

China's Rise and Environmental Degradation: The Way Out

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Abstract

China's remarkable economic success is accompanied by environmental degradation. Without a doubt, some of the most profound environmental changes are under way in China, but China's environmental problems are still severe. Nevertheless, scholars around the world have different perspectives on the major causes of China's environmental degradation, the domestic and global implications of environmental degradation, and how China should cope with its environmental issues. This paper will re-assess China's environmental problems and analyze its main causes in a global context, and argue that the current environmental degradation of China is actually an unavoidable result of China's modernization during globalization. Coping with China's environmental problems is a comprehensive project, and it may take a long time to accomplish the project's goal. Either ignorance of environmental problems or unrealistic expectations could damage the battle fighting China's environmental degradation.

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1. Introduction

China has achieved remarkable economic success in the post-Mao era and its economy has grown tenfold since 1978. However, China's rise parallels environment degradation. Today, China faces looming environmental issues, as it is becoming one of the largest and most polluted countries in the world. According to the 2010 Environmental Performance Index released by Yale University and Columbia University at the World Economic Forum, China ranked 121 out of 163 countries on the list.¹ The Chinese government

realized the serious consequences of the environmental degradation and has launched a campaign on environmental protection. Some of the most profound environmental changes are under way in China, but its environmental problems are still severe. The dominant viewpoint in Western societies suggests that China economic growth has damaged the distribution of the earth's natural resources and energy and threatens the global economy and environment. They warn that the rest of the world cannot ignore China's environmental degradation, because, ultimately, the whole world is affected by many of the devastating catastrophes originating in China.² To push the Chinese government to do more in improving China's environment, the U.S. Embassy in China has set up a monitoring point on the embassy roof in 2009 and posts hourly air-quality data on its popular Twitter feed. However, a senior Chinese official demanded in May 2012 that foreign embassies stop issuing air pollution readings, saying it was against the law and diplomatic conventions.³ This reflects the many differences between China and the Western societies on some critical issues: Do China's environmental problems threaten the international society? Is it possible for China to avoid environmental degradation while it is on rise during globalization? What are the main causes of China's environmental problems? Will China be able to solve its environmental problems in a short period of time? This paper will re-assess China's environmental problems and analyze their main causes in a global context, and argue that the current environmental degradation in China is actually an unavoidable result of China's modernization during globalization. Coping with China's environmental problems is a comprehensive project, and it may take a long time to accomplish the project's goal.

2. Environmental Degradation in China

Today, China is facing almost all of the world's ecological challenges: climate change, desertification, deforestation, declining water resources, acid rain, soil erosion, air and water pollution, and biodiversity loss, etc. Pollution is the basic problem amid all other environmental problems. The pollutants are broadly divided into seven types, including contaminated water, polluted air, solid waste, radioactive substances, noise, soil pollution and others.

Polluted air is one of the most serious environmental problems affecting the daily life of the Chinese people. Polluted air is everywhere in China. It is especially severe in metropolitan areas. Sixteen of the world's twenty most polluted cities are in China. According to a scientific report, "the air quality of nearly 70 per cent of urban areas [does] not meet the country's national ambient air quality standards (NAAQS)" and "nearly 75 per cent of urban residents [are] regularly exposed to air considered unsuitable for inhabited areas."⁴ Ordinary Chinese are starting to miss blue skies, clean rivers, green

forests, and birds.⁵ Air pollution is grave in some heavily industrialized cities. Air pollution is “in every major northern city and many urban areas in the south are exposed to air pollution levels that are three to seven times higher than World Health Organization guidelines.”⁶

China supports 22 per cent of the world's population with only 8 per cent of the world's water. Although China ranks fifth of all nations in water resources on a per capita basis, China's water supply is 25 per cent below the global average, and it has only one-fifth as much water per capita as the United States.⁷ As south China is relatively wet, the water supply problem is most acute around big cities in northern China, where precipitation levels are lower than in the south. The shortage of water has resulted in a lack of drinking water, especially in metropolitan areas. According to a survey of more than 600 Chinese cities, two-thirds of them had inadequate water supplies, while one of every six experienced severe water shortages.⁸ As incomes continue to increase and more Chinese people move from older housing into homes with modern plumbing, the amount of domestic wastewater has drastically increased.

