Air Pollution in China: Is the United States Responsible?

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Abstract

In the last two decades, an economic boom in China has occurred due to the rapid export-driven industrialization within the country. This growth in coal-powered manufacturing has in turn caused a rise in air-borne pollutants and has negatively affected the environment as well as the health of those within the country and in the surrounding nations. The United States has a responsibility to help reduce the amount of emissions produced in China because of the negative affects these pollutants are causing. Moreover, a large amount of the manufacturing occurring in China has come about as a result of American outsourcing of manufacturing to the country. Thus, the only way to bring about a positive change and curtail the rising amounts of harmful chemicals such as CO_2, SO_2, NO_x and particulate matter is for the United States to aid China to implement joint measures of pollution prevention and control. Funding and encouragement from the United States to work together with China will result in more successful policy that both countries can comply with, rather than world wide treaties which have been fruitless in the past.

Project Goals/Objectives

- Establish a correlation between emission levels and manufacturing of exports in China
- Determine why China's government has so far failed to address increasing emissions
- Explain why China's pollution creates a global problem
- Track the movement of pollutants across the ocean and their effects on environment and health
- Prove that United States has a responsibility to provide humanitarian, environmental and economic aid to China in solving the air pollution problem

Conclusions/Recommendations

We have found that the United States has a measurable amount of responsibility towards reducing the emissions in China. Around 25% of all goods produced in China are exported to the United States. Of the overall emissions of SO_2, CO_2, NO_x, and particulate matter generated from the coal plants, up to 14% of these emissions can be traced directly to the production of goods exported to the United States. These emissions cause health problems such as respiratory illness and environmental issues such as acid rain and global warming, and these effects are felt heavily not only in China but across the entire globe, even in the United States. These facts clearly show that the United States has an economical, environmental and humanitarian responsibility to work with China to create viable and constructive emission standards.

Why hasn't China solved its own pollution problem?

The industrialization of China has taken place in the past two decades and has occurred at a tremendous rate of speed. Because China relies on the burning of coal as their main energy source, and coal is one of the most polluting forms of energy, the air quality in China is deteriorating very rapidly. Figure 1.b below shows the sharp increase in sulfur dioxide emissions in China as the country began to industrialize.

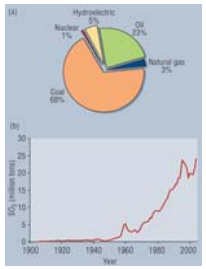

Fig.1. Primary Chinese energy sources in 2003 and (b) the historical growth of SO_2 emissions. Garrison, Arthur W. "Acid Rain in China." *Environmental Science and Technology* 40.2 (2006). 27 Nov. 2007 <http://pubs3.acs.org/acs/journals/toc.page?incoden=esthag&involume=40&inissue=2>.

China has not been successful in cleaning their environment and preventing the increase in pollutants because the country industrialized at such an enormous rate. The attitudes of communist leader Mao Zedong who led the industrial revolution of China were very negative towards the environment, and because of this, the people in China have been very uneducated about the situation their industry is creating for the country. The attitudes of the current government are also restricting the implementation of environmental policy. Because the local, and national leaders of China have all been very focused on the development of the economy, the protection of the environment has been ignored. In order to make cleaning the air a greater priority in China, the United States needs to intervene.

Why is the United States economically responsible?

Economically, China is dependent on other nations. The growth of its economy is based off of increased industry, which thrives because of other countries outsourcing their production to China in order to take advantage of China's cheap production costs. The influence of China's main source of revenue, the manufacture and trade of exports, on environmental problems is apparent when one takes into account the percentage of GDP that comes from the manufacture and shipment of goods.

The United States is receiving 25% of China's overall exports; up to 14% of China's emissions generated from exports can be linked to China-U.S. trade. American trade with China alone increased global CO_2 emissions by 720 million metric tons from 1997-2003 (Funk 3). The high extent to which America takes advantage of Chinese manufacturing obligates the country to step in and work with China to find a viable solution that allows both economies to continue to thrive.

