Parallels between China the West?
Factors that Influence Public Opinion on the Environment in China

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Introduction and Research Question

Most research on environmental attitudes centers on developed countries. Limited research on environmental attitudes exists for China. However, China has had a different experience to developed countries in recent decades. It has experienced staggering economic growth and substantial environmental degradation and pollution. The pace in the growth of pollution has been swift. For example, China is now the world's largest emitter of carbon emissions. Given the different circumstances, culture and history compared to developed countries, should we expect a similar state of environmental attitudes in China to the state, either currently or historically, in developed countries? Does Chinese public opinion on the environment fit the existing frameworks on environmental attitudes?

A clear understanding of the state of environmental attitudes in China will be useful to the Chinese government and environmental NGOs. The Chinese government is committed to a "Harmonious Society." To ensure the harmony, the government must be aware of public concerns. An area of concern for the government is pollution. The government takes this concern seriously, as demonstrated in the 2011-2015 Five-Year Plan that seeks to address environmental protection as well as income inequality. Given that the Chinese government employs long-term planning, this work might be useful for the government to predict where public opinion is expected to be in the future. Environmental NGOs in China will also be informed by a clearer understanding of environmental attitudes there. They may use the findings to influence how they shape communications with the public in order to most effectively influence public opinion on the environment.

Literature Review

Literature on environmental attitudes at the individual level can be clustered into three groups: 1) the "direct effect hypothesis" in which economic factors may trump "luxuries" such as the environment; 2) the "indirect effect hypothesis" in which values determine environmental attitudes (I primarily examine postmaterialism); and 3) theories based on demographic factors such as age, education and gender.

Direct Effect Hypothesis

The "direct effect hypothesis" argues that support for environmental protection is a product of affluence. This resource-based explanation posits that the wealthier an individual, the greater the concern for environmental issues. Conversely, poorer individuals are more likely to be focused on obtaining immediate needs and are thus less likely to be concerned with environmental issues. According to Grossman and Krueger (1995) and Shen and Saijo (2008), higher levels of affluence lead to a greater willingness to accept increased costs for higher environmental quality. Wealthier people have more disposable income to allocate to environmental quality than poorer people do. Essentially, the rich have a lower opportunity cost to address environmental issues than the poor do.

Kemmelmeier, Krol and Kim (2002) reason that "less affluent individuals are required to focus more on their own and their family's material self-interest in order to survive and thus have less opportunity to engage in costly environmentally friendly behavior than affluent individuals" (pp. 258). Environmental quality is like a luxury good: it can only be indulged after more basic material needs such as adequate food, shelter and economic security are met (Van Liere and Dunlap, 1980). Similarly, Kitschelt (1988) finds that favorable environmental attitudes are

disproportionately found in those that are economically secure.

The argument that economic factors are primarily responsible for producing proenvironmental attitudes and behavior has been widely criticized. One must only examine the emergence of environmental movements amongst the poor in the developing world, it is argued, to recognize that individual affluence is not a prerequisite for environmental concern (Brechin and Kempton, 1994; Dunlap and Mertig, 1995). Instead, values, rather than economic status, is what principally shapes environmental attitudes and behavior (Karp, 1996; Rehakova, 2001; Schultz and Zelezny, 1999).

Indirect Effect Hypothesis

The "indirect effect hypothesis" is based primarily on Inglehart's (1990, 1995) conceptualization of materialism and postmaterialism. He claims that the emergence of environmental concern is due to a collective shift from "materialist" values to "postmaterialist" values over the last thirty years in advanced industrial countries. The change has been away from materialist concerns that are almost exclusively based on material well-being and physical security, to postmaterialist concerns such as sexual freedom, international disarmament and feminism (Oskamp and Schultz, 2005).

Inglehart bases his model on Abraham Maslow's (1970) conceptualization of a "hierarchy of human needs." This theory posits that once basic needs are met, higher personal needs and socially conscious concerns become relevant. Maslow saw human beings' needs arranged like a ladder: the most basic needs, at the bottom, were physical – air, water, food and sleep. Then came safety needs – security and stability. This was followed by psychological and social needs – a sense of belonging, love and acceptance. At the top of the ladder were "self-actualizing"

needs – fulfillment and realizing one's potential. Maslow argued that if needs lower on the ladder were not met, one would be inhibited from climbing to the next step (Wahba and Bridwell, 1976).

Inglehart (1990, 1995) claims that values of an individual are determined by the level of wealth and security during the formative period of one's lifetime and remain somewhat constant throughout one's life. Based on data primarily from the Eurobarometer, Inglehart finds that, even considering events like inflation, the values of each generation remain relatively constant. Since developed countries experienced unprecedented wealth and security after 1950, the proportion of postmaterialists to materialists in each successive generation has increased. Coupled with intergenerational replacement, the share of the population that is postmaterialist has been augmented (Abramson and Inglehart, 1992). This has led to growing interest in social and environmental issues, subsequently resulting in public policy responses to the issues raised (Giacalone, Jurkiewicz, and Deckop, 2008). These values shifts have created an electoral base for greens and other socially concerned movements. Environmental concerns are a paragon of postmaterialist concerns; the environmental movement is now generally considered "the archetypical example of postmaterial politics" (Dalton, 1994, xiii). Thus, greater levels of postmaterialism are associated with increased environmental concern.