Recent studies suggest industrial pollution contributes more to China's water shortages than was previously assumed.⁹ More lakes suffer from sedimentation and diminishing water surfaces as a result of physical and human factors.¹⁰ About 70 per cent of China's lakes and rivers were polluted to some degree. In a survey taken in 2004, it was found that 28 per cent of 412 monitored areas of seven major rivers in China were rated of no practical use.¹¹ Between 2001 and 2005, about 5 per cent of Chinese wells contained more than 50 micrograms per liter of arsenic, which affected 582,769 people.¹² Seventy-five per cent of surface water flowing through urban areas of China is not suitable for drinking, and 90 per cent of urban ground water is contaminated. Nearly 500 million people lack access to safe drinking water.¹³ Chinese officials have acknowledged that 300 million people drink contaminated water on a daily basis, and of these, 190 million people drink water that is so contaminated, and it makes them sick. Water pollution is more serious in east China than in northwest China. The Yangtze River and Yellow River provide drinking water for tens of millions of Chinese people, but more than 10,500 chemical companies are located along their banks. Any single accident could lead to disastrous consequences.¹⁴ The harbours of the Yangtze River and the Yellow River are already listed as dead zones by the United Nations—low oxygenated areas and de-oxygenated zones in which fish and shrimp cannot survive, and even sea plants cannot grow.

China's ocean has also become polluted. China's coastline extends 18,400 kilometers and abuts four seas: the Bo Hai, the Yellow Sea, the East China Sea, and the South China Sea. In 2006, China's seas generated \$270 billion GDP, but the booming economy has increased the degradation of the ocean.

Untreated sewage is being dumped into surrounding estuaries, creating a surplus of red phytoplankton. Red tides are becoming a common occurrence in China, killing off marine life and adversely affecting the surrounding coastal communities. The ocean pollution comes from industries, agriculture, domestic sewage, oil and gas exploration, and fish farming.¹⁵ Consequently, polluted oceans make seafood unsafe to eat and damage the local ocean industry as well.

Lands in China are also polluted. About 1.03 million square kilometers of land are degraded by soil erosion. Land erosion in certain areas, such as the Yunnan, Guizhou, Jiangxi and Hubei provinces, has ranged between 40 per cent and 70 per cent of the cultivated area.¹⁶ China has one of the most serious soil erosion problems in the world, and this immediately raises food security concerns. Land erosion directly results in arable land shrinking. China has 22 per cent of the global population, but just 7 per cent of the world's arable land. China loses up to 5 billion tons of soil due to erosion every year. The nutrients lost are the equivalent of 40 million tons of fertilizer, which in turn equals the amount of chemical fertilizer used annually by Chinese agriculture. About 40 million *mu* of cultivated land has been destroyed by erosion since 1949. This clearly represents a huge loss to Chinese agriculture. The Ministry of Land and Resources predicts that grain-producing land will decline by 0.18 per cent annually. China will have to import 300 million tons of grain by 2030. However, there will be only 200 million tons of commercial grain available by that time.

China's forest is diminishing while desertification is expanding. Official Chinese statistics indicate that in 2003, China's forest covered 18.21 per cent of the country's total area. Today, forests only cover 14 per cent of China's land. In recent years, they have decreased at an annual rate of 5,000 square kilometres.¹⁷ Desertification has already swept over 30 per cent of China's land. In Inner Mongolia, residents have been forced to abandon their villages because the desertification is so severe. Although the desertification has been curbed in some areas, it is still expanding at a rate of more than 3,000 square kilometres every year.

China's environmental problems are severe but it does not necessarily threaten the international society. There is a theory that China's rise inevitably damages the distributions of international resources, energy, and economy, and imposes a serious threat to global economy, energy, resources, and environment. It is true that more than half of world's population has entered industrial society and it has seriously impacted on the system of global resources and ecology. As a result, it comes out an issue of the distributions of the rights to global environmental development and the responsibilities to global environmental governance. The theory of China's environmental threat reflects that Western countries are worrisome to the current pattern of the

global natural resources and hope to maintain its dominant position through global environmental governance in order to contain China. Thus, China faces great challenges to theories of its sovereignty, the principles of its diplomacy, and its responsibilities to the international society.

