Pollution Due to the Manufacture of Export Goods in China's Pearl River Delta*, 40 ENVTL. SCI. & TECH. 2099 (2006).

² Qunyang Sun et al., *The Pearl River Delta: A World Workshop, in CHINA AS THE WORLD FACTORY 27* (Kevin Honglin Zhang ed., 2006).

³ *Id.*

Sea.⁴ In part due to its strategic location, the PRD has been the most rapidly growing economic region in the world since China began its economic reforms in 1979.⁵ Indeed, the PRD, which has been described as the “world’s workshop,”⁶ is an economic phenomenon: with a gross domestic product (GDP) in excess of \$300 billion and annual GDP growth rates exceeding ten percent in most localities,⁷ the PRD would be the world’s sixteenth largest economy and tenth leading exporter if it were a country.⁸ Industries in the PRD manufacture a wide variety of goods including electronics, clothing, toys, and cars.⁹ Nearly all of the goods manufactured in the PRD are destined for export and in the year 2002 alone, exports from the PRD reached \$113 billion, representing thirty-five percent of China’s total exports.¹⁰

Considering how many of China’s exports come from the PRD, it is not surprising that the PRD is also home to some of the busiest sea ports in the world. Since 1996, the ports of Shenzhen and Hong Kong have been among the four largest and busiest container ports in the world when measured by twenty-foot equivalent units (TEUs).¹¹ In 2006, Hong Kong managed 23,540,000 TEUs while Shenzhen processed 18,470,000 TEUs in container “throughput.”¹² Together, Hong Kong and Shenzhen accounted for nine-and-a-half percent of global container throughput.¹³ Plainly stated, the relatively small body of water surrounding the ports in the PRD sees the highest density of shipping traffic in the world.¹⁴

The PRD’s massive economic growth and the frenetic activity in its ports have led to considerable pollution of the air, water and soil in the

⁴ Bixian Mai et al., *Distribution of Polycyclic Aromatic Hydrocarbons in the Coastal Region of Macao, China: Assessment of Input Sources and Transport Pathways Using Compositional Analysis*, 37 ENVTL. SCIENCE SCI. & TECH. 4855, 4856 (2003).

⁵ Sun, *supra* note 2, at 27.

⁶ *Id.* at 50.

⁷ Si-ming Li & Koon-Kwai Wong, *Urbanization and Pearl River Delta’s Changing Aquatic Environment*, THE CENTRE FOR CHINA URBAN AND REGIONAL STUDIES (OCCASIONAL PAPER NO. 54), Feb. 2005, at 5-7.

⁸ Streets, *supra* note 1, at 2099.

⁹ *Id.*

¹⁰ *Id.*

¹¹ Veronica Galbraith, *Hong Kong & Shenzhen Green Harbours: Reducing Marine-Related Emissions in the Pearl River Delta*, CIVIC EXCHANGE, March 2008, available at http://www.mardep.gov.hk/en/publication/pressrel/pdf/wps_civic_exchange.pdf; a twenty-foot equivalent unit is the standard unit for counting containers of various capacities and for describing the capacities of container ships or terminals; one 20 foot shipping container equals 1 TEU. Glossary of Statistical Terms, OECD, June 19, 2002, <http://stats.oecd.org/glossary/detail.asp?ID=4313> (last visited March 13, 2009).

¹² Galbraith, *supra* note 11.

¹³ *Id.*

¹⁴ *Id.*

region.¹⁵ Of particular concern are the significant quantities of harmful emissions being released into the atmosphere by the factories, power plants, and associated transportation systems.¹⁶ By way of comparison, fine particulate matter¹⁷ in the PRD has been measured at levels nearly double the U.S. National Ambient Air Quality Standard,¹⁸ which results in reduced visibility in the region.¹⁹ Although a considerable amount of air pollution is caused by the manufacturing industry and by the power plants that support it, the ships that transport manufactured goods in and out of the PRD emit an estimated ten to forty percent of all harmful greenhouse gases in the region.²⁰

Until relatively recently, little attention was paid to the effects of ship emissions on the environment.²¹ In the last decade, however, international organizations have identified the shipping and port industries as significant sources of air pollution throughout the world.²² Marine transport is an efficient and cost-effective way to transport goods around the world and as such, at least ninety percent of all global trade is served by the shipping industry.²³ Shipping trade is expected to triple in the next two decades and will likely become an even greater source of air pollution.²⁴

¹⁵ Streets, *supra* note 1, at 2099.

¹⁶ *Id.*

¹⁷ Particulate matter is the term used to describe particles such as dust, dirt, soot, smoke, and liquid droplets that are found in the air. Some particles are large or dark enough to be seen as soot or smoke while others are so small that they can only be detected with an electron microscope. Particles measuring less than 2.5 micrometers in diameter are referred to as “fine” particles and are believed to pose the greatest health risks because their small size (approximately 1/30th the average width of a human hair) allows them to lodge deeply in the lungs. *Fine Particle Designations*, U.S. ENVIRONMENTAL PROTECTION AGENCY, Dec. 22, 2008, <http://www.epa.gov/pmdesignations/faq.htm#0> (last visited Feb. 19, 2008).

¹⁸ The National Ambient Air Quality Standards are standards for pollutants considered harmful to public health and the environment which are set by the Clean Air Act. The Clean Air Act established two types of national air quality standards. First, it established primary standards which set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. The Clean Air Act also established secondary standards, which set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. *Air and Radiation: National Ambient Air Quality Standards*, U.S. ENVIRONMENTAL PROTECTION AGENCY, (2009) available at <http://www.epa.gov/air/criteria.html>.

¹⁹ Streets, *supra* note 1, at 2099.

²⁰ *Id.*

²¹ Rachel Oliver, Shipping’s Impact on the Air, CNN.COM, Jan. 20, 2008, <http://www.cnn.com/2008/WORLD/asiapcf/01/20/eco.about.ships/index.html> (last visited Jan. 10, 2009).

²² GREEN HARBOUR WORKSHOPS 2008: WORKSHOPS SUMMARY REPORT 3 (2008), http://www.civic-exchange.org/eng/upload/files/200806_gportsws.pdf, (last visited Dec. 17, 2008) [hereinafter GREEN HARBOUR].

²³ Oliver, *supra* note 21.

²⁴ Galbraith, *supra* note 11.

Because of the poor quality of the fuel²⁵ used by the shipping industry, ocean-going ships have a disproportionately large impact on the environment and human health.²⁶ Ocean-going ships are estimated to consume at least two billion barrels of oil per year;²⁷ they generate almost thirty percent of the world's smog-forming nitrogen oxide emissions,²⁸ nearly ten percent of sulfur dioxide emissions that cause acid rain²⁹ and create particulate matter,³⁰ and release as much as 1.2 billion tons of carbon dioxide per year.³¹ Putting those statistics into perspective, in one hour, a single ship entering port generates air pollution equivalent to that of 350,000 cars.³² In 2001 alone, the shipping industry used as much as 280 million tons of fuel (twice as much as the entire aviation industry used).³³

The PRD is home to some of the busiest ports in the world, including the ports of Hong Kong and East and West Shenzhen, and its inhabitants are particularly vulnerable to the harmful effects of ship emissions.³⁴ For example, an estimated 3.8 million people live near the Hong Kong port and are directly affected by shipping and port-related emissions.³⁵ In recent years, health experts have called increasing attention to the connection between ship emissions and the rising incidence of heart and lung disease.³⁶ Studies sponsored by the World Bank linked sulfur dioxide and total suspended particulates in large Chinese cities to increased incidences of

²⁵ Ocean-going ships typically run on bunker fuel, an inexpensive yet dirty diesel fuel comprised of residue from the production of higher grade fuels; bunker fuel contains significant concentrations of contaminants that have been banned from use in most other industrial and consumer applications and pose serious threats to the environment and human health. *Bunker Fuels*, LIQUID MINERALS GROUP, <http://www.liquidminerals.com/framebf.htm> (last visited March 13, 2009).