Since younger adults, the well-educated and urban residents tend to be postmaterialists, it can be difficult to isolate postmaterialism as a distinct variable (Olofsson and Ohman, 2006). However, Dunlap and York (2008), Gelissen (2007), and Goksen, Adaman and Zenginobuz (2002) have validated the argument: individual postmaterialists tend to be more concerned about the environment than materialists are, regardless of their economic position, and are more willing to make financial sacrifices for greater environmental protection. Jones and Dunlap (1992),

examining the 1970s and 1980s, find that postmaterialists' concern for the environment remains stable regardless of fluctuating economic conditions. Olofsson and Ohman (2006) find that postmaterialist values are the most stable predictors of environmental concern.

Demographic Based Hypotheses

The third group of theories includes demographic variables: age, education, gender, urban or rural residence, political party affiliation, and environmental involvement. While there are exceptions (Arcury and Christianson, 1990; Shen and Saijo, 2008), generally research suggests that younger individuals are more likely to have proenvironmental attitudes and engage in environmentally friendly behaviors (Hunter et al., 2004; Olli, Grenstad, and Wollebaek, 2001; Weaver, 2002). This "age effect" means that age is negatively correlated with environmental concern measures. The reasoning for this is still nebulous, but it could be attributed to life-cycle effects or the differing imprint of socialization on various generations (Kanagy, Humphrey, & Firebaugh, 1994). Van Liere and Dunlap (1980) argue that since younger people are less integrated into the dominant social order, which often views solutions to environmental problems as threatening, they have greater concern for environmental problems. Fransson and Garling (1999) suggest that younger people have greater access and interest in new information than older people do; thus, they are more cognizant of environmental issues.

The results for urban residence suggest that urban residents are more likely to be environmentally concerned than rural residents because they are more exposed to signs of environmental deterioration, such as air pollution (Fransson and Garling, 1999). This assumes that exposure to poor environmental conditions leads to environmental concern. Findings of this effect are mixed. The residence effect receives support in several studies (Arcury &

Christianson, 1990; Chatterjee, 2008), while others find no differences between urban and rural residents (Gelissen, 2007; Jones, Fly, and Cordell, 1999; Marquart-Pyatt, 2008). Jussaume and Higgins (1998), however, argue that there is a positive association between rural residence and attitudes towards environmental issues.

With few exceptions (Jones and Dunlap, 1992; Samdahl and Robertson, 1989), research broadly confirms a positive effect of education on environmental concern (Lee and Norris, 2000; Olli, Grenstad, and Wollebaek, 2001; Shen and Saijo, 2008). It is unclear why this occurs, but there a number of theories. Some argue that concern for the environment is learned through exposure to educational systems that instill norms and values in individuals (Marquart-Pyatt, 2008). Others posit that education can influence psychological attributes, making individuals more open to new ideas and values with which they may come into contact. This effect can be explained in terms of the enlightenment hypothesis: education implies socialization to values that evoke greater commitment to the common good, which may also extend to a greater commitment to protecting environmental quality (Gelissen, 2007; Guber, 2003). Another explanation for the association may be because of an intervening variable: higher educated individuals have higher incomes, which is often linked to higher concern for environmental issues (Weaver, 2002).

While some scholars find mixed results (Jones and Dunlap, 1992; Marquart-Pyatt, 2008), women are generally found to be more concerned about environmental issues than men (Bord and O'Connor, 1997; Dietz, Kalof, and Stern, 2002; Hunter et al., 2004). However, the findings are much clearer for local issues and more tenuous for global environmental issues (Brown and Mikkelsen, 1990; Davidson and Freudenburg, 1996; Freudenburg and Pastor, 1992). The conclusions are usually explained through the "gender socialization theory": this is based on the effect of women's traditional gender socialization (a motherhood mentality or an ethic of care

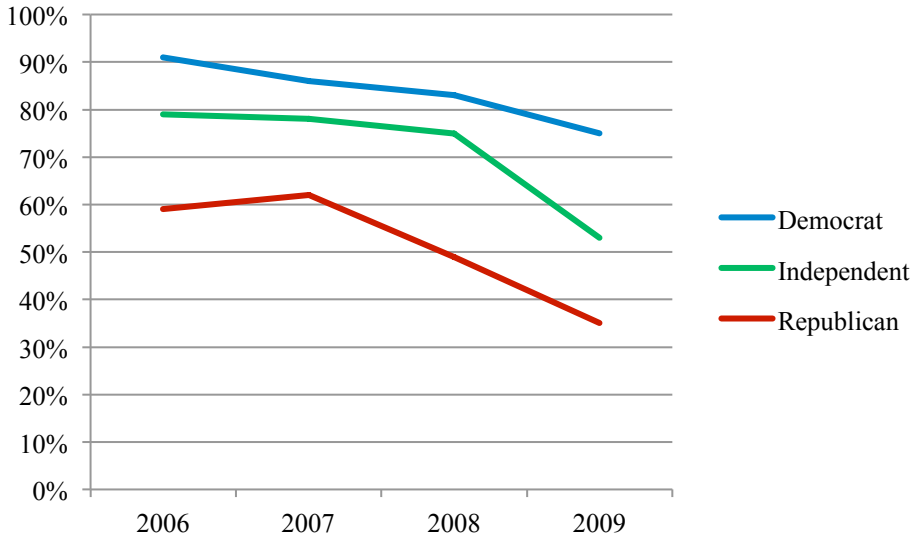
encouraging women to be more compassionate, nurturing, protective, and cooperative than men), and extending the traditional caretaking expectations to protective attitudes toward nature.