China is the the world's biggest energy consumer and greenhouse gas emission because of its large population and economy. In 2008, China surpassed the United States as the largest global emitter of greenhouse gases by volume. However, China's carbon dioxide pollution is largely caused by the manufacturing of goods for developed countries.¹⁸ It is not China, but the U.S. is the biggest country which consumes energy and produces greenhouse gas emission in terms its per capita. Since the 1990s, American people have largely consumed goods produced overseas, mainly in China and other Asian countries. Thus, it cannot be justified that China's environment threatens the international society. Instead, the U.S. and other developed countries should take major responsibility in global environmental governance, because they have created the current environmental problems. In addition, environmental degradation is a by-product of industrialization. No country can avoid a certain level of environmental degradation during the process of modernization. It is not surprising that China's environmental degradation has become severe since the Chinese economy took off in early 1980s, as environmental problems were even more severe in some European countries during the Industrial Revolution between the seventeenth and nineteenth centuries.

3. The Consequences of China's Environmental Degradation

Poverty, disease and environmental problems are the three greatest challenges nations face in the twenty-first century. The three problems are interrelated, but the environmental problem is the most serious and costly one. China's environmental problems have a negative impact on China's domestic development and the global community.

China's environmental degradation hinders the development of Chinese economy and bites into economic growth. For example, China has a big acid pollution problem, which falls on over 30 per cent of the country.¹⁹ Acid rain is estimated to cause more than \$4 billion a year in crop damage, as well as close to \$1 billion in material damage. In September 2006, the State Environmental Protection Administration of China (SEPA) and the National Bureau of Statistics of China (NBS) jointly released the first green GDP report that indicated that environmental pollution cost China 511.8 billion *yuan* (USD64 billion) in economic losses in 2004, accounting for 3.05 per cent of the country's GDP.²⁰ The World Bank estimated that China's economic losses due to environmental degradation amounted to eight per cent of the country's GDP. In recent years, in fact, overall costs to China's

economy from environmental degradation are estimated at 8 to 12 per cent of GDP annually.

China's environmental problems have directly damaged Chinese people's health. Air pollution affects respiratory systems and the visibility of the atmosphere.²¹ Much of the indoor air pollution in China is caused by the use of solid fuels in simple household stoves. Although China has been experiencing great urbanization, more than 65 per cent of the population is still rural, most of which still uses biomass and coal fuels that produce substantial pollution.²² Coal and biomass are difficult to burn in simple household devices without emitting pollutants. There is great difficulty in premixing the solid fuels and air before burning. Thus, the burning of these solid fuels poses a great health risk to those cooking with the materials. With this inability to pre-mix, anywhere from 10-38 per cent of what is being burned off become dangerous pollutants that harm those who inhale them.²³

Pollution has made cancer China's leading cause of death. Air pollution is a major cause of lung cancer, as harmful particles enter the lungs and cannot be discharged.²⁴ Particle pollution from the burning of coal causes approximately 50,000 deaths per year in China. Air pollution is estimated to be the main cause of nearly 50 per cent of all respiratory ailments. The number of pollution-related deaths has already reached 750,000 per year.²⁵ Keith Florig notes that: "Today, diseases linked to air pollution are among the largest threats to public health in China, ranking with smoking as the most frequent cause of death."²⁶ Pollution is also responsible for between 380,000 and 500,000 premature deaths annually, and that number will likely reach 550,000 in 2020. An additional 90,000 die each year due to water contamination.²⁷

China's environmental problems have intensified the conflicts between the government and society, which triggers social protests and undermines social stability. About ten per cent of China's social protests are related to pollution. Official Chinese data demonstrates that unrest began rising rapidly between 1993 and 1995. The government admits to a nationwide increase of 268 per cent in mass incidents from 8,700 in 1993 to 32,000 in 1999,²⁸ from 58,000 incidents in 2003 to 87,000 in 2005.²⁹ In 2010, the number of protests in China was alarmingly high, reaching a total of about 180,000. Consequently, the budget for the government to maintain social stability (*wei wen*) is increasing and has exceeded its military budget. China is entering a peak period for mass incidents and in the next several years may face even more conflicts that will greatly test the governing abilities of all levels of the CPC.³⁰ Although China has become unprecedentedly prosperous, social unrest could continue to contribute to internal strife, economic downturn, and uneven growth.