²⁶ Galbraith, *supra* note 11.

²⁷ Oliver, *supra* note 21.

²⁸ *Groups Call for Big Cuts in Shipping Industry Air Pollution*, CLEAN AIR TASK FORCE, April 3, 2006, http://www.catf.us/press_room/20060303-IMOrelease306FINAL.pdf (last visited Dec. 17, 2008) [hereinafter *Groups*].

²⁹ Acid rain is a broad term used to refer to a mixture of wet and dry deposited material from the atmosphere containing higher than normal amounts of nitric and sulfuric acids. The chemical forerunners of acid rain formation result from both natural sources, such as volcanoes and decaying vegetation, and human-made sources such as sulfur dioxide and nitrogen oxides emissions. Acid rain causes acidification of lakes and streams, contributes to the damage of trees at high elevations and many sensitive forest soils, and accelerates the decay of building materials and paints. *What is Acid Rain?*, U.S. ENVIRONMENTAL PROTECTION AGENCY, June 8, 2007, <http://www.epa.gov/acidrain/what/index.html> (last visited Feb. 19, 2009).

³⁰ *Groups*, *supra* note 28.

³¹ Oliver, *supra* note 21.

³² *Groups*, *supra* note 28.

³³ Oliver, *supra* note 21.

³⁴ Galbraith, *supra* note 11.

³⁵ *Id.*

³⁶ *Id.*

bronchitis and other pulmonary disorders.³⁷ Similarly, a report produced by the University of Delaware estimated that at least 60,000 people throughout the world die each year from lung or heart failure caused by shipping-produced fine particulate matter.³⁸ The number of ship emission-related deaths is expected to increase forty percent by 2012 if immediate action is not taken.³⁹ Ship emissions also contribute on a more general level to China's already significant air pollution, which is linked to roughly 178,000 premature deaths in the nation each year.⁴⁰ In spite of these alarming statistics, the Chinese government has implemented very few initiatives in the PRD to reduce the effect of ship emissions on the public health⁴¹ and there has been little coordinated effort among the sea ports in the region to reduce ship emissions and address their contribution to air pollution.⁴²

This Comment argues that the existing framework of environmental law in China is inadequate to address the increasingly serious problem of air pollution in the PRD caused by ship emissions. Part II of this Comment provides a brief explanation of the political reform that has taken place in China over the course of the last thirty years and discusses how this reform has contributed to air pollution in the PRD. Part III examines the environmental law framework in China and analyzes how effectively it addresses the problem of air pollution caused by ship emissions, while Part IV examines the institutional obstacles that encumber the environmental law framework. Finally, Part V makes two recommendations for how the existing legal framework should be amended to better address the problem of air pollution caused by ship emissions: first, the Chinese government should draft and implement legislation that imposes emissions regulations on ships entering and departing from ports in the PRD; second, the Chinese government should appeal to the International Maritime Organization, an agency of the United Nations,⁴³ to have the PRD declared a Micro-

³⁷ Xiaoying Ma & Leonard Ortolano, *Environmental Regulation in China: Institutions, Enforcement, and Compliance* 3 (2000).

³⁸ Oliver, *supra* note 21.

³⁹ *Breakthrough on Shipping Fuels as IMO Working Group Recommends Sulphur Cap*, European Federation for Transport and Environment, April 16, 2008, <http://www.transportenvironment.org/News/2008/4/Breakthrough-on-shipping-fuels-as-IMO-working-group-recommends-sulphur-cap/> (last visited Dec. 17, 2008) [hereinafter *Breakthrough*].

⁴⁰ Ma & Ortolano, *supra* note 37, at 3.

⁴¹ Galbraith, *supra* note 11.

⁴² Green Harbour, *supra* note 22.

⁴³ *About IMO: Introduction to IMO*, International Maritime Organization, <http://www.imo.org/> (follow "About IMO" hyperlink) (last visited Jan. 27, 2009) [hereinafter *IMO*].

Emissions Control Area, thereby significantly limiting the sulfur content of ships' fuel while traveling in the region.⁴⁴

II. ECONOMIC REFORM IN CHINA CONTRIBUTED SIGNIFICANTLY TO ENVIRONMENTAL DEGRADATION IN THE PRD

An examination of China's history reveals a considerable understanding of the need for ecological balance, rooted both in the efforts of the Chinese people to survive and prosper in agrarian and pastoral societies,⁴⁵ and in Chinese religious and philosophical traditions that stress the need for people to live in harmony with nature.⁴⁶ In spite of this obvious concern for the environment within Chinese cultural traditions, Chinese civilization seems to have been guided less by this awareness and more by its need to satisfy the basic economic needs of its people.⁴⁷

A. *The Chinese Government's Focus on Economic Growth Eclipsed Environmental Concerns*

In the 1950s, China borrowed from the Soviet Union the Stalinist "big-push development strategy" that emphasized heavy industry to the "virtual exclusion of more environmentally benign sectors of the economy."⁴⁸ China introduced a set of environmental standards on a provisional basis in 1956 and then promulgated these standards on a revised basis in 1962, but these standards proved inadequate and were largely ignored.⁴⁹

The Third Plenary Session of the Eleventh Central Committee of the Communist Party of China, held in 1978, was a turning point in the history of China's economic development that would prove to have a lasting impact on the health of the environment.⁵⁰ The Communist Party decided at the meeting, among other things, to shift the focus of the Party's work to socialist modernization and it established a policy of reform and

⁴⁴ In Micro-Emissions Control Areas, sulfur content in fuel is restricted to 0.1% 24 nautical miles from the baseline and 100 nautical miles along the coast. *BLG Sub-Committee Agrees Technical Proposals for Reduction of Air Pollution From Ships*, INTERNATIONAL MARITIME ORGANIZATION, February 12, 2008, http://www.imo.org/About/mainframe.asp?topic_id=1709&doc_id=9015 (last visited Feb. 19, 2009).

⁴⁵ An agrarian society is one that grows crops while a pastoral society is one that relies mainly on domestic livestock. Most societies have mixed agrarian and pastoral economies. ANTHONY GIDDENS & SIMON GRIFFITHS, *SOCIOLOGY* 38 (2006).

⁴⁶ LESTER ROSS & MITCHELL A. SILK, *ENVIRONMENTAL LAW AND POLICY IN THE PEOPLE'S REPUBLIC OF CHINA* 1, 2 (1987).

