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Industry Study

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Environment Industry

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ENVIRONMENT 2009

ABSTRACT: The environment industry merits recognition as a key industry for the United States. Environmental degradation, the depletion of natural resources, and the social, economic and political problems associated with climate change combine to pose major challenges for the world community and for the future prosperity and security of the United States. They also offer substantial growth potential for the environment industry. The United States needs to improve its environmental performance, make binding reductions in emissions and take a leading role in an international effort to address climate change.

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PLACES VISITED

Domestic

U.S. Green Building Council, Washington, DC
Committee on Natural Resources, U.S. House of Representatives, Washington, DC
Environment and Public Works Committee, U.S. Senate, Washington, DC
Alexandria Sanitation Authority, Alexandria, VA
Chesapeake Bay Foundation, Annapolis, MD
Royal Caribbean Cruise Line, Fort Lauderdale, FL
U.S. Southern Command, Miami, FL
Port Everglades, Fort Lauderdale, FL
Wetlands Bank Group, Pembroke Pines, FL
Everglades National Park, Miami, FL
South Florida Water Management District, West Palm Beach, FL
Broward County Environmental Protection, Fort Lauderdale, FL
International Finance Corporation, Washington, DC
World Bank, Washington, DC

International

Conservation International, Galápagos Islands, Ecuador
Charles Darwin Foundation, Galápagos Islands, Ecuador
World Wildlife Fund, Galápagos Islands, Ecuador
Municipal Recycling Center, Puerto Ayora, Galápagos, Ecuador
Responsible and Alternative Development for Galápagos Foundation, Ecuador
Cargill Grain Terminal, Santarém, Brazil
Former Henry Ford Rubber Plantation and Belterra Municipality, Brazil
Stefanelo Soybean Farm, Belterra, Brazil
Large-Scale Biosphere-Atmosphere Experiment in Amazonia (LBA), Tapajós National Forest, Brazil
Oficinas Caboclas Project, Santarém, Brazil
Maguari, Jamaraquá, Nuquini, and Suruacá communities, Pará State, Brazil

INTRODUCTION

In the rapidly globalizing world, the environment is becoming a critical national security issue. The United States must protect its vital national interests to remain a prosperous and secure country. Environmental degradation, natural resource depletion, and climate change pose large-scale challenges. The United States is witnessing the "decreasing value of our resource base due to pollution, unsustainable resource extraction, natural resource degradation, contamination and accumulated waste materials."[1] Growing public awareness of environmental issues, coupled with the changing political landscape of the new Obama Administration and a Democratic majority in the Congress, are promoting environmental issues to a higher priority.

Climate change is a looming security challenge. Its "direct effects are likely to fall most heavily on those countries least able to deal with them," and therefore those most likely to suffer humanitarian disaster and possibly tip into instability or conflict.[2] This potential scenario "increases the responsibility of the international system to generate collective solutions."[3] It serves U.S. national interests to engage in preventative actions rather than in more costly mitigation efforts, assuming remediation will be possible.[4]

The industry that addresses environmental challenges is primarily defined as commercial in nature, but any assessment of the industry must take into account the impact of non-commercial actors on the industry. The environment industry is greatly influenced by non-profit environmental advocacy groups, international bodies and federal, state and local government. The advocacy groups draw public attention to environmental concerns, press government to take action, and influence the laws and international agreements that direct the industry's development. Furthermore, government at all levels, with its regulatory agencies and enforcement mechanisms, arguably drives the industry more than purely market forces.

To enrich its understanding of the complexity and inter-relations of environmental issues, the seminar hosted leaders from the environmental non-governmental organization (NGO) community, entrepreneurs and inventors, federal regulators, and diplomats. The seminar visited Congressional staffers who draft and shepherd environmental legislation, NGO leaders who educate the public about endangered species and habitat, architects who design "green" buildings, and engineers who operate waste water utilities. Students met with businesses that create wetland banks and trade in ecological credits in Florida's commercial real estate market, and toured cruise liners that emit pollutants but also manage waste to comply with domestic and international regulations. The seminar traveled to Florida, Ecuador and Brazil to witness both environmental success and challenges. Over the months, the group studied the vital links between the environment's health and societal well-being. It concluded the environment is critical to ensuring U.S. national security and that the environment industry will increasingly contribute to U.S. security planning.

THE INDUSTRY DEFINED

The environment industry has no crisp, easy definition. The industry ranges from sewage treatment to pollution abatement, from waste management to recycling. Due to

the industry's diversity, it overlaps with several industries studied at the Industrial College of the Armed Forces (ICAF), such as energy, agribusiness, and strategic materials.

Several organizations have attempted to define the amorphous environment industry. The Organization for Economic Cooperation and Development (OECD) defines it as "firms producing goods and services capable of measuring, preventing, limiting or correcting environmental damage such as the pollution of water, air, soil, as well as waste and noise-related problems. They include clean technologies where pollution and raw material use is being minimized."[5] The U.S. Department of Commerce has identified the industry as "all goods and services associated with environmental protection, assessment, environmental regulatory compliance, pollution control, waste management, remediation, design and operation of environmental infrastructure and delivery of key environmental resources."[6]

While these definitions are adequate, the definition used by Environmental Business International (EBI), the leading U.S. researcher for the industry, is the most inclusive: "All revenue generation associated with environmental protection, assessment, compliance with environmental regulations, pollution control, waste management, remediation of contaminated property and the provision and delivery of environmental resources." [7]

These definitions are limited to for-profit businesses, but key environmental players range beyond the profit-motivated businesses and service providers. Non-profit and non-governmental organizations are critical in raising the public's consciousness about environmental concerns and in influencing regulations and international environmental negotiations. These groups help drive the industry, sway the regulatory community, and inform and motivate the public.

Government is another key driver. Regulations at all levels of government, as well as international treaties and agreements, shape the industry. What government permits or prohibits can change its path.

The seminar's study, therefore, was not bound by the traditional definitions of the environment industry. While it adopted EBI's definition of the industry, the seminar also examined the context within which the industry operates. In addition to visits to and briefings from businesses included in EBI's definition of the environment industry, the students also examined businesses that focus on the environment as part of their business practices. For example, the cruising sector of the tourism industry has widely-acknowledged negative environmental impacts (carbon emissions and ocean dumping), but Royal Caribbean is a leader in on-board waste management and recycling. Students also visited or were briefed by numerous non-profits and governmental and multilateral organizations. All of the environmental players form a web of complex interactions, and the seminar analyzed their interrelations as they collectively chart the national response to environmental challenges.