The growing environmental problems have damaged China's image in the international society, and have become the world's problems too. Sulfur

dioxide and nitrogen oxides spewed by China's coal-fired power plants fall as acid rain on Seoul and Tokyo. According to the *Journal of Geophysical Research*, much of the particulate pollution over Los Angeles originates in China. The environmental issue is one of the hottest topics between China and the United States because it applies to all other issues. For example, why is the cost of Chinese products so low? Not only do Chinese enterprises use cheap labour but they also save on the cost of environmental protection. Under the Obama administration, the U.S. government has paid more attention to climate changes and makes climate change a national priority.³¹ If the Chinese government does not handle the environmental issue well, it will seriously hurt their relations with other countries.³²

4. Will China be Able to Solve the Problems in a Short Period?

A high percentage of Chinese people are pessimistic in response to this question, because they simply believe it is very difficult to deal with such a complex project. First of all, China's environmental degradation is a common issue in a global context. During the industrial revolution European countries experienced the same environmental problems that China is currently facing, but for them the peak of pollution is over. There are many environmental issues in the global community today, including biodiversity protection, desertification control, nuclear safety, protection of the ozone layer, marine pollution by dumping wastes, the trans-boundary movements of hazardous wastes, global climate change, conservation of wetland ecosystems, and the international trade of endangered wildlife. Under this circumstance, it is almost impossible for China to tackle their problems alone without close international cooperation, in order to effectively battle global environmental degradation. Since China reopened its door to the rest of the world, the country has signed 17 international environmental treaties, which are related to 11 global environmental issues, such as biodiversity protection, desertification control, nuclear safety, protection of the ozone layer, marine pollution by dumping of wastes, global climate change, conservation of wetlands, and prior informed consent procedure. The Chinese government made an announcement before the Copenhagen Climate Conference that the government would pledge to cut the amount of carbon dioxide emitted for each unit of national income 40 to 45 per cent by 2020. According to the Xinhua Agency, this is a voluntary action taken by the Chinese government based on its own national conditions and is a major contribution to the global effort in tackling climate change.³³ However, words do not necessarily reflect deeds. It takes time for members of treaties to implement the international treaties.

Government's involvements play critical roles in battling environmental problems. However, there are so many domestic problems in China. Among

all the domestic problems China faces, the environmental problems rank neither on the top nor at the bottom. Some scholars suggest that “the limited capacity of the political system, combined with the plethora and scope of environmental problems, mean that not all problems receive the same level of policy attention.”³⁴ The Chinese government is able to invest only limited efforts in improving its environmental degradation. The environmental protection battle involves many aspects of government affairs such as public health, business, labour, and trade. Thus, the central government is required to consult with various departments at the national level in order to set an effective proposal for solving environmental problems.

China environmental problems are derived from multiple sources that are not easily eradicable in a short period of time. It should be noted that a country’s level of environmental degradation is unrelated to the level of economic development and the nature of the political system. At present, environmental problems are critical in Asia, especially in developing countries, such as India, Vietnam, and China. In comparison, Africa is an undeveloped region, but environmental problems in Africa are worse than people thought. Conversely, India is a democratic system, but environmental problems are severe. Singapore is an authoritarian regime, but the country is as clean as a beautiful park. The nature of the Chinese political system does not necessarily negatively affect China’s environmental problems. Instead, the highly centralized administrative system makes it even easier to create laws and put them into practices.

To be sure, industries are major polluters. Since the foundation of the PRC in 1949, their ultimate goal has been to industrialize China. In 1950, Mao Zedong made it clear that his plan was to build factories with smokestacks all around China. In the early years of the post-Mao era, Chinese leaders embraced the principle of “growth first,” which was best reflected by a famous slogan of Deng Xiaoping: “no matter if it is a white cat or a black cat; as long as it can catch mice, it is a good cat.” Since the reform movement, China has not just become the world’s factory, but also its smokestack.³⁵

China’s pollution comes directly from domestic sewage, chemical fertilizers and pesticides, motorized boat oil, human and animal wastes, and industrial batteries.³⁶ Air pollution is directly derived from industrialization. For example, 80 per cent of air pollution in Hong Kong came from Guangdong’s factories and power plants.³⁷ Noise pollution is mainly the result of excessive traffic and construction noise. Industrial waste directly contributes to the shortage of good water quality in China. The industries that contribute the most to pollution in China are chemical, electric power, waste recycling and disposal, non-ferrous metals, petroleum and coking, ferrous metals, non-metallic mineral products, food, coal mining and washing, paper products, plastic textile, and leather industries. They produce an annual 820

million tons of solid waste, with an integrated utilization rate of 46 per cent. Chinese cities dump 140 million tons of domestic waste annually, of which only 10 per cent is disposed of in a safe way. Industry waste, on the other hand, has dramatically increased from 13.1 billion tons in 1995 to 22.1 billion tons in 2000.³⁸