⁴⁷ *Id.*

⁴⁸ *Id.*

⁴⁹ *Id.*

⁵⁰ Qunyang Sun, *supra* note 2, at 28-29.

international engagement.⁵¹ Accordingly, in 1978, China implemented economic reform that was designed to convert a highly centralized economy into a more market-oriented economy.⁵² This decision paved the way for the great economic reform that took place over the course of the next thirty years. During this period of reform, the Chinese government curtailed the role of centralized planning and embraced a laissez-faire approach⁵³ to governing.⁵⁴ This change greatly affected both China's economic development and the health of its environment.

B. China's Laissez-Faire Approach to Governing Resulted in Environmental Degradation

The economic objectives of China's reform program were remarkably grand. For example, the economic reforms of Communist Party leader Deng Xiaoping aimed to quadruple China's gross national product during the last two decades of the twentieth century.⁵⁵ Throughout the 1980s the actual growth rate of China's GDP was close to ten percent a year, and it has continued to grow at an average annual rate of more than ten percent since the early 1990s.⁵⁶ This rapid economic development has led to the sacrifice of China's natural resources in the name of commercial advancement.⁵⁷

Following its embrace of a laissez-faire approach in the 1980s, China loosened its "top-down" regulation of land use and, as a result, socially efficient⁵⁸ environmental standards were almost wholly neglected.⁵⁹ Summarizing the relationship between China's economic reform and the degradation of its environment, the World Bank wrote:

The interrelationships between environmental issues and economic growth and development are central to any discussion of environmental matters. The structure of the economy, and

⁵¹ *Id.*

⁵² Bryan Bachner, *Hong Kong and the Unprecedented Transfer of Sovereignty: Conserving a Legal Heritage in Hong: Environmental Regulation After 1997*, 19 LOY. L.A. INT'L & COMP. L. REV. 363, 383 (1997).

⁵³ A doctrine that opposes governmental regulation of commerce beyond what is minimally required and instead advocates for an economic system that is driven by free market forces.

⁵⁴ Bryan Bachner, *Regulating Pollution in the People's Republic of China: An Analysis of the Enforcement of Environmental Law*, 7 COLO. J. INT'L ENVTL. L. & POL'Y 373, 374 (1996).

⁵⁵ Michael A. Gheleta, *Sustaining the Giant Dragon: Rational Use and Protection of China's Water Resources in the Twenty-First Century*, 9 COLO. J. INT'L ENVTL. L. & POL'Y 221, 222-223 (1998).

⁵⁶ *Id.*

⁵⁷ Bachner, *supra* note 54, at 376.

⁵⁸ Environmental standards are considered socially efficient when the marginal costs of the pollution equal the marginal social benefits of the activity creating the pollution. Bachner, *supra* note 52, at 371.

⁵⁹ Bachner, *supra* note 54, at 376, quoting the WORLD BANK, REP. No. 9669-CHA, 1 CHINA ENVIRONMENTAL STRATEGY REPORT xix (1992).

general economic policies and management, largely determine the nature of environmental problems and the framework for environmental policies and programs in any particular country. In China, the impacts of economic policies . . . have not always been conducive to sound environmental policies and management. The explosive growth of industry has been a major factor in water, air, and soil pollution, and the impact on this growth has been exacerbated by the fact that China has pursued an industrial strategy that has consistently emphasized basic heavy industrial sectors that are the worst polluters.⁶⁰

The PRD provides an excellent illustration of how China's policy of "economic growth at any cost" has had an adverse effect on the environment. Early in the period of reform, the Chinese government implemented preferential economic policies in the Guangdong and Fujian Provinces and encouraged the provinces to act boldly to develop their economies.⁶¹ The environmental cost of this economic growth has been great, however. The goods manufactured in the PRD are so attractive and inexpensive to consumers around the globe because manufacturers do not have to pay for costly pollution controls.⁶² Consequently, developed countries receive the benefits of cheap, "pollution-free goods," while the environmental damage remains in China.⁶³ Much of the economic growth in the PRD has been extremely chaotic due to the fact that different localities in the region compete with each other to attract domestic and foreign investment.⁶⁴ Additionally, the highly fragmented structure of local government in China makes it next to impossible to launch a coordinated effort to tackle environmental problems facing the region.⁶⁵ Although studies of air quality in the PRD show signs of constant and rapid deterioration, the Chinese government's prevailing concern appears to continue to be one of fostering further economic growth.⁶⁶

⁶⁰ *Id.*

⁶¹ Qunyang Sun, *supra* note 2, at 28-29.

⁶² Streets, *supra* note 1, at 2099.

⁶³ *Id.*

⁶⁴ Li & Wong, *supra* note 7, at 5-7.

⁶⁵ *Id.*

⁶⁶ *Id.*

III. CHINA'S LEGAL FRAMEWORK HAS PROVEN AN INEFFECTIVE MEANS OF COMBATING AIR POLLUTION IN THE PRD

Faced with unprecedented environmental challenges, China's lawmakers and policymakers are working to create a dynamic environmental law framework.⁶⁷ At present, this framework includes approximately twenty statutes, more than forty regulations, roughly five hundred standards, and more than six hundred other legal norm-creating documents primarily addressing pollution control and natural resource conservation.⁶⁸ Dedicated lawmakers, politicians, government officials, and industrial managers in China have worked to elevate environmental protection to the status of "national fundamental policy."⁶⁹ Despite these efforts, however, the existing environmental law framework remains an inadequate means of combating air pollution in the PRD, in part because the framework does not contain a single law that specifically regulates ship emissions. On a more general level, policymakers in China admit that enforcement of environmental laws has been lackluster, particularly in the PRD.⁷⁰

A. *China Did Not Develop An Environmental Policy Until the 1970s*

The Chinese government did not begin serious attempts to address ever-worsening pollution until the late 1970s, well after the nation's economic growth and industrial development had begun to take its toll on the environment. Indeed, from the founding of the People's Republic of China until the mid-1970s, the government, eager to advance modernization, did not deem it necessary to develop a comprehensive environmental policy.⁷¹ In 1972, however, China participated in the United Nations Conference on Man and the Environment held in Stockholm.⁷² China's participation in the conference marked the beginning of a new understanding of its environmental problems and potential solutions.⁷³ In 1974, the State Council, China's highest administrative body,⁷⁴ established an Office of

⁶⁷ Richard J. Ferris Jr., *Reaching Out to the Rule of Law: China's Continuing Efforts to Develop an Effective Environmental Law Regime*, 11 WM. & MARY BILL OF RTS. J. 569, 582 (2003).

⁶⁸ *Id.*

⁶⁹ Eduard B. Vermeer, *Industrial Pollution in China and Remedial Policies*, 156 THE CHINA QUARTERLY (SPECIAL ISSUE) 952, 953 (1998).

⁷⁰ Bachner, *supra* note 54, at 376.

⁷¹ *Id.* at 377.

⁷² ROSS, *supra* note 46, at 3.

⁷³ ELIZABETH ECONOMY, *THE RIVER RUNS BLACK: THE ENVIRONMENTAL CHALLENGE TO CHINA'S FUTURE* 93 (2005).

⁷⁴ Ferris, *supra* note 67, at 577.