CURRENT CONDITION

The concept of national security today extends beyond the traditional idea of safeguarding territory from external aggression. Political and social stability, human health, resource availability, and economic prosperity are all strategic concerns, and they

are linked to, even dependent upon, sustainable development and environmental stewardship.

Commentator Thomas Friedman recently observed:

> "The country that owns green, that dominates that industry, is going to have the most energy security, national security, economic security, competitive companies, healthy population and, most of all, global respect. I want that country to be the United States of America. This isn't about economic power; it's about national power."[8]

Concurring with Friedman, the students determined that the environment is an overarching, strategic issue. The environment industry will be of increasing importance in security planning as environmental challenges continue to unfold or concerns are successfully addressed through new technologies and sustained national effort.

There are a range of views about what constitutes environmental security, but opinions generally coalesce around the concept of resource scarcity and environmental degradation.[9] Historically, many conflicts have involved access to natural resources, such as water, oil, wood, ore or natural gas. According to the United Nations (UN), over the last two decades, "at least 18 violent conflicts have been fuelled by the exploitation of natural resources….As the global population continues to rise, and demand for resources continues to grow, there is significant potential for conflicts over natural resources to intensify."[10]

Beyond the potential for increased conflict from environmental causes and the fundamental need to protect our natural resources, climate change poses a significant challenge to the international community. The Intergovernmental Panel on Climate Change expects the earth's mean temperature to rise several degrees over the course of this century without decisive action to curb greenhouse gas emissions from fossil fuel combustion.[11] Potential impacts of climate change include rising sea levels, increased flooding, increased extremes of both precipitation and aridity, mass extinction of some species, forced human migration, increased ocean acidity and more intense hurricanes.[12] Many of these anticipated consequences have potential to affect the strategic security of the United States.

While the future outcomes of climate change remain an unknown quantity and a controversial topic among industrialists and environmentalists, some countries have squarely placed climate change among their national security priorities. The 2008 National Security Strategy of the United Kingdom (UK) states, "Climate change is potentially the greatest challenge to global stability and security, and therefore to national security. Tackling its causes, mitigating its risks and preparing for and dealing with its consequences are critical to our future security, as well as protecting global prosperity and avoiding humanitarian disaster."[13] In the recent past, the national security strategies of both Presidents Clinton and Bush made passing references to environmental concerns. The seminar anticipates future national security strategies will increasingly highlight the environment as a strategic consideration for the United States as policy makers progressively react to the degradation and depletion of natural resources, recognize climate change's likely impacts and assess and pursue options for adaptation and mitigation.

Whether examining site-specific concerns dealing with resource depletion or degradation or addressing large-scale environmental issues such as climate change, there is a wide range of potential activities for businesses within the environment industry. The role of federal, state, and local government as driving forces within the industry distinguishes it from a number of other major industries which are more consumer-driven. Increased regulation at all government levels, stemming primarily from public pressure, has prompted industry expansion since the 1970's. While a growing number of companies are finding that environmental responsibility is good for their bottom lines, many in the business community still equate environmental costs with profit drains. This mindset underscores the continued need for government regulation.

Comparing the environment industry financially to other industries is problematic due to the industry's diverse scope and fluid boundaries. EBI is the only American firm to track the industry professionally, and its data are far from definitive. First, EBI's definition (see previous section) excludes the NGO sector, taking no account of the over 26,000 registered environmental and conservation organizations in the United States and their revenues, estimated to be $8.2 billion in 2005, the latest figure available.[14] In addition, EBI has a two-year time lag in its data; its figures for 2008 are based on 2006 data. Lastly, EBI data is restricted by the rigid way in which environmental companies are counted. The North American Industry Classification System allows only one code for a business based on its primary activity. If a company does not declare the "environment" to be its primary business concern, EBI excludes the company. For example, EBI calculations do not factor in any environmental work undertaken by an oil company. EBI data therefore does not capture the revenues and jobs generated by all businesses whose products and services benefit the environment. Despite these various caveats, EBI's figures are currently the best available, and they reveal an industry considerably larger than some U.S. industries more traditionally termed strategic, as the chart below reveals.[15]

Industry	Revenue Generated	Employment
Environment	$282 Billion (2006)	1.6 Million
Iron and Steel Manufacturing	$125.6 Billion (2008)	99,487
Ship Building	$17.3 Billion (2008)	87,497
Tank and Armored Vehicle Manufacturing	$4.7 Billion (2008)	10,836
Radar and Satellite Operations	$2.1 Billion (2008)	9,750

The United States is competitive in the global environment industry, but it is difficult to measure this competitiveness. EBI estimates that the global environment market was about $690 billion in 2006; the United States' share represented approximately 41% of the world market, the dominant market portion.[16] A recent UK study that includes both renewable energy businesses and the low carbon sector as parts of the environment industry estimates the 2007 world market value of the industry at approximately $4.5 trillion.[17] This study calculates the U.S. share of the market to be approximately 21%. Even with this smaller percentage, the United States' share was the world's largest, followed by, on an individual country basis, China, Japan, India and

Germany.[18] The European Union (EU) as a whole, however, is the United States' closest competitor in the industry.

The environment industry is viewed as a growth industry, with EBI forecasting that the U.S. industry will grow by 4.8% in 2009;[19] the aforementioned UK study forecasts six years into the future and predicts the market, as it defines it, will grow by an astounding 45% by 2015 to a value of approximately $6.5 trillion.[20] EBI anticipates growth may slow in the United States, based on its assessment that there are fewer new Superfund sites, that asbestos is no longer used, and that newer facilities are more energy efficient.[21] The seminar's research does not support that assessment, given the thousands of small-scale contaminated sites, the long-term challenges posed by pollution mitigation, and the changed political and economic landscape that could positively impact the environment industry. More stringent and aggressive federal, state, and local regulations could spur growth in the industry as could the growing realization among many business leaders that environmental practices can be good for profits. Globally, the opportunity for growth is great, as will be seen in the international markets section of this report. Export revenues currently account for over 10% of the U.S. environment industry. Canada, Mexico and Japan are the United States' largest export markets, but China will likely be an expanding market.[22]

While anticipated to grow, the industry is nonetheless displaying characteristics of a mature industry as evidenced by decelerating growth, heightened competition, growing sophistication among its client base, greater emphasis on marketing, the consolidation of market share by larger players and heightened merger and acquisition activity.[23] Another indicator of maturity is the formation of trade associations to support the industry. Due to the diversity of the industry, to date no one trade association effectively represents the entire industry, but a number of "niche" environmental associations now exist such as the American Waterworks Association and the Environmental Industry Associations.