Chinese factories are still using old technology and many manufacturers lack measures to protect the environment. Some 2000 tons of mercury from more than 2 billion tons of coal burned every year enter the soil and pose threats to agricultural production and human health. Air-borne pollution particles have cut rainfall in many regions of China, particularly in the northeast and northwest. China's emissions increase is 2-4 times greater than expected. China's CO₂ emissions reached 19.95 million tons, more than any other country.³⁹ Experts estimate that CO₂ emissions must be reduced by at least 40 per cent if they are to meet the environmental capacity of China's atmosphere. The International Energy Agency predicted that China's carbon emissions would not reach those of the United States until 2020. These factors suggest the old production technologies produce more polluters, but environmental degradation cannot be solved by modern technology itself.

Rapid population growth also contributes to China's environmental problems.⁴⁰ China's population will continue to grow and reach its peak at 1.6 billion in the 2030s despite of the one-child policy.⁴¹ Population growth reduces arable land and increases and directly demands more production of food, fibers, housing, and other materials.⁴² The rapid growth of China's population is side by side with the development of urbanization. China's urban population increased from 132 million people in 1992 to 665.57 million in 2010.⁴³ Cities produce a great amount of waste on a daily basis, including industrial waste (IW), municipal solid waste (MSW), and hazardous waste (HW). The majority of waste in China is IW, totaling 2.3 billion tons in 2009 and 190 million tons of solid waste annually and amount to 29 per cent of the world's municipal solid waste (MSW). Only 31 per cent of collected MSW is handled in an environmentally friendly manner.

Another factor is that the development of urbanization demands more automobiles on the street. Since China became a large consumer of automobiles, about 14,000 new cars hit the streets daily, and it is predicted that China will have more than 130 million cars on the road by 2020. As a result, "Chinese developers are laying more than 52,700 miles of new highways throughout the country."⁴⁴ The major increase of motor vehicles and the massive amounts of new highways create environmental problems. The carbon emissions from these cars have doubled the amount of pollution in the air. Because of the lack of government regulation, air quality in cities has become extremely poor. Before the 2008 Beijing Olympic Games, the Chinese government removed roughly two million vehicles from city streets and shut

down many factories in Beijing in order to meet the anti-pollution standards of the United Nations.⁴⁵ As a result, the number of days with a blue sky was more than the total number of “blue sky days” in the past ten years.

China’s urbanization has been unavoidably accompanied by water and energy shortages. About 400 of the 668 cities in China suffer from some degree of water shortage.⁴⁶ In the past three decades, China has built about 7.5 billion square feet of commercial and residential space, more than the combined floor space of all the country’s malls and strip malls. As cities have become more populous, they have expanded into the countryside, consuming land once used for agricultural purposes. It is estimated that urban sprawl and transportation networks take up 1.4 million hectares annually.⁴⁷ Moreover, Chinese buildings rarely have thermal insulation, and about 95 per cent of new buildings do not meet China’s own codes for energy efficiency. Thus, they require twice as much as energy to heat and cool as those in similar climates in the United States and Europe.

The ultimate source of environmental degradation is human behaviour. Some countries in South America, such as Peru, Brazil, Argentina, and Columbia, are developing countries, but their environmental problems are not as severe as some developing countries in Asia. One of explanations for this is that environmental problems are related to people’s behaviour towards environmental protection. Since 1950, the temperature on earth has increased more than 0.5° C. Environmentalists suggest that about 74 per cent of this global climate change is caused by human behaviour. Human actions are indeed changing the global climate system; global environmental threats are really caused by human acts.⁴⁸ Some scholars suggest that “China’s worsening environmental crisis is, at its core, a crisis of policies and perceptions.”⁴⁹ When the local environmental quality is poor, it could result from weak public environmental awareness and insufficient environmental protection efforts. In turn, the serious environmental problems should generate public concern about the environment. Ultimately, human’s activities are responsible for the problem in the first place. Ordinary citizens inevitably pollute and degrade the environment to some extent.