Environmental Protection.⁷⁵ The Office of Environmental Protection was placed under the guidance of the Leading Small Group on Environmental Protection,⁷⁶ a top-level inter-ministerial group charged with studying environmental protection issues.⁷⁷ The Leading Small Group on Environmental Protection only met twice in the next nine years,⁷⁸ and with the exception of several minor pilot projects, progress on issues of environmental protection throughout the mid 1970s was slow.⁷⁹

Efforts to address environmental degradation got off to a stilted beginning in the early 1970s. By the late 1970s, however, Communist Party leader Deng Xiaoping initiated the reform process and began the decentralization of China's economy. This process was shaped by the general acknowledgement that the former centralized economy had grossly neglected environmental protection.⁸⁰ For the first time in the short history of the People's Republic of China, policymakers incorporated environmental protection into the State Economic and Social Development Plan⁸¹ and determined that implementation of economic development and environmental protection policy would continue in tandem.⁸² The national government established an environmental protection bureaucracy and introduced new environmental protection and natural resource laws.⁸³ At the provincial and municipal levels, lawmakers established a regulatory framework and institutional infrastructure designed to foster environmental protection.⁸⁴ A burgeoning environmental awareness in the nation had taken root.

B. China's Existing Environmental Law Framework Does Not Sufficiently Restrict Sulfur Emissions or Regulate Ship Emissions

In response to its serious and worsening environmental problems, China created a vast network of environmental agencies and an expansive regime of statutes, regulations, and legal norm-creating documents. Despite these considerable efforts to combat environmental degradation, however, there are very few laws in China that comprehensively address air pollution

⁷⁵ ROSS, *supra* note 46, at 3.

⁷⁶ *Id.*

⁷⁷ ECONOMY, *supra* note 73, at 95.

⁷⁸ *Id.*

⁷⁹ ROSS, *supra* note 46, at 3.

⁸⁰ Bachner, *supra* note 54, at 377.

⁸¹ *Id.*

⁸² *Id.*

⁸³ *Id.*

⁸⁴ *Id.*

and not a single law that regulates ship emissions. As such, China's existing environmental law framework is ill-equipped to address air pollution in the PRD. Environmental government agencies in China will be unable to improve the declining air quality in the PRD unless laws are promulgated that regulate and restrict specific sources of pollution, such as ship emissions.

Contrary to popular opinion, since the late 1970s, the Chinese government has not been insensitive to its ever-worsening environmental problems. Indeed, the 1978 Constitution of the People's Republic of China⁸⁵ laid the foundation for the establishment of China's current environmental legal system.⁸⁶ When the Constitution was revised in 1982, it included much more comprehensive and concrete environmental provisions than the 1978 Constitution.⁸⁷ In particular, the 1982 Constitution clarified the government's duty to protect natural resources and the environment in Article 26: "The [S]tate protects and improves the living environment and the ecological environment and prevents pollution and other public nuisances."⁸⁸ This change signaled that the Chinese government was ready to fulfill the commitment to environmental protection that it had initiated three years prior when the National People's Congress ("NPC") Standing Committee enacted China's first basic or foundational environmental law, the Environmental Protection Law ("EPL").⁸⁹

The EPL was crafted as a "framework" environmental law and lays forth the fundamental principles for environmental protection that are often reflected in subsequent laws.⁹⁰ The EPL provides a legislative basis for environmental protection,⁹¹ requiring the adoption of policies favorable to environmental protection that synchronize environmental protection with economic construction and social development.⁹² Since the enactment of the EPL, the NPC has adopted roughly twenty statutes primarily addressing pollution control, natural resource conservation, and product stewardship, strikingly few of which pertain to air pollution.⁹³

In addition to the EPL, since 1979, the central government has created eight major pollution control programs and established over one hundred

⁸⁵ XIAN FA (1978) (P.R.C.).

⁸⁶ Gheleta, *supra* note 55, at 256.

⁸⁷ *Id.*

⁸⁸ XIAN FA art. 26, § 1 (1982) (P.R.C.).

⁸⁹ Gheleta, *supra* note 55, at 256.

⁹⁰ Ferris, *supra* note 67, at 582.

⁹¹ MA & ORTOLANO, *supra* note 37, at 16.

⁹² Gheleta, *supra* note 55, at 257.

⁹³ Ferris, *supra* note 67, at 583.

environmental laws and regulations.⁹⁴ In 1988, China established a national agency known as the National Environmental Protection Agency (“NEPA”) to implement these new pollution control programs.⁹⁵ NEPA was originally given the rank of vice-ministry, meaning that it could issue binding orders to government units with ranks below the vice-ministerial level.⁹⁶ As part of a major restructuring of the central government in 1998, the agency was given full ministerial rank and renamed the State Environmental Protection Agency (“SEPA”).⁹⁷ SEPA is responsible for administering environmental protection policy under the State Council.⁹⁸ The principal role of SEPA is to prevent and control pollution, supervise and manage environmental protection, protect and improve the living environment, and promote sustainable economic and social development.⁹⁹

SEPA’s major success in the area of air pollution control came when it persuaded the Chinese government to begin controlling sulfur oxide emissions.¹⁰⁰ By the late 1990s, ambient sulfur oxide concentrations in densely populated urban areas were exceedingly high.¹⁰¹ In 1998, supported by studies and expert opinion from top Chinese universities and research institutions, SEPA helped rally support for new sulfur-control legislation that sought to limit ambient sulfur oxide pollution and halt the increase of acid rain.¹⁰² The program became known as the two control zones (“TCZs”) plan because of its geographical coverage of 1) cities with high ambient levels of sulfur oxide that are subject to “ambient concentration compliance requirements”, and 2) regions with significant acidification problems that are required to reduce sulfur oxide emissions, thereby decreasing the incidence of acid rain.¹⁰³

At the time the legislation was drafted, most evidence of the harmful effects of sulfur oxide on human health and the damage caused by acid rain was anecdotal; there was no way to systematically assess the level of ambient sulfur oxide or the impact of acid rain.¹⁰⁴ Nonetheless, SEPA persuaded the Chinese government to control sulfur oxide emissions, relying

⁹⁴ MA & ORTOLANO, *supra* note 37, at 8.

⁹⁵ *Id.*

⁹⁶ *Id.* at 79.

⁹⁷ *Id.* at 80.

⁹⁸ Bachner, *supra* note 54, at 379.

⁹⁹ *Id.*

¹⁰⁰ Sarah K. Guttikunda et al., *Programs to Control Air Pollution and Acid Rain*, in *URBANIZATION, ENERGY, AND AIR POLLUTION IN CHINA: THE CHALLENGES AHEAD* 73, 77 (2004).

¹⁰¹ *Id.* at 76.

¹⁰² *Id.* at 76-77.

¹⁰³ *Id.* at 75-76.