CHALLENGES

Starting in the 1970's and with steady industry entrants throughout the past 40 years, the environment industry is both a relative newcomer and an established, increasingly mature field. Similar to other industries, the environment industry is fully globalized. One country's environmental degradation and pollutants, as well as mitigation, can no longer be considered a purely internal matter because one country's actions, or lack thereof, affect the well-being and security of the others across the globe.

Another challenge for the industry is, paradoxically, regulation. While regulation has been crucial to its development, the environment industry faces constant pressure as a result of unclear or changing regulatory regimes. "Lack of regulation in some areas, uncertainty, and inconsistent application of regulations and standards all increase uncertainty for supply-side enterprises, and inhibit the development of demand."[24] This is most pronounced in the international market. As one U.S. businessman with an international clientele observed, "You need some certainty on the incentives side and on the market side because we are talking about multi-year investments, billions of dollars that will take a long time to take off."[25]

The perception that environmental protection and economic growth are in a "zero sum" contest is another challenge for the industry. Historically, the business community,

outside of the environment industry, has tended to view environmental adjustments as a drag on its profitability though that perception is shifting. The "future competitiveness of all industries and nations," however, "will increasingly depend on the efficient allocation, management and reuse of resources."[26] Encouraging industries and businesses to view good environmental practices as sound business practices and investments in the future is an on-going challenge.

The current economic downturn poses a financial challenge to the environment industry, as it does to most industries. The recession and current lack of credit could force small or emerging firms into closure or Chapter 11. Likewise, crucial research and development, needed for continued growth, could suffer from the current economic conditions and negatively impact future investment and growth. The industry is "highly dependent on technological innovation and development."[27] The many environmental NGOs also face diminishing donations, and hard economic times can quickly turn environmental stewardship into a perceived luxury amid other pressing needs.

A major challenge is that the inter-connectedness of the environment requires a coordinated effort among countries to affect a solution to common concerns. Protecting trees in Brazil cleans carbon dioxide from the atmosphere in North America as well as South America. Pollutants released upstream affect the environments of all countries downstream. In sum, environmental degradation and stewardship transcend geo-political boundaries.

Yet another major challenge to environmental security lies in the achievement of international agreements. Stewardship of the global environmental commons requires treaties to establish standards that then must be implemented by individual states. While the UN coordinates the development of international conventions, there is currently no international organization with the ability to enforce compliance to universal environmental standards. As a result, environmental security remains a voluntary activity among states.

OUTLOOK

The environment industry is poised for continued expansion and growth in the United States and abroad. The United States should retain its competitive edge if it can sustain and expand its research and development. A more environmentally conscious world will demand solutions to environmental challenges, providing a growing market in the United States and globally. As public awareness of the consequences of environmental degradation and climate change accelerates, pressure for sustainable development will intensify.

The federal government has yet to determine the national response to climate change, what UN Secretary-General Ban Ki-moon has called "the defining challenge of our time," but that could change with the shifting political landscape.[28] The newly Democratic White House and Congress have signaled an openness to binding reductions on carbon emissions and/or a cap-and-trade system for emissions. This spring the Environmental Protection Agency (EPA) formally proposed regulating greenhouse gas emissions to combat climate change, concluding that the gases endanger the public health and welfare of current and future generations.[29] The emerging issue now is how the United States will restrict its emissions.

Many businesses are increasingly recognizing that environmental stewardship, if translated into greater efficiencies, can positively impact their bottom lines. Traditional resources are finite, and, as the human population grows, more demands will be placed on these resources. The companies and nations who understand these limitations and implement more efficient, socially responsible and sustainable practices will have a competitive advantage in the market and will help ensure the long-term health of the natural environment and the quality of life afforded to future generations.

Many corporations are responding to market forces by undertaking long-term, transformational sustainability initiatives that are generating increased profitability, reduced risk exposure and increased market value. Even during the current economic downturn, this sustainability focus is paying off for corporations and investors alike. A recent study of companies on the Goldman Sachs "SUSTAIN focus" list showed 16 of 18 examined outperformed their industry peers over a six-month period by 15%.[30]

The increasing use of Environmental Management Systems (EMS) is another indicator that businesses are accepting environmental standards and procedures as central components of their profitability. EMS, a set of processes and practices that enable an organization to reduce its environmental impact and to increase its efficiencies, is codified in a variety of international standards, the International Standards Organization (ISO) 14000 being the dominant one.[31] Increasingly, many view a business operating with ISO certification as gaining a competitive edge -- though that has not been definitively demonstrated to date.[32] The EU could make ISO certification a legal prerequisite for entering its heavily regulated market. If that is adopted, ISO certification would have enormous consequences for any company with global ambitions.

The EU, a progressive leader in environmental innovation and best practices and, increasingly, the United States appear more willing to "internalize the economic externalities of pollution, environmental degradation and wasted resources into an economic system that values the environment rather than freely permitting its exploitation." [33]

GOVERNMENT GOALS AND ROLE

Government's role in managing environmental stewardship is crucial. The environment is a common resource and to ensure its health, governments at all levels must monitor and act appropriately to avoid the "tragedy of the commons."[34] Because the environmental consequences of human social, commercial, and industrial activity do not routinely factor into business transactions, governments are responsible for creating a system of regulations and taxes to protect the national, regional, and local commons. Increasingly, many people expect government or supranational organizations to protect the international commons as well given that environmental degradation has trans-national consequences. European countries are beginning to do so through cap-and-trade programs, and it appears the United States, as noted earlier, is poised to do the same at a national level. Groups of U.S. states have already established cap-and-trade regimes. For example, the northeast's Regional Greenhouse Gas Initiative took effect in January 2009.[35] The Western Climate Initiative, signed in 2007, is due to go into rolling effect in 2012. The initial program will cover emissions from electricity and large industrial and

commercial sources, and by 2015 it will cover emissions from transportation and other residential, commercial, and industrial fuel.[36]

Government at all levels must take the lead in setting the example for sustainability initially through its own operations and then through additional policies and regulations to provide the impetus to change individual and corporate behavior. By mandating the removal of environmental externalities, government creates the requirements for an environment industry as companies invest in environmental goods and services to comply with the law, gain comparative advantage by acting in a socially responsible way, and avoid punitive consequences. Specifically, the seminar concluded solid waste regulations need to be updated by implementing recycled or "cradle-to-cradle" product management to promote waste reduction or reuse at the manufacturer level. This measure would divert volumes of waste from landfills that are filling and expanding at a steady pace.