Sector/Activity	Fraction of Emissions due to Exports			
	VOC	RSP	NO_x	SO_2
Power Generation	0.08	0.21	0.31	0.32
Industry	0.21	0.35	0.45	0.44
Transportation	0.05	0.10	0.22	0.29
PRDEZ Total	0.08	0.24	0.28	0.37

The table above adapted from a table in *Environmental Science and Technology* journal, shows the percentage of emissions in the Pearl River Delta Economic Zone (PRDEZ) that can be attributed to the production of exports. The four rows represent the amount to which certain emissions come from the production of energy for purposes of manufacturing, the overall industry including the manufacture of goods and materials cost, the transportation of finished products, and the total amount of export emissions in the PRDEZ. As one can see, a substantial majority of all types of pollutants can be traced to exports, and since a large portion of the exports come to the United States, the United States has an obligation to help reduce the emissions.

How does China's pollution affect the United States?

Though many thousand miles apart, the harmful effects of China's pollution also affect the United States. Chemicals and particles released from Chinese factories are absorbed into the air, and travel across the Pacific to the western United States. As shown in Figure 3 below, it has been found that mercury originating in China is traveling to rivers in Oregon, where it concentrates in fish, making them unsafe to eat.

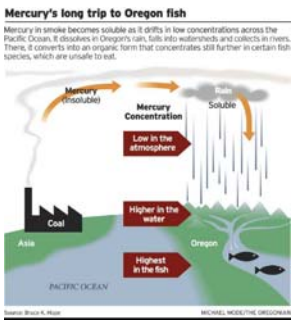

Fig.3. Read, Richard. "China's mercury flushes into Oregon's rivers." 24 Nov. 2006. 5 Dec. 2007. <http://www.usconservation.org/china/china%20pollution.htm>

Certain emissions released anywhere in the world also have damaging affects on the global environment. Carbon dioxide (CO_2) is a "greenhouse gas," one of the primary human-imposed causes of global warming. Though most of the damage done to the ozone layer in the past has come from countries other than China, the continued increase of coal burning power plants will likely cause China to continue to be the largest contributor in the future. Though China seems very far away, its emissions have negative affects on both the United States, and other closer nations, as well as on the condition of the global environment as well.

What are the health and environmental effects of air pollution in China?

Fig. 4.1

Coal power plants release a huge number of toxic chemicals and substances into the air including carbon dioxide, sulfur dioxide, small airborne particles, nitrogen oxide, carbon monoxide, hydrocarbons, mercury, arsenic, fluorine, lead, cadmium, trace amounts of uranium, and other toxic metals (Union of Concerned Scientists). These chemicals are extremely damaging to health and the environment.

Sulfur dioxide (SO_2) is one of the most concentrated pollutants in China, which causes acid rain. It also forms small particles which enter the lungs and cause breathing difficulty, respiratory illness, and extra aggravation for people with heart disease (U.S. Environmental Protection Agency). Mercury is highly poisonous and is thought to cause fetal and child developmental problems (Bradsher). Arsenic, in excessive amounts, causes pigmentation (flushed appearance, freckles), hyperkeratosis (scaly lesions on the skin, generally concentrated on the hands and feet as shown in Figure 4.2), Bowen's disease (dark, horny, precancerous lesions of the skin), and squamous cell carcinoma (Finkelman). Fluorine causes fluorosis, which results in limited movement of joints, mottling of tooth enamel, and severe bone deformation as shown in Figure 4.1 (Finkelman). It is estimated that all of the combined air pollution in China kills 400,000 people every year (Mone 33).

Fig.4.2. Finkelman, Robert B. (U.S. Geological Survey), et al. "Health Impacts of Coal and Coal use: Possible Solutions." International Journal of Coal Geology 50.1(2002): 425-43.

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