¹⁰⁴ *Id.* at 77.

on descriptions of potential human health impacts and damage from acid rain on manmade structures, forests, bodies of water, and above all, agricultural production.¹⁰⁵ In passing the TCZs legislation, China took a bold step toward controlling sulfur emissions.¹⁰⁶ That being said, meeting the targets established by the law has proven difficult.¹⁰⁷

Contributing to this legal regime are China's obligations under more than eighty bilateral and multilateral environmental treaties.¹⁰⁸ For example, on September 3, 2002, Premier Zhu Rongji announced at the World Summit on Sustainable Development in Johannesburg¹⁰⁹ that China was moving forward with ratification of the Kyoto Protocol to the Framework Convention on Climate Change, reinforcing China's commitment to the reduction of greenhouse gases.¹¹⁰ As a non-Annex I¹¹¹ country, however, China is not bound to any greenhouse gas emission limits or carbon abatement measures during the first control period¹¹² of the Kyoto Protocol, a fact that renders its ratification of the Kyoto Protocol merely symbolic.

Finally, in acknowledgment of the serious threat posed to the environment by ship emissions, China ratified Annex VI of the International Convention for the Prevention of Pollution from Ships (the "MARPOL Convention"—MARPOL is an abbreviation for "marine pollution")¹¹³ on

¹⁰⁵ *Id.*

¹⁰⁶ *Id.* at 76.

¹⁰⁷ *Id.* at 77.

¹⁰⁸ Ferris, *supra* note 67, at 581.

¹⁰⁹ Often called Earth Summit II, this conference was attended by representatives from almost every major country (the United States being the most notable exception) and nearly 8,000 non-governmental organizations, and established a series of calls for action and timetables for addressing various environmental problems. *World Summit on Sustainable Development*, HEINRICH BÖLL FOUNDATION, Nov. 25, 2003, <http://www.worldsummit2002.org/> (last visited Feb. 19, 2009).

¹¹⁰ Ferris, *supra* note 67, at 581.

¹¹¹ Non-Annex I countries are non-industrialized and developing nations that do not have binding emission reduction targets for the first period (2008-2012) of the Kyoto Protocol and are not allowed to participate in the international emission trading market. These countries are recognized by the Framework Convention on Climate Change by the Convention as being either especially vulnerable to the adverse impacts of climate change (e.g. countries with low-lying coastal areas) or as being vulnerable to the potential economic impacts of climate change response measures (e.g. countries that rely heavily on income from fossil fuel production and commerce). *Parties & Observers*, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int/parties_and_observers/items/2704.php (last visited March 13, 2009).

¹¹² The major feature of the Kyoto Protocol is that it sets binding targets for thirty-seven industrialized countries and the European community for reducing greenhouse gas emissions. These target reductions amount to an average reduction of five percent against 1990 greenhouse gas emission levels over the first control period, which is five-year period beginning in 2008 and ending in 2012. Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 10, 1997, 37 I.L.M. 22 (1998) available at http://unfccc.int/kyoto_protocol/items/2830.php.

¹¹³ International Convention for the Prevention of Pollution from Ships, Nov. 2, 1973, 12 ILM 1319 (1973), *as amended* Feb. 17, 1978, S. EXEC. DOC. E, 95-1 (1978), 1340 UNTS 184, available at

June 1, 2006.¹¹⁴ In June of 2008, Hong Kong, whose port is a major source of pollution in the PRD, also ratified the convention.¹¹⁵ The MARPOL Convention was adopted on November 2, 1973, at the International Maritime Organization¹¹⁶ and is arguably the most important international convention regulating and preventing marine pollution by ships.¹¹⁷ Annex VI of MARPOL, which was adopted in September of 1997 and entered into force on May 19, 2005, limits the amount of sulfur dioxide and nitrogen oxide ships can emit and also prohibits the intentional release of emissions that deplete ozone.¹¹⁸ Specifically, Annex VI requires that ocean-going ships burn fuel with a sulfur content of 4.5% or less.¹¹⁹ Unfortunately these restrictions are insufficiently restrictive and effectively meaningless because the global average of sulfur content of the fuel burned by ocean-going ships is already well below 4.5%.¹²⁰ In 2007, for example, the global average of sulfur content of the fuel burned by ocean-going ships was 2.4%.¹²¹ Although China and Hong Kong's ratification of Annex VI was a crucial and necessary first step towards the effective regulation of ship emissions in the PRD, ratification alone is inadequate due in part to the fact that the restrictions established by the MARPOL Convention are insufficiently restrictive.

IV. INSTITUTIONAL OBSTACLES HINDER EFFORTS TO STRENGTHEN THE ENVIRONMENTAL LAW FRAMEWORK

China's environmental law framework has proven an ineffective means of combating air pollution in the PRD not only because of the weaknesses within the framework itself, but also because the framework

http://www.imo.org/home.asp?topic_id=1709&doc_id=9753 (last visited Jan. 27, 2009) [hereinafter *MARPOL*].

¹¹⁴ Galbraith, *supra* note 11.

¹¹⁵ *Hong Kong Port on Board with MARPOL Annex VI*, POTEN & PARTNERS, June 16, 2008, <http://www.poten.com/PubHeadlines.aspx?id=10906> (last visited March 13, 2009).

¹¹⁶ *IMO*, *supra* note 43.

¹¹⁷ The 1973 MARPOL Convention had not yet entered into force in 1978 when the "Protocol of 1978 relating to the 1973 International Convention for the Prevention of Pollution from Ships" ("1978 MARPOL Protocol") was adopted. The 1978 MARPOL Protocol was adopted at a 1978 Conference on Tanker Safety and Pollution Prevention that was held in response to a slew of tanker spills in 1976 and 1977. Because the 1973 MARPOL Convention had not yet entered into effect, the 1978 MARPOL Protocol absorbed the parent Convention. The combined convention is known as the "International Convention for the Prevention of Marine Pollution from Ships, 1973, as Modified by the Protocol of 1978 Relating Thereto" ("MARPOL 73/78"), and it entered into force on October 2, 2 October 1983. *Id.*

¹¹⁸ Galbraith, *supra* note 11.

¹¹⁹ *MARPOL*, *supra* note 113.

¹²⁰ *Breakthrough*, *supra* note 39.

¹²¹ The sulfur content of residual fuel measured for 2003, 2004, and 2005 gave a three year rolling average for the period of 2.7%. The rolling average for 2002-2004 was 2.67%. *Id.*

must contend with significant institutional obstacles. Coordinated legal efforts to tackle environmental problems in the PRD are encumbered by China's complex system of lawmaking and the lawmakers' tendency to draft aspirational laws. Furthermore, there are limited resources available in China to invest in environmental controls, and economic development ultimately remains the nation's and the PRD's top priority.

A. *China's Complex System of Lawmaking Thwarts Coordinated Efforts to Address Air Pollution*

The implementation of effective environmental laws in China has been stymied by the nation's complex system of lawmaking, which divides authority among many legislative and administrative bodies at the various levels of government. To begin, the Constitution of the People's Republic of China identifies the primary institutions responsible for the enactment or promulgation of laws or legal documents.¹²² The Constitution also recognizes the National People's Congress as the highest-level legislative body in China.¹²³ The NPC is empowered by the Constitution to enact and amend "fundamental" national statutes,¹²⁴ while the Standing Committee within the NPC is authorized to enact and amend all national laws with the exception of fundamental national statutes.¹²⁵

In an effort to streamline and reinforce the lawmaking process,¹²⁶ the NPC established nine advisory committees, which are responsible for drafting national laws and overseeing implementation of these laws.¹²⁷ The committee with primary responsibility for environmental protection matters is called the Environmental Protection and Natural Resources Conservation Committee (the "EPC").¹²⁸ The EPC has a number of roles, including the promulgation of environmental and resource laws and the examination of proposals related to the environment and protection of natural resources.¹²⁹

While the NPC is the highest-level legislative body in China, the State Council beneath the NPC is China's highest-level administrative body and the executive authority of the NPC.¹³⁰ The State Council's powers include the authority to: 1) approve and promulgate national administrative

¹²² XIAN FA arts. 58, 62, 64, 67, 89, 99, 100, 116 (1982) (P.R.C.).