Male socialization, however, emphasizes an economic provider role and encourages men to be more rational, masterful, accumulative, and competitive than women. This would lead to a "marketplace mentality" that is related to unecological attitudes emphasizing economic growth, technical mastery of the earth, and exploitation of resources, regardless of any seriously negative effects on the environment (Horrigan, 1989; Keller, 1985). Socialization based theories are further extended by structural theories, which argue that the gendered nature of occupational and economic positions reinforces the differing environmental orientations of women and men. Additionally, since men have greater involvement in the marketplace, this makes them more likely than women to favor economic growth (Blocker & Eckberg, 1997).

Political party affiliation in the United States is often associated with concern for environmental issues. Democrats tend to be more concerned about environmental problems than Republicans. For example, Republicans routinely express less concern for climate change, one of the most salient contemporary environmental issues (The Pew Research Center, 2009). Following the global financial crisis, the decline in concern for climate change has been consistent across partisan lines, but the drop has been especially sharp for Republicans and Independents (see graph 1). According to the Pew Research Center, a majority of Republicans (57%) found no solid evidence for global warming and only 53% of Independents did.

Finally, it is reasonable to anticipate that individuals who have high levels of environmental involvement have high levels of environmental concern (Fox and Firebaugh, 1992; Jahn, 1998). Gelissen (2007) finds that individuals who are members of environmental organizations or who perform voluntary work for environmental causes are more willing to make financial sacrifices

Figure 1: Concern for climate change in the United States based on political party affiliation



Source: Pew Research Center

to protect the environment. Presumably these individuals are characterized by a strong environmental involvement and will therefore show higher levels of support for environmental protection than individuals who are characterized by weaker environmental involvement.

In the analysis I consider how these various perspectives play out with respect to environmental attitudes in China. I use the United States as a base case. The next section describes the Chinese context, followed by the state of the environment in the United States.

State of the Environment in China

On the one hand, China's strong economic growth since the 1980s has brought about positive impacts on the environment. Technological changes have improved resource utilization and energy efficiency. On the other hand, total energy consumption in China increased by 70% between the late 1990s and 2005, with coal consumption increasing by 75% (World Bank, 2008). According to the Energy Information Administration (2011), China's sources of energy are almost entirely from nonrenewable sources that contribute to air pollution. China is now the

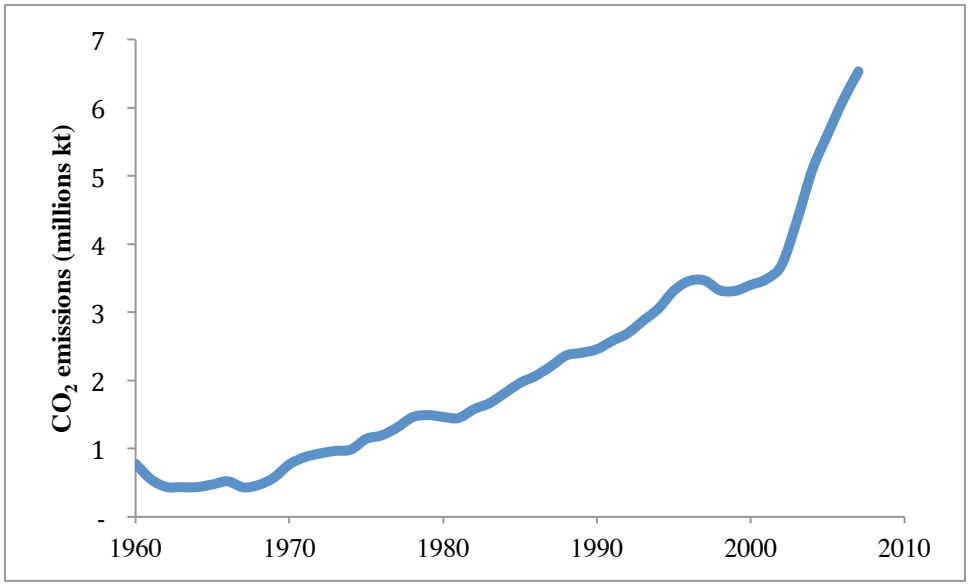
world's largest consumer of coal; the country's use accounts for almost half of worldwide use of coal.