An international agreement to reduce greenhouse gases is needed, and the United States should use its power and prestige to this end. Without serious efforts to address global climate change, many of the U.S. government's previous environmental triumphs over the last 40 years will seem like small tactical victories in a lost war. The global commons could be severely damaged, perhaps irreparably. The upcoming UN conference on climate change in Copenhagen this December provides an excellent forum for a display of U.S. leadership. The United States would enter that stage with an enhanced ability to press rapidly industrializing countries such as China and India for emissions reductions if it had in place its own domestic greenhouse gas regulations.

A worthwhile greenhouse gas treaty would take preventative, precautionary and corrective steps to counter the accumulating effects of human activity. Such a treaty would be in keeping with precedent. Environmental laws, regulations and treaties exist to mitigate impacts of human activity in two broad areas: the consumption of natural resources beyond self sustaining levels and the contamination of the environment with pollution levels that go beyond the environment's capacity to absorb.[37]

In addition, the international community needs to address the melting Arctic ice, the area's emerging possibilities for resource extraction, and the opening of navigable, far northern waterways. The United States should partner with Canada and Russia to propose an international convention on managing the Arctic to establish its peaceful and legally recognized use.

Existing global organizations should be leveraged to meet the inter-connectedness challenge inherent with environmental stewardship. The UN and its subsidiary organizations, as well as other multilateral organizations, convene gatherings to address trans-national environmental issues and draft international environmental treaties. They generally lack enforcement capabilities, however. The seminar concluded the UN or a newly created multilateral forum should be empowered to oversee implementation of environmental treaties by signatories. Any such expansion of institutional power would, however, likely come into conflict with member states' insistence on their sovereignty. Still, there is precedent which could be built upon with both the World Trade Organization (WTO) and the International Atomic Energy Agency (IAEA) serving as possible models. Many countries have willingly handed over some measure of their economic sovereignty to the WTO, which has the authority to arbitrate and sanction trade

disputes. Likewise, countries have given the IAEA a mandate to monitor nuclear activities and to report non-compliant governments to the UN Security Council.

The government should dedicate substantial resources to develop new technologies to keep the United States in the forefront of environmental innovation. The environment industry, as well as firms from other sectors with environmental compliance and stewardship responsibilities, benefits from both corporate and government sponsored research. By using taxpayer-funded research to identify innovative solutions, the government can stimulate new economic opportunity, much like military and space exploration research and development spawned whole new product lines and businesses in the past. Companies that eventually license new technology enter the marketplace, contributing to the gross domestic product and tax base, generating employment, and most importantly, providing effective tools for environmental compliance and stewardship.

The Department of Energy (DOE) through its laboratories sponsors research that is producing innovative technologies of interest to the environment industry. For example, Ames Laboratory is analyzing contaminants, and one of its projects uses sonar technology to determine important information about waste while avoiding unnecessary handling of dirty and potentially toxic materials. Another project employs lasers rather than chemicals in the safe and efficient clean-up of highly radioactive materials. The lab is also developing marketable technology that eliminates lead in landfills that originates from solder in discarded circuit boards.

Additionally, Argonne National Lab is producing a safer alternative to lithium ion batteries designed for hybrid electric vehicles by eliminating the need for nickel-metal hydride. Brookhaven National Lab is concentrating on finding "potential approaches for enhancing terrestrial carbon sequestration as a partial mitigation of CO_2-induced climate change."[38] The Idaho National Lab is finding ways to allow chemically tainted groundwater to be cleaned in a manner that also allows the chemicals to be isolated for reuse, thus keeping the amount of hazardous waste to a minimum. In a joint venture, DOE, the State of Illinois and Archer Midland Company (AMC) are sponsoring a large-scale carbon dioxide sequestration demonstration project. The project proposes to inject carbon emissions from the AMC ethanol plant more than one mile into the ground to mitigate greenhouse gas emissions and continue DOE efforts to develop U.S. carbon capture and storage capabilities.[39]

Other federal entities have many interesting projects underway. The Environmental Protection Agency, for example, is funding ventures of broad interest to the commercial sector. The projects include pesticide spray drift reduction technologies, lead paint remediation in dwellings, rapid detection of microbial contamination of water, and research into more environmentally safe methods to utilize coal.

The recent "Stimulus Package" will vastly increase federal funding for the environment industry. The 2009 American Recovery and Reinvestment Act authorizes, for example, $3.4 billion solely for the demonstration and deployment of carbon capture and sequestration technologies.[40] This funding will provide valuable information necessary to reduce the amount of carbon dioxide emitted into the atmosphere from industrial facilities and fossil fuel power plants. Among other environmental authorizations, the Act also allots $6 billion for cleaner water infrastructure, $300 million for reduced diesel emissions, and $200 million for cleaner underground storage tanks.[41] Another $800

million will go to clean up toxic waste sites, and $500 million is dedicated to nuclear waste clean-up.[42]

PIVOTAL INTERNATIONAL MARKETS

For international research projects, seminar participants focused on "pivotal" states, those that have sufficient regional influence, economic opportunity, or environmental commitment to influence U.S. national interests. In order for a state to be pivotal, its influence must positively or negatively alter the economic or environmental dynamics in a region. Such a state may also have sufficient economic opportunity to ensure near and long term U.S. environmental market presence. It may also have the ability or desire to regulate environmental standards in order to achieve sustainable development and environmental reform. Because levels of economic development and environmental stewardship are correlated, the following summary is organized not by region but by stages of economic development.

Developed States

As noted earlier, the EU is the United States' primary competitor in the industry. This section focuses on other key individual players. Japan, Canada, the Republic of Korea, and Australia are all developed pivotal states, and all have significant impact on global environmental conditions. These countries are critical U.S. strategic partners both in terms of national security and economic prosperity.

Japan has the world's second largest economy.[43] In 2004, it comprised a full 16% of the global environmental market and was one of the United States' largest export markets.[44] American environmental firms do significant business in Japan, but their market penetration is relatively low. U.S. companies, however, are making inroads into the waste management, renewable energy, emissions reductions, and environmental monitoring sectors.[45] The key environmental economic driver is the high degree of environmental regulation, which in turn is driven by the intersection of costly environmental problems, air and water quality, and population pressures (127 million people live on only 377,000 square kilometers).