¹²³ Ferris, *supra* note 67, at 576.

¹²⁴ *Id.*

¹²⁵ *Id.*

¹²⁶ *Id.* at 577.

¹²⁷ *Id.*

¹²⁸ *Id.*

¹²⁹ Bachner, *supra* note 54, at 578-79.

¹³⁰ Ferris, *supra* note 67, at 578.

regulations, 2) issue decisions and orders in accordance with the Constitution and other laws, 3) review legislative proposals for referral to the NPC or its Standing Committee, and 4) oversee the work of its underlying ministries and commissions.¹³¹ Below the State Council are the various State Council ministries and other administrative departments.¹³² These ministries and departments include government bodies with responsibilities that include or affect environmental protection.¹³³ The administrative departments are permitted to create “ministerial regulations” within their areas of expertise.¹³⁴

Provincial people’s congresses (and their standing committees) represent yet another facet of the lawmaking system in China. These provincial people’s congresses may issue local regulations so long as they do not contravene the Constitution, applicable national laws, or administrative and ministerial regulations.¹³⁵ Four of China’s municipalities, Beijing, Chongqing, Shanghai, and Tianjin, have lawmaking powers corresponding to those of provincial governments.¹³⁶

Finally, at the bottom of the government structure, are the municipal people’s congresses. Operating at the local government level, these congresses may promulgate local regulations to supplement or implement national and provincial laws as well as administrative regulations.¹³⁷ These laws are subject to restrictions similar to those at the provincial level, except that these regulations must not contravene regulations issued by the people’s congress of the province in which the municipal government is situated.¹³⁸ Municipal people’s congresses require approval from their provincial people’s congress for draft municipal regulations before promulgating those regulations.¹³⁹

This highly fragmented system of lawmaking renders coordinated legal efforts to address environmental problems in the PRD almost impossible.¹⁴⁰ Environmental laws in China are implemented through a *de facto* form of federalism: National laws provide a framework for the administration of environmental protection, but a great deal of enforcement

¹³¹ *Id.*

¹³² *Id.*

¹³³ *Id.*

¹³⁴ *Id.* at 579.

¹³⁵ Ferris, *supra* note 67, at 579.

¹³⁶ *Id.*

¹³⁷ *Id.* at 579-80.

¹³⁸ *Id.* at 580.

¹³⁹ *Id.*

¹⁴⁰ Li & Wong, *supra* note 7, at 5-7.

authority has been delegated to the regional environmental authorities.¹⁴¹ Although allowing local administrators to tailor their environmental programs to their local needs appears advantageous, the approach has many practical disadvantages.¹⁴² For example, central authorities, without knowledge of local needs or values, may impose standards that local authorities consider too costly to enforce.¹⁴³ Additionally, under pressure from central planners for a profitable economic climate, local planners may seek to improve economic output by sacrificing environmental standards.¹⁴⁴ Although very little empirical research has been done on the structural tensions underlying this *de facto* federal system, clearly it has been difficult to attain a balance between central and provincial authority.¹⁴⁵

Additionally, local government officials are often extremely sensitive to potential interventions by national government authorities that could contravene their decisions.¹⁴⁶ There are two primary reasons for this sensitivity. First, provincial governors and municipal mayors appoint the directors of their local environmental protection bureaus (“EPBs”); if a governor or mayor has supported a particular project that is later hindered or halted by national government intervention, the EPB official responsible for the project is likely to suffer political or professional retribution as a result.¹⁴⁷ Second, national government intervention in a local environmental matter is often viewed as a “failure” on the part of the EPB officials involved.¹⁴⁸ Even if not viewed as an outright failure on the part of the EPB official, such an intervention is often viewed as, in the words of one local environmental official, “a bitter root to swallow.”¹⁴⁹

B. The Drafting of Aspirational Laws and the Lack of a Technical Infrastructure Render Environmental Laws Ineffective

Compliance with Chinese environmental laws often requires access to sophisticated infrastructure that does not yet exist, or does not exist in sufficient quantity and quality.¹⁵⁰ For example, the Law on Prevention of

¹⁴¹ Bachner, *supra* note 54, at 383.

¹⁴² *Id.*

¹⁴³ *Id.*

¹⁴⁴ *Id.*

¹⁴⁵ *See id.* at 384.

¹⁴⁶ Ferris, *supra* note 67, at 595.

¹⁴⁷ *Id.*

¹⁴⁸ *Id.*

¹⁴⁹ *Id.*

¹⁵⁰ *Id.* at 599.

Environmental Pollution Caused by Solid Waste¹⁵¹ requires management of hazardous wastes from the generation to disposal of the wastes.¹⁵² There are very few waste facilities in China, however, that can process such wastes in an environmentally responsible fashion.¹⁵³ Thus, the law disregards the immediate practicability of waste disposal in favor of environmentally attractive targets that are largely unattainable with the existing infrastructure or technology.¹⁵⁴ This illustrates the “aspirational” approach taken to the drafting of environmental laws in China.¹⁵⁵ The gap between the environmental laws and the government’s ability to effectively implement them renders the laws more or less useless.¹⁵⁶ Despite the fact that lawmakers are aware of the limitations of this drafting approach, they are often motivated to promulgate new laws rather than to address the inefficacy of existing laws.¹⁵⁷ Under the present regime of government promotion in China, the development of new laws provides a more easily identifiable sign of accomplishment than the improved implementation of existing laws.¹⁵⁸

C. *China Has Limited Resources Available for the Monitoring and Management of Air Pollution in the PRD*

There are limited resources to invest in environmental control in China.¹⁵⁹ At both the national and local levels of government, policy decisions necessarily involve not only balancing GDP growth and environmental protection, but also stretching the finite resources that are available to address concerns about pollution of the air, water, and soil.¹⁶⁰ Additionally, institutional capacity for managing air pollution in China is under-developed; most local environmental agencies simply do not have sufficient technological capacity to monitor and regulate sulfur emissions.¹⁶¹ Nor are there a sufficient number of trained professionals to adequately staff the environmental institutions. For example, environmental lawyers in

¹⁵¹ Law on Prevention of Environmental Pollution Caused by Solid Waste (promulgated by the Standing Comm. Nat’l People’s Cong., Oct. 30, 1995, effective April 1, 1996), translated in ASIAN LEGAL INFORMATION INSTITUTE (P.R.C.), available at <http://www.asianlii.org/cn/legis/cen/laws/poepcbsw597/>.

¹⁵² Ferris, *supra* note 67, at 599.