In summary, it is a very complex task to remove all these pollution sources, because it involves various issues, such as government policy, employment and the technologies for treating the factories’ wastes, and people’s awareness of environmental protection. The success of environmental protection really depends on the joint efforts of the entire society. Every member of society has the responsibility to share in the common goal of protecting the environment.⁵⁰ It is impossible to fundamentally improve environmental degradation in China without altering human behaviour, both individually and collectively.⁵¹ In other words, the objective of environmental protection cannot be achieved without every member of society acting together.

5. Resolutions to Improve China's Environment

China faces a dilemma. As the development of China's economy, the living standard of the Chinese people has dramatically increased and also produced serious environmental problems. Chandran Nair has made a bold argument that Asia cannot have both high level of living standard and environmental problems free, due to the simple fact that the world cannot survive the consequences of the growth of highly populous Asian economies to levels of development reached by industrialized countries. Thus, Asian countries should not simply duplicate the Western model of consumption-led economic growth, because there are too many people in Asia, and there are not enough resources on the planet. Asia must do something differently.⁵² In this sense, Asian values and the model of governance should be an alternative to Western capitalist lifestyles. He believes authoritarian regime is a good system to global environmental problems, such as Singapore-style "guided democracy" or China's authoritarian approach. To Nair it is not true that consumption-driven capitalism can deliver wealth to all. In fact, it can only deliver short-term wealth to a minority; in the long term, it can only deliver misery to all. Economic growth is an evil to natural environment and Western capitalism is incapable of solving the environmental problems in Asia. However, Asian values do not guarantee prevention of high economic growth from causing environmental disaster. Japan tried to maintain Asian traditional values while its economy taking off, but it has not prevented it from joining the top five in carbon emissions. China's environmental degradation also indicates that the combination of authoritarianism and Asian values do not guarantee any different results than the Western model. China must develop its economy by avoiding any catastrophic consequence of the development model using every possible means such as bans on some forms of consumption and re-pricing of resources.⁵³

In order to effectively improve China's environmental degradation, first and foremost, it is required to fundamentally improve the people's awareness of environmental protection. Theoretically, the Chinese government has implemented environment protection for more than three decades. Since early 1970s, the Chinese government has paid great attention to enhancing public environmental awareness through relevant education and communication. The first National Conference of Environmental Protection, held in 1973, marked the start of environmental protection in China. In 1983, the Second National Environment Protection Conference was held. The third National Conference was held in 1989. Since then, China's environmental management system has been established, a number of environmental protection policies, regulations, and laws have been enacted, extensive environmental education and communication has been carried out, and environmental pollution control has been enforced.⁵⁴

Practically, environmental awareness in China is relatively weak so public attitudes towards environmental protection still have a big room to improve. The public attitude towards environmental protection includes environmental awareness and the actual behaviour of protecting the environment. Environmental awareness refers to people's knowledge about environment protection and environment realities, including environmental conditions and problems and government policies regarding them. The practical behaviours towards environmental protection reflect people's mindsets and the willingness to play roles in recognizing public participation in and promotion of environmental protection. According to a survey, while about 30 per cent of Chinese people know a lot about environmental laws and regulations, about 42 per cent of respondents had only heard of it and 26 per cent never heard of it. Although the majority of people believe they have roles to play in environmental protection, they believe that government and enterprises, not citizens, should take the major responsibility to protect the environment.

Many Chinese people tend to show passivity and apathy towards activities that damage the environment.⁵⁵ Even though many people are discontent with other people's environmentally unsound behaviour, they are unwilling to choose environmental protection over economic growth. Instead they refuse to change their behaviour to protect the environment, and also pollute the environment without guilty consciences.⁵⁶ In addition, the new consumer culture of urban life in the post-Mao era inevitably contributes to the deepening waste disposal crisis. For example, a great number of urban residents do not reuse plastic bags and do not often practice waste separation and recycling. The development of the automobile industry has changed people's lifestyles and travel behaviours. The more people travel by car, the more pollution is produced.