Canada is a vital strategic and economic partner for the United States. It accounts for nearly 20% of all U.S. trade and purchases nearly one-fifth of all U.S. environmental technology exports.[46] Canada's most lucrative environmental industries include waste management, water and wastewater treatment, site remediation, consulting, and monitoring and analysis. Its environmental sector consists of nearly 7,000 companies that generate more than $25 billion in annual sales. Because Canada is a mature market, Canada has specific areas where U.S. firms could focus their expertise. These "niche markets" include water and wastewater treatment, monitoring and analysis, water treatment infrastructure, water quality management, air pollution control, solid waste management, and livestock pollution.[47] The United States faces competition primarily from French and British firms within the integrated water services arena.

South Korea is a pivotal state for its industrial importance as well as its role as a political counter to North Korea. Its environment, however, is fragile and can quickly undermine its vitality. The explosive pace of urbanization has aggravated existing challenges to water and air quality as well as land use. The government is making an

aggressive bid to improve water quality by investing more than $2.8 billion in water improvement projects.[48] The Korean government, however, limits its direct investment in air quality improvements and instead pushes the burden onto the private sector through regulation. Relative to other Asian countries, Korea's enforcement regime is strong with officials conducting regular and unannounced inspections to ensure sustained progress.[49] Korea is an attractive market with great potential for continued growth based on urbanization and industrialization. U.S. firms, however, will face significant challenges from Japanese and European competitors. Market opportunities also may be limited by Korean efforts to develop their own technologies for export and domestic markets.[50]

Australia, another important state, is a key strategic partner of both the United States and China. Environmentally, it has been impacted by global fishing issues and ozone depletion. Australia's economic industry size is estimated at $10.9 billion for 2008 and includes more than 1,200 local environmental companies.[51] Key competitive sectors include water and waste water treatment, environmental engineering, and site remediation. Australia's robust environmental industry is supported by strong governance and regulation providing outstanding opportunities for U.S. companies.[52]

Transitional States

Transitional states are developing economically at a rapid rate and are increasingly integrated with developed countries' economies. Pivotal transitional states include China, Russia, Mexico, Brazil, India, and Israel.

China is a pivotal state for a multitude of reasons, not least of which is that 1.3 billion people call it home.[53] As the world's most populous country, China's leaders rely on robust economic growth to maintain social stability. It is estimated that environmental degradation costs China almost nine percent of its GDP.[54] China is also struggling to cope with explosive urbanization that places extreme pressure on water availability, sewage disposal, and waste treatment.[55] Without large domestic investment and technological assistance from abroad, poor water availability and quality, air pollution, and inadequate waste management will continue to degrade China's environmental and national vitality.[56] Although China is the third largest environmental export market for the United States, Japanese and European firms offer fierce competition.[57] Additionally, Chinese businesses, which bear the brunt of the financial burden for technological upgrades, are reluctant to purchase top end goods and services. Therefore, unless U.S. firms are granted a subsidy program like their Japanese and European competitors, they are unlikely to expand market dominance beyond monitoring and water treatment equipment.

Russia is pivotal because of its economy, the eighth strongest in the world last year), and its extensive natural resources. It has the world's second largest coal reserve and eighth largest oil reserve, in addition to extensive mineral and forest resources.[58] There is a growing environmental market with opportunities for U.S. companies. Investments in environmental protection and clean-up focus on air and water quality, and they account for more than 78% of Russia's approximately $2 billion environmental market, one that is expanding at a remarkable rate of 20-25% a year.[59] Russia is also the world's fourth largest environmental export market according to a 2008 UK study.[60] Competition in its environmental market is dominated by Germany, Italy, and Sweden. Unfortunately, environmental regulation is undermined by confusing and unevenly enforced regulation, high levels of regional and federal government corruption, and rising

tariffs.[61] The poor status of environmental regulation contributes to dim short term prospects for U.S. investment in the Russian environmental market; those prospects, however, may be mitigated through long-term investment in partnerships with Russian firms.

Politically and economically, the U.S. - Mexican relationship is vital to the stability and well-being of both nations. The United States buys 85% of Mexico's exports; Mexico is the United States' third largest trading partner, and U.S. products account for 51% of Mexico's total imports.[62] The environmental sector trade numbers follow these same trends. Mexico ranks second in U.S. environmental exports and first in the dollar value of U.S. imports. Solid municipal waste equipment and wastewater treatment plants provide lucrative market opportunities for the United States. They generated $150 million in sales for the United States in 2008 and are anticipated to grow by 3-6% over the next few years.[63] Medical waste equipment, air pollution control equipment and services, and hazardous industrial waste equipment and services are also likely to grow.[64] Major competitors across the industry are France, Germany, Spain, Canada, the United Kingdom, and Japan. The Mexican government welcomes U.S. environmental business and defaults to EPA standards when a specific policy has not been established.

Brazil has the ninth largest GDP in the world and is the leading economic power in South America. It has the highest ranking investment-grade sovereign debt rating of any South American country.[65] As a result, the outlook for U.S. market opportunities is positive. Despite bureaucratic barriers for market entry and poor environmental regulation and enforcement, Brazil encourages investment by environmental firms and NGOs. Brazilian authorities have recognized the importance of sustainable growth and the preservation of the country's rainforest and have enacted laws to protect against, limit, and manage destructive agricultural and ranching efforts. The government lacks, however, the ability to enforce its laws fully. With agriculture and industry being the largest markets within Brazil, the most attractive environmental markets for direct foreign investment include waste management and energy.

India has the fourth largest GDP in the world, with the United States being its largest trading partner. Regionally, India has the largest GDP in South and Central Asia.[66] It is also a member of the South Asian Association for Regional Cooperation. As a result, the nation has evolved into a regional leader. Although entry into the Indian market is hindered by bureaucracy, and corruption undermines effective governance and business confidence, recent political and economic reforms are bolstering desired foreign investment. India's population has placed a high demand on natural resources and energy. The country's aging infrastructure is inadequate to support its population and requires significant investment. While India has made a commitment to environmental stewardship and reversing climate change, and has ratified the Kyoto Protocol, environmental regulation and enforcement remain problematic.