¹⁵³ *Id.*

¹⁵⁴ *Id.*

¹⁵⁵ *Id.*

¹⁵⁶ *Id.* at 600.

¹⁵⁷ Ferris, *supra* note 67, at 600.

¹⁵⁸ *Id.*

¹⁵⁹ Guttikunda, *supra* note 100, at 79.

¹⁶⁰ *Id.*

¹⁶¹ *Id.*

China are in short supply.¹⁶² As of 2003, only five out of the fourteen officials staffing the SEPA Law and Policy Department had earned law degrees.¹⁶³ Individuals with expertise in environmental law are typically associated with academic institutions or government organizations and as such, there are very few formally trained lawyers in the legal departments of government environmental institutions.¹⁶⁴

D. *Economic Development Remains the PRD's Top Priority*

Despite the PRD's expressed commitment to achieving sustainable development, the goal of balancing economic development and environmental protection remains elusive.¹⁶⁵ China has stressed that environmental policies cannot be divorced from the economic development that is necessary to meet the basic needs of its people.¹⁶⁶ China's continued emphasis on economic growth has overshadowed efforts to reform and strengthen the environmental law framework.

At all levels of government, China lacks the institutional capacity and political will to enforce its environmental laws. Further challenges include the fact that weak and uneven enforcement of environmental laws and protectionism in local markets have discouraged industries from reducing pollution and increasing efficiency.¹⁶⁷ The central government also lacks the capacity for self-regulation and does not allow media and action groups to further environmental causes,¹⁶⁸ and society as a whole has done little to curtail individual polluting behavior because there is a pervasive lack of awareness of the threats of environmental pollution to human health and future resource availability.¹⁶⁹ Although some government officials, such as Zhang Kunmin, Deputy Director of the State Environmental Protection, argue that China's economic growth has not contributed to the deterioration of the environment, law and policymakers in China generally agree that implementation and enforcement of environmental laws has been ineffective, particularly in the PRD.¹⁷⁰

The Hong Kong and Guangdong governments in the PRD acknowledged the region's significant air pollution in their 2002 agreement

¹⁶² Ferris, *supra* note 67, at 598.

¹⁶³ *Id.* at 599.

¹⁶⁴ *Id.* at 598.

¹⁶⁵ Bachner, *supra* note 54, at 381.

¹⁶⁶ Vermeer, *supra* note 69, at 955.

¹⁶⁷ *Id.* at 953.

¹⁶⁸ *Id.*

¹⁶⁹ *Id.*

¹⁷⁰ Bachner, *supra* note 54, at 376.

to cut sulfur dioxide emissions by forty percent, nitrogen oxide emissions by twenty percent, and respirable suspended particulates and volatile organic compounds both by fifty-five percent before 2010.¹⁷¹ There has been little action taken, however, to achieve these lofty goals.¹⁷² The environmental discourse has yet to have any major impacts on the PRD landscape; the overriding concern remains one of fostering further economic growth and of attracting more foreign investment.¹⁷³

V. CHINA SHOULD TAKE A TWO-PRONGED APPROACH TO ADDRESS THE THREAT POSED BY SHIP EMISSIONS

The air pollution caused by ship emissions poses a serious and growing threat to the PRD and its inhabitants and China should take a two-pronged approach to address the problem. First and most importantly, Chinese lawmakers should draft and implement national legislation that imposes emissions restrictions on ships while in and around the ports of the PRD. Second, the International Maritime Organization should declare the PRD a Micro-Emissions Control Area, thereby significantly limiting the sulfur content of ships' fuel while traveling in the region.

A. *China Should Impose Emissions Regulations on Ships Traveling in and Around the Ports of the PRD*

In order to reduce the harmful emissions from ships and their effects on the environment and human health in the PRD, Chinese lawmakers should draft and implement national legislation that imposes strict emissions restrictions on ships while in and around the ports of the PRD. Encouragingly, it appears that support already exists for the implementation of emissions regulations. The Civic Exchange,¹⁷⁴ a Hong Kong public policy think tank, released a study conducted as part of its *Green Harbours: Hong Kong and Shenzhen* project in February and March 2008.¹⁷⁵ The study explores how deep-sea operators and ports, together with others involved in the logistics sector, can reduce emissions to improve air quality in the PRD.¹⁷⁶ The results of the study demonstrated that the major stakeholders engaged in the marine and port sectors (ocean-going vessel operators, port

¹⁷¹ Rachel E. Stern, *Hong Kong Haze: Air Pollution as a Social Class Issue*, 43.5 ASIAN SURVEY 780, 782 (2003), available at <http://caliber.ucpress.net/doi/pdf/10.1525/as.2003.43.5.780?cookieSet=1>.

¹⁷² *Id.*

¹⁷³ Li & Wong, *supra* note 7, at 5-7.

¹⁷⁴ The Civic Exchange, www.civic-exchange.org (last visited Feb. 19, 2009).

¹⁷⁵ GREEN HARBOUR, *supra* note 22.

¹⁷⁶ *Id.*

operators, local craft operators and land vehicles involved with port operations) recognize that they have an important role to play in improving air quality in the PRD and are ready and willing to reduce emissions from their industries.¹⁷⁷

According to information gathered from the stakeholders during a series of workshops hosted as part of the *Green Harbours: Hong Kong and Shenzhen* project, the stakeholders want and need regulation in order to reduce emissions and clean up the air in the PRD.¹⁷⁸ The ocean-going vessel, port, local craft and land vehicle industries that the stakeholders represent are highly competitive, however. Without regulations that demand cleaner operations, the stakeholders acknowledged that they would be unlikely to voluntarily implement environmentally friendly practices, especially if the practices were more expensive than dirtier alternatives that would give their competitors an economic advantage.¹⁷⁹ They expressed the shared opinion that the new regulations must extend throughout the PRD so that all regional players are equally affected and so that the newly regulated ports do not lose all their traffic to less expensive, less green ports elsewhere.¹⁸⁰ Finally, the stakeholders agreed that the Hong Kong, Shenzhen, and Guangdong authorities in the PRD must work together to draft and implement the new regulations.¹⁸¹ The results of the studies conducted by the Civic Exchange demonstrate that support for the implementation of emissions regulations already exists in the shipping and port industries.

The Chinese government should capitalize on this support by passing national legislation requiring ocean-going ships to burn cleaner low-sulfur fuels while in and around ports in the PRD. Although low-sulfur fuel is more expensive than the low-quality bunker fuel commonly used by the shipping industry at present, the Chinese government should follow the example of other countries and implement an incentive program to offset the costs of the new restrictions to the shipping and port industries. China would not be the first body to experiment with incentive programs. In March of 2008, the ports of Los Angeles and Long Beach in California unveiled a year-long program designed to persuade ocean-going ships to

¹⁷⁷ *Id.*

¹⁷⁸ *Id.*

¹⁷⁹ *Id.*

¹⁸⁰ GREEN HARBOUR, *supra* note 22.