According to the World Bank (2007), between the late 1990s and 2005, air pollution emissions remained constant or increased. The assessment at the end of the tenth five-year plan (2001–05) concluded that China's emissions of sulfur dioxide (SO_2) and soot were 42% and 11% higher, respectively, than the target set at the beginning of the plan. Due in large part to the high level of coal consumption, China is now the world's heaviest emitter of SO_2 emissions. Emissions in 2005 were over 25 million tons, 28% higher than in 2000, and 42% higher than the 2005 target. By contrast the United States produced about 11 million tons in 2005. Acid rain is just one result of the country's prolific SO_2 pollution. Although nitrogen dioxide emissions are not at the extreme level of SO_2, levels, in Beijing emissions rose 50% between 1996 and 2006.

The pollutant for which emissions has increased the most since the early 1990s is carbon dioxide (CO_2). Emissions have more than doubled in the last two decades (see figure 1). As with other pollutants, the use of coal is a major contributor to the high CO_2 emissions in China. However, the proliferation of cars also plays an important role. Between 1994 and 2004, the number of cars increased by a factor 10 (World Bank, 2008).

Water pollution is also a cause for serious concern. Between 2001 and 2005, about 54% of the seven main rivers in China on average contained water deemed unsafe for human consumption. This was a 12% increase from the early 1990s. The trends in surface water quality from 2000 to 2005 suggest that quality is worsening in the main river systems in the North, while improving slightly in the South. This may partly be the result of rapid urbanization; the urban population increased by 103 million people nationwide from 2000 to 2005. In 2004, about 25,000 km of Chinese rivers failed to meet the water quality standards for aquatic life and about

Figure 2: Annual Chinese CO_2 emissions



Source: World Bank, 2007.

90% of the sections of rivers around urban areas were seriously polluted. Many of the most polluted rivers have had no fish for many years (World Bank, 2008). It is estimated that since 2000, 500 million Chinese suffer from polluted water (Brown, 2003).

The Chinese central government began taking environmental concerns most seriously in the early 2000s. Since Hu Jintao became the Communist Party chief in 2002 and Wen Jiabao became prime minister in 2003, China's leadership has argued for more sustainable growth and for decreasing pollution in order to achieve a "Harmonious Society." The 2006-2010 Five-Year Plan in particular addressed environmental issues seriously. In major cities, such as Beijing, restrictions have been placed on days in which drivers can use cars and the supply of new car registrations has been rationed. Despite strong pledges, the local implementation of environmental policies has often lagged. Consequently, Chinese citizens have increasingly turned to protests to demonstrate against environmental degradation. Although official data is

opaque, the official number of "mass incidents" rose from 10,000 in 1994 to 74,000 in 2004. Unrest has also led to an increase in imprisonment and intimidation of protestors, especially of the leaders of the movement (*The Economist*, 2008).

Although pollution is severe in China, with the exception CO_2, pollution levels are similar to those in many parts of the United States in the late 1960s to the early 1980s (World Bank, 2008). Given this pattern, China may be following a Kuznets curve in which the emphasis at earlier stages of development is on economic development at the expense of pollution abatement. However, according to the theory, once a certain level of development is achieved, investment is made in abatement and pollution then decreases. Therefore, as the level of development improves, the level of pollution follows the trajectory of an inverted "U." While Chinese pollution may be dire now, once a certain development threshold is reached, pollution levels might begin to decrease. This pattern occurred in the U.S., as well as in most Western countries. I will briefly examine the evolution of environmental issues in the U.S. below.

State of the Environment in the United States

The high levels of pollution in the late 1960s to the early 1980s in the U.S. helped give rise to the American environmental movement. Although there were several major social movements of the twentieth century, such as the civil rights and women's rights movements, Thiele (1999) argues that environmentalism in the U.S. is the "most enduring and important" and one "whose importance, in all probability, will increase over the coming decades and centuries" (pp. xvii). Since a large majority of Americans consider themselves to have environmental values, politicians of all stripes must be circumspect and ensure they do not profess any anti-environmental rhetoric. For example, President Richard Nixon, a Republican, signed the Clean

Air Act and created the Environment Protection Agency.

Traditionally, these issues were national, or at least regional, and involved problems such as air and water pollution or had a conservationist bent. Yet, over time, environmental issues became recognized as being global. They required not only national responses, but also international commitment to problems such as acid rain, deforestation, biodiversity loss, depletion of the ozone layer, and climate change. While the issue of global warming is now ubiquitous, and possibly synonymous with environmental issues, past problems like ozone-depleting emissions were similarly prominent. Benedick (1998) claims that a primary reason for successful international agreement and implementation of the landmark 1987 Montreal Protocol on ozone-depleting substances was the strong public opinion in favor of immediate and aggressive action.

Given the heavy levels of pollution in China, and the salience of the environmental impact there, it will be instructive to consider how existing theories of public opinion on the environment, developed primarily in a Western context, fit in the Chinese context.

Methodology

Data

I used the World Values Survey (WVS) data set. According to the survey's organizers, the WVS is a worldwide investigation of sociocultural and political change. It is a collection of representative national surveys of basic values and beliefs in 97 countries (although not every country is surveyed every year). The surveys provide a comprehensive measurement of all major areas of human concern, from religion to economic and social life. There have been five waves, although the first wave only considers Europe. For the purposes of my research, I only

examined the fifth wave. In China, the fifth wave took place in 2007, while in the United States it took place in 2006.