Although Israel is for the most part isolated from economic trade with its Arab and Persian neighbors, it holds significant importance as an independent power that shares many strategic interests with the United States. Its aggressive environmental reform programs and successes serve as the model for regional neighbors. For example, an industrial park in the Negev desert, once notorious for its pollutant infiltrations to groundwater, is now being required by the government to comply with stringent

wastewater treatment standards.[67] Israel openly seeks and fosters cooperation and partnership between the industrial and technological sectors for environmental improvements. In 1998, when the most recent comprehensive assessment was published, Israel's open and competitive environmental business market was estimated at over $430 million with water treatment, waste management and air pollution controls as the most lucrative sectors for U.S. firms. [68] The Israeli government has undertaken organizational reform to better devise, execute, and monitor its environmental guidelines. The potential for U.S. expansion is promising based on the two countries' long-term strategic partnership and renewed Israeli emphasis on environmental stewardship and developmental technologies.

Developing States

Developing states often face particularly severe environmental problems, and the most pivotal have far-reaching regional influences and offer the potential for an increasing environmental market presence. Egypt, South Africa**,** Nigeria**,** and Indonesia are leading examples of such states.

Egypt has significant environmental influence throughout the Arab world. Since 2004, Egypt has established and executed bilateral, regional, and international agreements in the environmental field, actively participated in multilateral environmental agreements, promoted the transfer and adoption of environmentally friendly technologies, and encouraged foreign investments in the area of environmental protection. The overall environmental technologies and services market in Egypt was estimated at over $680 million in 1998, the date of the most recent study.[69] As with many Middle Eastern nations, municipal water supply and wastewater treatment constitute the largest and fastest growing market segments and offer the best opportunities for U.S. companies. Competition in the Egyptian environmental market is significant based on the established presence of both British and French firms. Although the United States maintains a sizable market lead, European competitors overall have over 50% of the market. The 2007 investment of over $1.1 billion by the U.S. Agency for International Development for municipal water and wastewater projects, however, presents an opportunity for the United States to expand business opportunities.[70]

South Africa is the dominant economy in sub-Saharan Africa with a per capita Gross National Income of $2,750 in 2003.[71] Only 13% of the population lives in "first world" conditions, while the rest live in harsher circumstances. U.S. businesses are competitive with particular opportunities in environmental technologies and environmental consulting. Because waste management services are provided by the government, South African firms exclusively win contracts. In order to penetrate the public sector market, U.S. businesses will find it advantageous to create a local subsidiary or team with a South African firm. Primary competitors for the United States are Dutch and UK companies that have operated there for decades. Although long-term prospects for business in South Africa are good, the global recession has hurt environmental business. Likewise, class tensions often drawn on racial and ethnic lines could lead to social unrest and make the business environment less attractive.

Nigeria is a pivotal state in sub-Saharan Africa due to its large and expanding population, its economic relationship with the United States, and its poor environmental record. As the largest country in Africa, it accounts for 47% of West Africa's population.

It is the largest U.S. trading partner in sub-Saharan Africa based largely on its petroleum exports. Nearly 46% of Nigeria's oil production goes to the United States, and that supply represents 11% of U.S. oil imports. Primary U.S. exports to Nigeria are machinery, wheat, and motor vehicles. Environmental services and equipment are not major U.S. exports, and the United Kingdom and China currently dominate that market. The country has one of the world's worst environmental situations. Half of all child deaths in sub-Saharan Africa and a tenth of the world's maternal mortality occur in Nigeria due to water pollution. Recently, Nigeria has embarked on a policy of privatization of environmental services and as such the government has reduced its spending on waste management from $165 million in 1995 to $5 million in 2001. The Nigerian government cannot effectively enforce laws, and the implementation of a successful environmental program is contingent upon more extensive and effective governance.

Indonesia is pivotal because of its geographic position at the crossroads of major trade routes and because of its large forest and mineral reserves and vast reefs that provide biodiversity and fishing sources to many other Pacific and Indian Ocean neighbors. Politically, Indonesia must balance its key trading relationship with China with its concern over Chinese regional hegemony. Indonesia uses the United States as a counterweight, providing potentially rich opportunities for U.S. businesses. Indonesia's environmental market size is estimated at $2-3 billion annually and is growing. More than 70% of the market is in water and waste water treatment.[72] Poor governance and regulatory enforcement are key barriers to entry. Japanese firms are the key competitors to U.S. environmental firms, particularly in fishery and reef restoration as well as waste water treatment.

INTERNATIONAL TRAVEL OBSERVATIONS

The seminar's travel to South America provided students an opportunity to reflect on many of the key themes explored over the course of the semester. Foremost among complex issues, the quest for economic development frequently clashes with environmental stewardship; in rare circumstances, the two goals are pursued in harmony. Ecuador and Brazil, home to world-renown environmental treasures, face unrelenting and rapid development.

The Galápagos Islands -- a unique biosphere threatened by the pressures of tourism, a growing permanent population and climate change – has seen a 300-fold increase in cars over the last few years, rising water temperature and shifting currents that harbinger possible extinction for rare species, and encroachment of protected land through development. At the same time, the study group heard about the Ecuadorian government's efforts to limit immigration to the islands and observed firsthand the town of Puerto Ayora's extensive recycling process and a farming project that combines profit with environmentally-friendly practices. Mainland Ecuador's oil pipeline provides critical income for the country and financially supports a number of Ecuador's environmental projects, but it also poses an environmental hazard. One speaker estimated the volume of the pipeline's leaks to be more than the Exxon Valdez oil spill in Alaska. A low-tech clean-up project witnessed along a river damaged by the pipeline appeared basic and of doubtful efficacy; the workers wielded simple mops.

The Brazilian authorities are also struggling to meet the demands of both environmental stewardship and economic development. Uncontrolled cattle grazing and soybean farming in the Amazon are deforesting the world's largest rain forest, the consequences of which could be dire far beyond Brazil. The issue is far from clear cut, however. Research at the Large-Scale Biosphere-Atmosphere Experiment in Amazonia suggests that the Amazon basin may not be, as widely thought, a carbon sink that absorbs CO_2 and produces oxygen because decomposition and fire make the forest a CO_2 emitter as well. Beyond its possible role in neutralizing greenhouse gases, the rainforest and its rich eco-system retains environmental value as an indigenous human habitat, for its biodiversity and its key role in influencing precipitation patterns for the continent. While the Brazilian government has enacted laws to protect the rainforest, it lacks effective enforcement; private enterprises are essentially policing themselves with mixed results.