¹⁸⁰ *Id.*

¹⁸¹ *Id.*

burn cleaner fuels when near the California coast.¹⁸² Using revenues collected from port operators under existing lease arrangements, the ports of Los Angeles and Long Beach pay the difference between the costs of the highly polluting bunker fuel and low-sulfur fuel for the year that the program is in effect.¹⁸³ Similarly, in April of 2009, Japan proposed to the International Maritime Organization a global levy on bunker fuel.¹⁸⁴ Under Japan's proposed plan, money collected from the bunker fuel charge would be pooled and then parts of it would be refunded to ships that improve their energy efficiency.¹⁸⁵

By passing legislation that extends throughout the whole of the PRD, the Chinese government could ensure that each port and shipping company in the region will be equally affected by the legislation and bound by the same restrictions, thereby greatly reducing the risk that regulated ports will lose business to less environmentally-friendly and less expensive ports elsewhere in the region. Furthermore, California's incentive plan and Japan's proposed plan demonstrate that plausible options exist to make emissions restrictions more palatable for the shipping and port industries.

Since no laws in China currently regulate or restrict ship emissions, passing national legislation that specifically and sufficiently restricts ship emissions in the PRD will be a significant step in the right direction. That being said, due to the fragmented system of lawmaking in China, lawmakers' tendency to draft aspirational laws, and the nation's continued focus on economic development, the effective implementation of environmental laws will likely prove difficult in China. Chinese lawmakers must therefore work with government environmental agencies and non-governmental organizations to draft a national law that limits ship emissions in a manner that is both sufficiently restrictive and yet practicable. Equally important, the Chinese government and authorities in the PRD must work with the appropriate government agencies to ensure that the law is implemented effectively and uniformly.

¹⁸² Louis Sahagun, *L.A. and Long Beach Ports Propose Air Cleanup Plan*, LOS ANGELES TIMES, March 19, 2008, available at <http://articles.latimes.com/2008/mar/19/local/me-ports19>.

¹⁸³ *Id.*

¹⁸⁴ Risa Maeda, *Japan to Propose Global Levy on Bunker Fuel-Source*, REUTERS, March 13, 2009, available at <http://www.reuters.com/article/latestCrisis/idUST172965>.

¹⁸⁵ *Id.*

B. *The International Maritime Organization Should Declare the PRD a Micro-Emissions Control Area*

Due to the severity of the threat to the environment in the PRD posed by ship emissions, the Chinese government should fortify any national emissions restrictions it imposes by enlisting the support of the international community. The stakeholders that attended the workshops hosted by the Civic Exchange voiced overwhelming support for appealing to the International Maritime Organization (“IMO”) to have the PRD declared a Micro-Emissions Control Area (“Micro-ECA”).¹⁸⁶ The IMO is a specialized agency of the United Nations based in the United Kingdom.¹⁸⁷ The agency has 168 Member States and three Associate Members and is charged with the task of developing and maintaining a comprehensive regulatory framework for shipping, including safety concerns, environmental concerns, legal matters, technical cooperation, maritime security, and the efficiency of shipping.¹⁸⁸

Declaring the PRD a Micro-ECA would drastically reduce the sulfur content of the fuel burned by ships in the region, thereby decreasing ship emissions and presumably improving air quality. If the PRD is declared a Micro-ECA, ships would be required to switch to fuel with only 0.1% sulfur content while traveling within twenty-four nautical miles from the baseline and 100 nautical miles along the coast.¹⁸⁹ This distance would stretch from Macau to East Shenzhen.¹⁹⁰ Furthermore, declaring the PRD a Micro-ECA would ensure that the major stakeholders in the shipping and port industries in the PRD are uniformly affected by the restrictions.¹⁹¹

Attempting to have the PRD declared a Micro-ECA is likely more realistic than attempting to have the region declared a Sulfur Emission Control Area (“SECA”). In a declared SECA, such as in the North and Baltic Seas, ships are required to change from using 4.5% sulfur content fuels to 1.5%, a switch that would undoubtedly serve to improve air quality in the PRD.¹⁹² SECAs, however, are difficult to institute because applicant states must demonstrate that land-based emissions are at such levels that marine emissions have become the dominant emission source for a local area, a scenario that is very unlikely in the case of the PRD due to the

¹⁸⁶ GREEN HARBOUR, *supra* note 22.

¹⁸⁷ IMO, *supra* note 43.

¹⁸⁸ *Id.*

¹⁸⁹ Galbraith, *supra* note 11.

¹⁹⁰ GREEN HARBOUR, *supra* note 22.

¹⁹¹ *Id.*

¹⁹² Breakthrough, *supra* note 39.

considerable land-based pollution caused by the manufacturing sector in the region.¹⁹³ It is for precisely this reason that the Micro-ECAs are a more attractive option for the PRD—Micro-ECAs do not require evidence of lowered land-based emissions and can be applied for by a single state.¹⁹⁴ Having the PRD declared a Micro-ECA would drastically restrict fuel sulfur content twenty-four nautical miles from the baseline and 100 nautical miles along the coast, presumably also dramatically reducing sulfur emissions throughout the entire region.

Nevertheless, while the IMO creates and adopts international ship emission standards, it is up to the Member States to enforce those standards.¹⁹⁵ Thus, having the PRD declared a Micro-ECA will restrict ship emissions and improve air quality in the region only if China enforces the emissions standards established for Micro-ECAs by the IMO and punishes violators. Under the terms of the MARPOL Convention (ratified by China in 2006 and by Hong Kong in 2008), any violation of the Convention that occurs within China's jurisdiction is punishable either under the law of China or under the law of the flag State.¹⁹⁶ As is true with any law in China that seeks to restrict ship emissions, the Chinese government must be willing and able to enforce the emission standards established for Micro-ECAS if they are to have any effect whatsoever.

VI. CONCLUSION

The air pollution caused by ship emissions poses a serious and growing threat to the environment in the PRD and the health of its inhabitants. Although China has successfully created an expansive network of environmental agencies, for the reasons discussed herein, the nation's current legal framework has proven an ineffective means of controlling air pollution caused by ship emissions. Accordingly, the Chinese government should act responsibly by imposing emissions restrictions on ships entering and departing from ports in the PRD and by appealing to the IMO to have the PRD declared a Micro-ECA. These two measures, while by no means a complete solution to the significant problem of air pollution in the PRD, would be a significant step towards restricting and reducing harmful ship emissions in the region.

¹⁹³ Galbraith, *supra* note 11.

¹⁹⁴ GREEN HARBOUR, *supra* note 22.

¹⁹⁵ The flag state is the state under which a ship is registered. *Flag State Implementation*, INTERNATIONAL MARITIME ORGANIZATION, http://www.imo.org/Safety/mainframe.asp?topic_id=156 (last visited Apr. 11, 2009).

¹⁹⁶ MARPOL, *supra* note 113.

Furthermore, imposing emissions restrictions in the PRD and declaring the region a Micro-ECA would signal to the rest of the world that China is willing to take dramatic measures to protect the health of the environment in the PRD and the health of its inhabitants. As the largest developing nation in the world, China can contribute significantly to global environmental protection by conducting its affairs responsibly. The manner in which China chooses to balance its interests in economic growth with its commitment to environmental protection throughout the coming decades will have a significant impact on climate change and ozone depletion across the globe.¹⁹⁷

¹⁹⁷ Gheleta, *supra* note 55, at 223.