According to Sheng (2007), the Chinese sample size in 2007 was 1,991 adults. The sampling was based on a GIS dataset that was the synthesis of the township level population data from the 2000 Census, paper and electronic maps, and images from Google Earth. The 2000 Census data was used primarily because it is the only national dataset that includes data on migrants. Despite this provision, the Chinese survey coordinators note that the sample may underrepresent males aged 18-29, a principally migrant demographic. However, the sample is otherwise representative in terms of age, gender, education level, geographic region, and level of economic development in the area and any inconsistencies are weighted based on post-stratification.

According to the WVS, the American sample size in 2006 was 1,249 adults. The participants were randomly selected by telephone. The firm employed to conduct the survey used both listed and unlisted numbers. Representativeness of the United States population was ensured by post-stratification based on age, gender, race, region and education level.

Variables

I used specific questions from the WVS, and in many cases constructed indices, to test the individual components of the above theories.

Dependent variables

A. National environmental concern

Rather than exploring questions that ask respondents about their willingness to pay for environmental quality or for a general opinion on the importance of environmental issues, I used

a battery of questions that asked about specific environmental concerns. Three of the six questions are related to national environmental issues; the remaining three are global in nature.

The three national questions are about concern for water quality, air quality, and sewage and sanitation quality. In both the United States and China, opinions of these three national issues were fairly consistent within each country (see appendix tables 1-3). For example, in the U.S. the mean for water concern was 2.822, the mean for air concern was 2.943 and the mean for sewage and sanitation concern was 2.722. Based on the consistency, I created an index for national environmental issues. The index consists of the three national questions, weighted equally. The data was recoded to a range of 0 to 9 (see table 1). 0 indicates no concern at all for any of the national environmental concern, while 9 indicates extreme concern. Concern for national environmental issues is substantially higher in the United States than in China.

Table 1: Descriptive statistics for national environmental concern

	Observations	**Mean**	**Standard Deviation**	**Min**	**Max**
China	1687	3.959	2.789	0	9
US	1211	5.486	2.965	0	9

B. Global environmental concern

The three global questions asked are about concern for global warming, loss of biodiversity and pollution of the world's oceans and other large bodies of water. Opinions of these three national issues were fairly consistent across both the United States and China (see appendix tables 4-6). I also created an index for global environmental issues. Just like the index for national issues, the global index consists of the three global questions, weighted equally. The data was recoded to a range of 0 to 9 (see table 2).

Unlike the substantial difference between the United States and China for concern for national

issues, the difference between the two countries is narrower. However, the mean level of concern is much higher in both countries. It is important, though, to note that up to 38% of respondents in China indicated that they do not know how to respond to the global environmental questions (see table 3). "Don't know" responses were much lower for national environmental questions (as low as 3.9%). The impact of such a large proportion of the Chinese population being unaware of global environmental problems will be discussed below.

Table 2: Descriptive statistics for global environmental concern

	Observations	Mean	Standard Deviation	Min	Max
China	1095	6.742	1.968	0	9
US	1208	7.048	1.960	0	9

Table 3: Proportion of Chinese respondents that indicated "Don't Know" for environmental questions

	Don't Know Response
Water concern	3.9%
Air concern	4.0%
Sewage concern	13.3%
Global warming	38.0%
Loss of Biodiversity	35.7%
Pollution of Oceans	33.7%

C. Overall environmental concern

I created an index for overall environmental concern. It was constructed based on the global and national concern indices, weighted equally. The index is recoded for a range of 0 to 9, for easy comparison to the above indices (see table 4). As is to be expected, the United States has a higher mean value.

Table 4: Descriptive statistics for overall environmental concern

	Observations	Mean	Standard Deviation	Min	Max
China	1048	5.525	1.911	0	9
US	1200	6.273	2.029	0	9

Independent Variables

A. Income (Direct Effect Hypothesis)

To test the direct effect hypothesis, income is measured through asking respondents to place their income into deciles. This question does not specifically ask for income level, however it is the only question in the survey that would fulfill the needs of testing this theory. Americans perceive themselves as wealthier than their Chinese counterparts (see appendix table 7). Given that respondents were asked to place themselves in deciles, Americans may be more optimistic than the Chinese are about their financial status. There may be several reasons for this American optimism, but exploring the reasoning is beyond the scope of this paper. It must be noted, however, that not having an objective measure of wealth is a constraint of the model.

B. Postmaterialism Index (Indirect Effect Hypothesis)

The Postmaterialism Index is based on questions that tap postmaterialist values. Four questions ask the respondent to rank their first and second priorities between two materialist and two postmaterialist choices. The four materialist and four postmaterialist values asked are listed below:

Materialist values

a. Maintaining order in the nation

b. Fighting rising prices

c. A stable economy

d. The fight against crime

Postmaterialist values

a. Giving people more say in important government decisions

b. Protecting freedom of speech

c. Progress toward a less impersonal and more humane society

d. Progress toward a society in which ideas count more than money

If the respondent ranked a postmaterialist value as his priority, it was coded as 1. If she ranked a materialist value as her priority, it was coded as a 0. I combined the results of these four questions into an index with a range from 0 to 4 (see table 5). 0 indicates the lowest level of postmaterialism, while 4 indicates the highest possible level of postmaterialism. As would be expected, the United States has a higher level of postmaterialism than that of China.