The government's decisive action is the most important measure in dealing with environmental degradation. The Chinese government has realized the severe consequences of environmental degradation and has launched the second economic transformation from a polluted economy to a green economy. At the United Nations General Assembly in September 2009, Hu Jintao promised that the CPC will fulfill its responsibility and improve China's environment.⁵⁷ The Chinese government has established government agencies to handle the country's environmental problems. The State Environmental Protection Administration (SEPA) is the single largest government agency overseeing the country's environmental problems on the "macro" scale, a full-fledged ministry with the power to implement regional supervising programmes, enact national environmental policies, and research the environmental impacts of major industrial projects. For years the Chinese government has participated in global summits, supported

climate change campaigns, and studied the problems that exist in China. China's eleventh 5-year plan specifically addresses energy efficiency and infrastructure improvements as key goals, and the twelfth 5-year plan addresses environmentally sustainable economic growth as an important aspect of development. Practically, major projects have already been initiated, such as the "grain for green" programme, which subsidizes farmers to reforest erosion-prone agricultural land. Extensive investment in high-speed train networks and the growth of renewable energy production are all good signs that China is coping with the complex problems of this environmental landscape. Another government initiative for ecological preservation is called the "Great Green Wall." China hopes to build a wall forest along the Gobi Desert stretching for 2,800 miles. This would help reduce air pollution while allowing plants to re-grow in these areas. If all goes according to plan, this will hopefully be completed around 2074.

However, the government still faces great challenges in handling environmental issues. First of all, the government should re-assess the guiding principle of China's development – economy-centred principle – and make well-balance between economic development and environmental protection. It is a misconception that Western industrial countries began dealing with environmental problems when they became rich, but China is still a developing country, so it is not urgent for China to speed up the process of environmental protection. The historical context of the environmental degradation arising from China's modernization is different from the environmental degradation arising from the Industrial Revolution. Although developed countries took centuries to fix environmental degradation, it was costly process. China should learn from the lessons of other countries instead of using them as an excuse to delay their own problem-solving process. In some respects, China should be more capable of handling environmental issues in terms of the advantages of science and technology. There is no basis to justify the argument that China should concentrate on economic growth and then, when it is rich, solve the environmental problems afterwards. China must effectively treat its environmental problems while promoting its economy. In fact, both environmental protection and economic development are integrated parts of modernization. In comparison with the technologies that developed countries adopted to treat the environmental problems a century ago, nowadays, China should be able to more effectively cope with its environmental degradation using modern technologies, including scientific methods for treating environmental degradation and mass media for increasing public environmental awareness.

Because China is still a developing country, ideally, it is the best for China to secure both environmental protection and economic development. In reality, the protection of the environment frequently conflicts with development

objectives. If economic development is overemphasized, environmental protection is unavoidably sacrificed. If people have strong environmental awareness, they try to reduce the damage to the environment when they develop their economy.⁵⁸ On the one hand, Chinese people really want to improve their living standard and enjoy a decent quality of life through promoting economic development; on the other hand, the process of economic development itself creates a great deal of polluters. At present, the top priority of the government is to improve the living standard of the Chinese people and make the nation rich. In this sense, it is possible that China's environmental issues will become worse before getting better.

Poverty is one of the main causes of environmental degradation in developing countries, because the lack of financial resources makes it more difficult for the people to protect their environment. Usually, a developing country only has limited funds for the projects of environmental protection. China remains a developing country. Yet, lack of funding is not an excuse for the government to ignore environmental degradation. China will need to invest large amounts of capital into projects designed to strengthen and address many environmental issues. China has spent five billion U.S. dollars per year dealing with the consequences of its environmental problems. Although solving environmental problems is a heavy burden for China, this amount of money is still very small in comparison to the 250 billion dollars America spends per year. China will invest nearly 450 billion *yuan* (Chinese currency), or roughly 1.5 per cent of the country's annual GDP, to ultimately go towards environmental protection efforts. However, some Chinese nationalists are opposed to the concept of environmental reform, due to the potential economic setbacks.⁵⁹