ESSAYS ON MAJOR ISSUES

The selections are arranged in a "step down" approach. The first examines why the environment, and the industry that supports it, are fundamentally strategic. The second addresses whether companies that invest in environmentally friendly practices and technologies gain a competitive edge. The third selection is a meditation on the concept of sustainability and the sobering challenges to achieving it. The fourth selection examines the state of environmental education and literacy in the United States today, issues of fundamental importance to the future regulatory landscape and the health of the industry.

The Environmental Security Nexus: Economic, Strategic Effects and U.S. Strategic Aims

As a critical part of the environment, humankind has to be in harmony with the broader environment so that anthropogenic changes do not induce the resource scarcities and ecological stresses that could impair human security. This environmental security nexus embraces resource scarcity and environmental degradation and spawns a thriving environment industry that, because it has economic and strategic effects, has a unique contribution to make to U.S. strategic aims. Today insecurity, instability, and conflict abound because the environmental security of many areas continues to be unmet. Environmental security, according to Jerome Glenn, Theodore Gordon and Renal Periled, is "the relative safety from environmental dangers caused by natural or human processes due to ignorance, accident mismanagement or design and originating within or across national borders."[73]

Is there a contradictory relationship between the environmental goods and services (EGS) industry and the environmental strategic effects of insecurity, instability and conflict potential? The specter of a contradictory relationship probably gains currency from the existing confusion surrounding access to and exploitation of natural resources and their linkages to conflict. Since 1990, approximately 40% of intrastate conflicts have been linked to natural resources. Three broad themes link the environment and natural resources to conflict: they contribute to the outbreak of conflict; they finance and sustain conflict; and they undermine peacemaking efforts.[74] On the contrary,

however, EGS business activities promote economic growth and employment as well as facilitate the transfer of skills to underdeveloped countries prone to conflict.

The U.S. environment industry has an invaluable contribution to make in furthering the nation's strategic aims. It can do this by first obtaining a seat at the national security policymaking table to sensitize policymakers on the role and benefits that can accrue from having environmental security on the agenda. Colonel W. Chris King, writing for the Army Environmental Policy Institute on the military's mission in environmental security, advances three compelling reasons for integrating environmental security into national security. First, it is a moral requirement; second, the United States has an obligation because it consumes a large percentage of the world's renewable and non-renewable resources; and third, it serves U.S. national interests to engage in conflict prevention actions rather than the more costly conflict remediation efforts.[75]

The impact of climate change on the military must also be factored into considerations of environmental security and U.S. strategic aims. A military advisory board comprising retired U.S. flag officers has studied the threats of climate change to national security. Of the five recommendations made, three had direct implications for the military. First, the United States "should commit to a stronger national and international role to help stabilize climate changes at levels that will avoid significant disruptions to global security and stability."[76] Second, climate change effects of rising sea levels and other extreme weather events will affect U.S. military installations nationally and internationally as several are in low-lying coastal areas. Third, there is a need for the Department of Defense, being a large emitter of greenhouse gases, to "enhance its operational capability by accelerating the adoption of improved business practices and innovative technologies" to produce energy efficiencies. This would also contribute to energy security by reducing energy dependence on foreign energy sources. If the world, led by the United States, does not undertake actions to secure our environment, then the words of Ole Danbolt Mjoes, the Nobel Peace Prize Chairman, will become prophetic: "Peace on earth depends on our ability to secure our environment."

-- Julian B. Lovell

Linking Environmental Behavior and Economic Performance

Corporations, the engines of the capitalist markets whose existence depends on access to the material and human resources necessary for production, are beginning to understand and adapt to the limitations of the earth's natural systems. Accompanying this is an increasing acceptance that good environmental performance can translate into improved financial performance, and that the internalization of the costs of doing business has long-term benefits for corporations and society as a whole.

Environmental markets are badly distorted as they fail to capture the true environmental costs of production. Our main economic measurements, gross domestic product and gross national product, generally fail to measure environmental impacts of production because the impacts are viewed as "external costs" to be borne by society as a whole. For example, the "market value" of a forest is often in the price that can be obtained for its wood, even though the standing forest may be worth much more for its contribution to water control, climate regulation and tourism.[77] Given this inherent

market shortcoming, and the requirement for a corporation to maximize return on investment, what factors ultimately drive a corporation's environmental behavior?

Regulations, production efficiencies, and market forces all tend to drive a corporation's environmental performance. Environmental regulations were initially developed to protect public health and safety and to address degradation of the environment due to human activity -- the "external" costs of our way of life -- by imposing fines and penalties on harmful activities. While effective, penalties and fines alone are insufficient drivers of behavior; they need to be supplemented by economic instruments such as taxes, pollution charges, and the elimination of subsidies for resource use. Another driver of environmental performance is an understanding that resources will continue to cost more as population grows and industrial activity increases. Through more efficient manufacturing and the use of new technologies, processes and materials, companies can reduce their consumption of raw materials and energy and lessen the ecological impacts and resource intensity of their products through the life cycle of the product. Lastly, market forces themselves provide a significant driver of corporate environmental behavior. This is rooted in the power of local communities and markets, including investors and consumers, to impact an irresponsible company's bottom line through their purchasing and investment choices.[78]

The empirical evidence supporting a link between pollution prevention and other forward-looking initiatives with corporate profitability is inconclusive, with some studies showing no effect or a drag effect on profitability.[79] If these extra-market factors, however, are instead looked at from the stand point of cost of capital and market valuation, a direct relationship is observed. By taking actions or making process changes necessary to avoid the costs associated with regulatory action or ecological taxation, a company will be able to decrease its exposure to fines and lawsuits and increase its market valuation. Analysis of more than 300 of the 500 companies that make up the Standard & Poor's index suggest that adopting a more environmentally proactive posture has a favorable impact on a corporation's perceived risk to investors and, accordingly, its cost of equity capital and value in the market place.[80]

A corporation's profitability is also dependent on its ability to reduce overhead and production costs. As the costs of raw materials, water and energy increase, so too will the financial benefits realized from process improvements and efficiencies. These improvements can result in a reduction in resource use and/or the switch to less environmentally harmful alternatives and a corresponding reduction in pollution. Such process improvements almost always result in long-term cost reductions and therefore an increase in profitability.

In the final analysis, as the human population grows, more and more demands will be placed on resources. The companies and nations that understand these limitations and implement more efficient, socially responsible and sustainable development practices will have a competitive advantage in the market, while ensuring the long-term health of the environment and the quality of life afforded to future generations.

-- David Mitchell Quivey

Sustainability – How Do We Get There From Here?