Table 5: Descriptive statistics for postmaterialist level

	Observations	**Mean**	**Standard Deviation**	**Min**	**Max**
China	1460	1.049	0.904	0	4
US	1215	1.591	1.002	0	4

C. Age and age cohort (Demographic Based Hypotheses)

Given broad research findings that age is closely linked to environmental concern, I thought it would be useful to both explore age as a discrete variable (see appendix table 8) and also further

explore age based on age cohort variables. Therefore, I created age cohorts as new variables. These dummy variables are based on the decade in which the cohort turned 18 years old (see appendix table 9). For example, individuals born between 1972 and 1981, inclusive, turned 18 between 1990 and 1999, inclusive. Therefore, their label is the "1990s cohort." In each of the models, the 1950s cohort was omitted. Therefore, the 1960s, 1970s, 1980s, 1990s and 2000s cohorts were included in each of the models.

There are three reasons to use this approach to define cohorts. First, it is conceptually simple to understand. Second, each decade roughly corresponds to a distinct period in Chinese history. For example, the Cultural Revolution would have heavily influenced individuals that came of age in the 1960s. Third, given that the theoretical basis of this paper is on whether values developed at a young age persist despite external changes, cohort based on coming of age might further develop this theory.

D. Education and gender (Demographic Based Hypotheses)

The WVS directly asked respondents for their education level and gender. Descriptive statistics for these independent variables are included in the appendix (table 10-11).

E. Coastal provinces (Demographic Based Hypotheses)

Extensive economic literature validates that there are substantial disparities in income and economic opportunities between coastal and inland areas of China (e.g. Fu, 2003). Causes of this inequality historically include preferential government policies, favorable geographic location, and inferior infrastructure in the inland regions. Since research in Western countries typically examines whether rural residency affects environmental concern, and because rural

residency is not explicitly asked in the WVS, coastal residency will serve as a proxy for urban residency (and inland residency serves as a proxy for rural residency). I created a dummy variable to indicate whether the individual resided in a coastal province (see appendix table 12). Coastal provinces were defined by how the literature classified them. This definition of coastal province split the sample roughly in half (see appendix table 13A).

I also created an American coastal dummy variable to serve as a proxy for urban residency and mirror the Chinese case. The WVS categorized respondents into ten regions. I classified the region as coastal or non-coastal based on the definition of the United States Census Bureau (see appendix table 12). More than half of the American population (57%) lived in coastal regions (see appendix table 13B).

F. Political party membership (Demographic Based Hypotheses)

As discussed above, there is substantial research in Western countries that suggests an individual's affiliation with a political party predicts his environmental concern. Since there is only one political party in China, testing this effect in China is not possible. However, party membership can be examined. Research broadly suggests that loyal party membership and support is typically rewarded with economic and non-economic benefits. For example, party membership, especially from a young age, is typically rewarded by career mobility (Li and Walder, 2001) and economic benefits (Li et al., 2008). Given that there are clear benefits to supporting the party, and official party position has recently concentrated on addressing environmental problems (e.g. the most recent Five Year Plans), this suggests that party membership might predict environmental concern, as it does in many Western countries.

Political party membership was coded as a dummy variable in which active and inactive

membership was coded as 1, no membership was coded as 0. Only 6% of the population are current or previous members of the party in China (see appendix table 14).

G. Environmental group membership (Demographic Based Hypotheses)

Environmental group membership was coded like political party membership—as a dummy variable in which active and inactive membership was coded as 1, and no membership was coded as 0. Interestingly, 10% of the Chinese population currently or historically affiliate themselves with an environmental group (see appendix table 15).

Models

I used three ordinary least squares multiple regression models to test the above hypotheses. The three models tested different combinations of the direct hypothesis, indirect hypothesis, and the demographic based hypotheses. In each of the models i is the i^{th} respondent, c is the country being examined, Y_{ict} is the level of environmental concern in either China or the US, and α is a constant.

The models I considered are below. They were considered for each of the countries and outcome variables.

$$Y_{ict} = \alpha + \beta_{1t}(Cohort) + \beta_{2t}(Gender) + \beta_{3t}(Education) + \beta_{4t}(Coastal\ residence) + \beta_{5t}(Political\ party\ membership) + \beta_{6t}(Environmental\ group\ membership) + \varepsilon_{ict}, \quad (1)$$

$$Y_{ict} = \alpha + \beta_{1t}(Age) + \beta_{2t}(Gender) + \beta_{3t}(Education) + \beta_{4t}(Coastal\ residence) + \beta_{5t}(Political\ party\ membership) + \beta_{6t}(Environmental\ group\ membership) + \beta_{7t}(Postmaterialism\ level) + \varepsilon_{ict}, \quad (2a)$$

$Y_{ict} = \alpha + \beta_{1t}(Age) + \beta_{2t}(Gender) + \beta_{3t}(Education) + \beta_{4t}(Coastal\ residence) + \beta_{5t}(Political\ party\ membership) + \beta_{6t}(Environmental\ group\ membership) + \beta_{7t}(Postmaterialism\ level) + \beta_{8t}(Income\ level) + \varepsilon_{ict}$, (2b)

Results and Findings

The results of the multiple regression models are organized below by outcome variables and country (see tables 6-11). F-Tests were also conducted on the cohort variables for model 1 (see appendix table 16). The findings and implications of these results are discussed below.