The government should make more effort in formulating more specific national policy for national environmental issues and strictly enforcing its implementation. For example, the government should regulate waste. The government should take the responsibility to build a comprehensive sewage system with primary waste water treatment and imposing waste water management fees on all water users. The waste needs to be disposed of in municipally appointed locations; the government should be responsible for the environmental management of domestic waste, and for maintaining sanitation within cities. Local governments should be required to provide these services, as well as enforce regulation regarding waste disposal. Recyclables are presently collected either by scavengers, sorted and brought to a local transport station, or mixed with other waste.⁶⁰ The government needs to regulate toxic waste and invest in a newer, safer water system. Food inspections also need to check animals for toxic infection. Due to the fact that China has large population and small arable land, the main goal of Chinese agriculture is to increase the output of its production, so the majority

of farmers in China prefer to use chemical fertilizers and pesticides because they are cheaper and more readily available. Under this circumstance, it is very difficult to fundamentally change peasants' behaviour in the Chinese context. Thus, the government should encourage peasants to explore a new way to increase their agricultural production and also help them to reach the goals.⁶¹

The most difficult job for the government is to convince its citizens to become more environmentally conscious. Until each Chinese citizen takes responsibility for his actions, there will continue to be environmental disasters. Because the major polluters come from industries, it is especially important for the leaders of industries to increase the consciousness of environmental protection. There is a big gap between the government's regulations and people's actions. Chinese enterprises have no incentive to minimize their impact on the environment. To make maximum profits, many Chinese companies try to circumvent government's regulations. A significant percentage of companies, especially private companies, are not aware of the urgency of dealing with environmental problems.⁶²

Various factors affect people's environmental awareness. Selfishness is an issue in China. Influenced by the traditional lifestyle in ancient agricultural society, quite a few percentage of Chinese people focus on their own interest, but pay much less attention to public common good. People's environmental awareness and behaviour are influenced by age, gender, educational attainment, income, living location, and political orientation.⁶³ Though females are generally more sensitive to pollution problems, unmarried young females with a higher level of education and household income are even more inclined to have a stronger environmentalist orientation than others. They more often practice environmentally-friendly behaviour than others.

Zhongjun Tang conducted a survey in Wuhan and took a sample group of a region reflecting the average national household composition, income, and economic development. The study group consisted of households with parents between the ages of 35 and 45 and children. According to the survey, all recycling taking place in the region involved selling recycling to scavengers who profited from trading waste to a dealer, or traveling far distances to directly sell recyclables to a dealer. The study shows that recycling is predominantly undertaken by the elder residents, most often women, and that people with less education, corresponding to lower incomes, recycle at higher rates than better educated or more affluent citizens.⁶⁴ Usually people are most inclined to engage in recycling, if recycling behaviour is rewarded or required by the community, or if they have the environmental knowledge.⁶⁵

People in developed countries are more willing to pay higher prices than people in developing countries. When the economy grows, people's incomes increase and their quality of life improves, and their expectation

of environmental quality becomes higher, which helps to enhance their environmental awareness. When people improve their financial situation, they demand a better quality of life and better environmental quality. Urban residents exhibit higher environmental awareness than rural people. This suggests that it is necessary to promote environmental education and enhance norms around pro-environmental behaviour in order to improve people's recycling behaviour, especially in rural locations. Education has a critical role to play in increasing environmental participation, developing environmental management systems, and changing people's values and behaviour to protect the environment.⁶⁶ When people have received higher education and have more environmental knowledge, they better understand the urgency of environmental protection and are more willing to protect the environment. It is not necessary for most people to have a large amount of scientific knowledge in order to have good environmental awareness, though a certain amount of knowledge about environmental science is necessary.

6. Conclusion

China's remarkable economic success is accompanied by environmental degradation. China is facing almost all major environmental problems during globalization. These problems have serious natural and social consequences, damaging the Chinese economy, harming people's health, and escalating the conflicts between the government and the people. If the Chinese government cannot appropriately handle the environmental issues, the negative consequences could not only damage the Chinese economy and social stability but also harm China's relations with the international community. Considering that China's environmental problems are derived not from a single source but from multiple sources, solving them is a comprehensive project. It is not realistic to expect to fundamentally improve China's environmental degradation in a short period of time. Most likely, China's environmental problems may get much worse before getting better. Therefore, either ignorance of environmental problems or unrealistic expectations could damage the battle fighting China's environmental degradation. The key for the government to solve the problems is to take decisive actions through policy making and implementation and investing all necessary funding in mobilizing national projects and helping local projects as well. To be sure, nurturing people's consciousness of environment protection and changing people's attitudes toward the environment are inseparable parts of the process of controlling environmental degradation. It is time for schools to make greater efforts toward environmental education. Mass media also has great power to influence people's environmental awareness and behaviour, as well as government environmental policy implementation.

Notes

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