There is no single definition of sustainability agreed to by everyone, though most agree that sustainability and sustainable development are used interchangeably. The World Commission on Environment's 1987 report *Our Common Future* defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."[81] While this definition is short and somewhat ambiguous, the remainder of the document delineates the inclusivity of the definition. It includes not only environmental protection, but also social equity and economic prosperity, all tied to the idea of an inhabitable future earth.

The earth is only as big as it is, and it is the only home we have. As the population continues to grow and countries continue to develop economically, we are pulling more natural resources from the earth and creating more pollutants than our world can handle. At the current rate of consumption, we are exceeding the earth's ability to regenerate and, in some instances, damaging the environment beyond remediation.[82]

At the individual level, it sounds like an easy task to live a sustainable lifestyle until you begin to execute. As far as I can tell, there is no significant impact on the world if I use plastic bags for my groceries instead of reusable cloth bags or if I throw my glass, aluminum cans, and plastics in the trash instead of the recycling bin. Every time I act in an unsustainable manner, the world around me still looks, acts and feels the same. It is this lack of instant feedback that exacerbates the issue. According to John Kotter, people do not change by thinking and analyzing but through a see-feel-change methodology.[83] In order to change behavior, you must affect the underlying value in order for that change to become permanent.

It all comes back to a willingness to change and to stop living for today. The question we must answer is whether or not we can make the change in our values to facilitate the actions necessary to ensure the perpetuity of our own race on this planet. There have been numerous conferences, action plans and actions taken, but is it enough? I would surmise it is not and tend to agree with a guest speaker who opined that we would not get the rich countries to lower their consumption until they began to suffer the effects of their consumption in a personal manner.

Many credit Rachel Carson for providing the impetus to move toward sustainable development with her book *Silent Spring* in 1962. In my opinion, Dwight D. Eisenhower also helped provide that impetus in 1961 during his farewell address to the nation:

> "As we peer into society's future, we – you and I, and our government – must avoid the impulse to live only for today, plundering, for our own ease and convenience, the precious resources of tomorrow. We cannot mortgage the material assets of our grandchildren without risking the loss also of their political and spiritual heritage."[84]

President Eisenhower had a vision of what could happen to our world if we do not curb our consumption and seek a balance to harmonize our existence with the world around us. Life is all about choices. It is time we made some hard choices about our world and our environment.

-- Betty Yarbrough

Creating an 'Active Citizenry'

The United States has clearly "greened" since the first Earth Day in 1970; businesses dealing with environmental issues are flourishing and environmental legislation has had enormous impacts on American growth and development. But, ironically, the level of national environmental literacy and the quantity and quality of environmental education do not correlate to this high level of consciousness.

The National Environmental Education Act of 1990 created the National Environmental Education Advisory Council (NEEAC) which defined environmental education as "a learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address these challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action."[85]

The NEEAC identified problems facing environmental education, including limited resources to sustain programs, gaps in program development and access to quality materials, and a nonexistence of universal guidelines to assure quality program development and implementation. Among its key findings are the following:

1. Environmental education is not a priority across the country.
2. State, local, and tribal efforts need greater resources and support.
3. Professional development for teachers and nonformal educators needs greater support and improvement.
4. Evaluation, quality assurance, and access to materials and information on programs are limited.[86]

Sustaining support is difficult because environmental education has become increasingly politicized over the past 20 years, with industries and businesses going on the offensive and objecting to how their business operations are often portrayed. Some critics call environmental education textbooks "alarmist", "emotional", "issue-driven", and based on an "anti-anthropocentric philosophy." On the other side, environmental activists express outrage at corporate-sponsored curriculum. In the end, fighting over environmental education among those with a political bias has become an impediment to promoting a neutral, science-based environmental literacy, and has probably deterred political support for improving and expanding environmental education efforts.

One observer in the early 1990s noted that "environmental education has produced ecologically concerned citizens who, armed with ecological myths, are willing to fight against environment misdeeds of others but lack the knowledge and conviction of their own role in the environmental problems."[87] This comment underlines one of the key NEEAC assertions that environmental education should be "a positive, pro-active tool for environmental compliance" and crystallizes its key message that "environmental education has as its central mission the development of an active citizenry."[88]

According to a Chinese proverb, "a wise man makes his own decisions; an ignorant man follows public opinion." To solve the environmental issues currently facing the United States and the globe, we need more wise men and women who can not only make their decisions, but can construct the solutions needed.

-- Mary Ellen Koenig

CONCLUSION

Environmental degradation, natural resource depletion, greenhouse gas emissions, and climate change all potently combine to pose challenges for U.S. national security. The nation must ensure the longevity of its natural resources, develop renewable energy sources, and strive to mitigate climate change. Government action at all levels will be crucial to advancing that agenda. While an enhanced regulatory framework will be contested by industry, government action must make the national, and by extension, international "commons" a priority. Industries must increasingly internalize sustainability, reduce waste, increase energy efficiencies, and either accept the increased costs that accompany tightened regulations or innovate to avoid them.

Within these challenges lies opportunity for the U.S. environment industry to expand its market share and develop new and advanced technology. With anticipated growth within the industry, the United States can position itself to maintain its competitive edge by expanding its environmental export market and investing further in research and development.

No nation is an island in the inter-connected world of environmental security. The United States' national security depends to a large degree on sustainable development, both at home and abroad. Given this global interconnectivity, the United States must promote sound environmental practices through example and leadership. With increasing public sensitivity to environmental concerns, U.S. prestige will be diminished if it, as one of the top CO_2 emitters, does not advocate, shape and abide by greenhouse gas agreements.

In the mid-20th century, the United States was at the forefront of a movement to create multilateral institutions to address crucial national security priorities. Those priorities focused on collective physical security and a stable economic system. Over the intervening half century, perceptions of what constitutes national security have evolved, often at a faster pace than the institutions' ability to adapt to new challenges. In the 21st century, the environment is gaining recognition as a critical national security priority. The United States should be at the fore of a new movement to implement an effective, multilateral approach to dealing with environmental challenges. It should press for a new international mechanism, whether embedded in the UN or apart from it, to negotiate international agreements, set objectives and standards, settle disputes and enforce provisions based on an agreed legal foundation.

In taking these steps, the United States will retain and expand its role as a global leader. To ensure enduring national security, the country must be a pace setter in the environment industry, an advocate of environmental regulatory development and compliance, and an active proponent of sustainable development. As Friedman so aptly observed, the country "that owns green" will have enhanced economic and political power -- crucial components of national security -- in the years to come.

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