A. National environmental concern

Table 6: The predictors of national environmental concern in China

Predictors	Model 1 β	Model 2a β	Model 2b β
Gender	0.067	0.079	0.163
Education	0.006	-0.012	0.016
Coastal residence	0.227	0.23	0.32
Environmental group membership	1.114*	0.961*	0.874*
Political party membership	0.427	0.253	0.434
2000s Cohort	1.105*		
1990s Cohort	0.943*		
1980s Cohort	0.576		
1970s Cohort	0.430		
1960s Cohort	-0.019		
Age		-0.023*	-0.021*
Postmaterialism level		0.376*	0.423*
Income level			-0.058
Constant	3.048	4.334	0.523
R Square	0.046	0.059	0.064

Note: Statistically significant effects ($p < 0.05$, two-tailed test) are noted by a shaded cell and an asterisk. The 1950s cohort was omitted. Source: World Values Survey, fifth wave (N = 1,094).

Table 7: The predictors of national environmental concern in the United States

Predictors	Model 1 β	Model 2a β	Model 2b β
Gender	-0.067	-0.067	-0.022
Education	-0.268*	-0.236*	-0.223*
Coastal residence	-0.026	-0.037	-0.074
Environmental group membership	0.597*	0.511*	0.532*
Political party membership	-0.052	-0.071	-0.002
2000s Cohort	1.034*		
1990s Cohort	1.717*		
1980s Cohort	0.994*		
1970s Cohort	1.059*		
1960s Cohort	0.489		
Age		-0.028*	-0.026*
Postmaterialism level		0.050	0.058
Income level			-0.019
Constant	5.907	7.926	7.779
R Square	0.043	0.045	0.042

Note: Statistically significant effects ($p < 0.05$, two-tailed test) are noted by a shaded cell and an asterisk. The 1950s cohort was omitted. Source: World Values Survey, fifth wave (N = 1,125).

B. Global environmental concern

Table 8: The predictors of global environmental concern in China

Predictors	Model 1 β	Model 2a β	Model 2b β
Gender	-0.316*	-0.254*	-0.277*
Education	0.047	0.04	0.039
Coastal residence	-0.038	-0.007	-0.029
Environmental group membership	0.245	0.162	0.085
Political party membership	0.114	0.188	0.179
2000s Cohort	0.577		
1990s Cohort	0.485		
1980s Cohort	0.225		
1970s Cohort	0.032		
1960s Cohort	0.208		
Age		-0.011*	-0.01
Postmaterialism level		0.058	0.044
Income level			0.101*
Constant	6.701	7.304	6.968
R Square	0.028	0.021	0.031

Note: Statistically significant effects ($p < 0.05$, two-tailed test) are noted by a shaded cell and an asterisk. The 1950s cohort was omitted. Source: World Values Survey, fifth wave (N = 823).

Table 9: The predictors of global environmental concern in the United States

Predictors	Model 1 β	Model 2a β	Model 2b β
Gender	0.368*	0.387*	0.387*
Education	-0.056	-0.066	-0.011
Coastal residence	0.013	0.035	0.008
Environmental group membership	0.890*	0.745*	0.821*
Political party membership	-0.344*	-0.404*	-0.362*
2000s Cohort	-0.380		
1990s Cohort	-0.040		
1980s Cohort	-0.175		
1970s Cohort	0.087		
1960s Cohort	-0.052		
Age		0.005	0.007
Postmaterialism level		0.303*	0.286*
Income level			-0.114*
Constant	6.738	6.012	6.266
R Square	0.044	0.064	0.077

Note: Statistically significant effects ($p < 0.05$, two-tailed test) are noted by a shaded cell and an asterisk. The 1950s cohort was omitted. Source: World Values Survey, fifth wave (N = 1,121).

C. Overall environmental concern

Table 10: The predictors of overall environmental concern in China

Predictors	Model 1 β	Model 2a β	Model 2b β
Gender	-0.100	-0.101	-0.080
Education	0.019	0.015	0.015
Coastal residence	0.123	0.125	0.137
Environmental group membership	0.619*	0.566*	0.467*
Political party membership	0.258	0.249	0.362
2000s Cohort	0.569		
1990s Cohort	0.432		
1980s Cohort	0.105		
1970s Cohort	-0.067		
1960s Cohort	-0.063		
Age		-0.013*	-0.012*

Postmaterialism level		0.210*	0.222*
Income level			0.035
Constant	5.235	5.759	5.538
R Square	0.044	0.051	0.051

Note: Statistically significant effects ($p < 0.05$, two-tailed test) are noted by a shaded cell and an asterisk. The 1950s cohort was omitted. Source: World Values Survey, fifth wave (N = 792).

Table 11: The predictors of overall environmental concern in the United States

Predictors	**Model 1** β	**Model 2a** β	**Model 2b** β
Gender	0.150	0.158	0.188
Education	-0.165*	-0.153*	-0.120*
Coastal residence	0.005	0.014	-0.024
Environmental group membership	0.743*	0.625*	0.670*
Political party membership	-0.207	-0.239	-0.177
2000s Cohort	0.336		
1990s Cohort	0.812*		
1980s Cohort	0.373		
1970s Cohort	0.558*		
1960s Cohort	0.216		
Age		-0.012*	-0.009*
Postmaterialism level		0.176*	0.172*
Income level			-0.062
Constant	6.352	6.967	6.995
R Square	0.041	0.041	0.041

Note: Statistically significant effects ($p < 0.05$, two-tailed test) are noted by a shaded cell and an asterisk. The 1950s cohort was omitted. Source: World Values Survey, fifth wave (N = 1,116).

Demographic Based Hypotheses

As predicted by the literature, there is always an age effect for national environmental issues in both countries. There is a cohort effect for the Chinese in the 1990s and 2000s cohort. A cohort effect is validated by F-tests (see appendix table 16). Chinese in this cohort came of age during a period of rapid economic expansion and growth in national wealth. This may suggest that if a cohort comes of age during a period of economic expansion and stability it might be more likely

to be concerned with national environmental issues. There is a cohort effect for national issues in the United States for all cohorts except the 1960s cohort (this is also validated by F-tests). However, there is only sometimes an age effect for global issues. There is never a cohort effect for global issues. There is never a coastal effect in either country for any issues.

There is not a gender effect for national issues in either country. However, there is a gender effect in both countries for global issues. Interestingly, the effect is negative in China; this suggests that males are more concerned about global issues in China. Meanwhile, in the United States there is the opposite effect—women are more concerned about global issues. Such an effect is supported by the literature.

There is never an education effect in China. However, there is an education effect in the United States for national environmental issues only. Interestingly, the effect is negative. Therefore, lower levels of education lead to higher levels of concern for national environmental issues. Perhaps this is because less educated workers are more exposed to pollution through unskilled employment.

Environmental group membership always has an effect in the United States on concern for all environmental issues. It is likely that individuals with environmental group membership in the United States are aware of all types of environmental issues. However, environmental group membership only has an effect on national issues in China. This finding might reflect the primary focus of environmental groups in China. Since pollution is so dire in China, the groups (and presumably their members) focus on national issues rather than global ones.

Political party membership has no effect in China. This may support reports that environmental policies determined by the party leadership in Beijing are not implemented at the national level (Economy, 2010). Party membership has no effect on concern for national issues

in the United States. However, there is an effect for global issues. This might suggest that national environmental issues are fairly apolitical. However, global environmental issues, particularly climate change, are polarizing; party membership strongly affects one's opinion of the issues.

Indirect Effect Hypothesis

The findings for postmaterialism in each country are the opposite of one another. In the United States, the level of postmaterialism doesn't have an effect on national concern for the environment. There may be two reasons for this. First, research (e.g. Neuzil and Kovarik, 1996) suggests that national environmental issues have evolved from the 1960s when they primarily belonged to fringe movements to becoming a mainstream American value by the late 1980s. The neutrality of national environmental issues, unlike global environmental issues, is supported by the lack of an effect of political party membership on national environmental issues. Second, air, water and sewage quality in the United States has improved substantially in recent decades. Since national environmental conditions have improved, there is less concern for them and their salience has diminished.

Therefore, while national environmental issues may have been a past concern of American postmateralists, just as nuclear disarmament and feminism was in past decades, their importance has diminished as national environmental concern became mainstream and the issue itself has been increasingly resolved. In short, national environmental issues in the United States are not "the issue" of the day, as they were for past generations. However, global environmental issues are an "issue of the day" for postmaterialists. This explains why postmaterialism level has an effect on concern for global issues in the United States.

In China, postmaterialism has an effect on concern for national issues, but not global issues. This may suggest that China is following an evolution similar to the United States in terms of postmaterialism and concern for the environment. Unlike the United States, national issues are the "issue of the day" for postmaterialists in China. Since pollution is severe throughout the country, it is plausible that Chinese postmaterialists, just like environmental organizations there, would focus their concern on national environmental issues rather than worrying about global issues. This is supported by the effect that environmental group membership has on national issues in China, but not global issues.

Perhaps once national environmental problems in China are solved, or at least ameliorated, postmaterialists will shift their concern to global issues, as happened in the United States. Another factor might be that the Chinese are not cognizant of many of the global environmental issues, as demonstrated by the extremely high level of "Don't Know" responses to global environmental problems. This lack of awareness may lead to a feedback loop in which the lack of salience prevents postmaterialists from knowing about the issues and therefore not having concern for them.

Direct Effect Hypothesis

Interestingly, income level has no effect on concern for national environmental issues in both China and the United States. However, there is an effect for global issues in both countries. In China, the effect is positive—higher income leads to greater concern for global issues. It is unclear, though, whether conclusions can be drawn from this result. For example wealthier Chinese might simply be more aware of global environmental issues than their poorer, rural counterparts.

In the United States, there is a negative effect on concern for global issues. Therefore, poorer individuals are more likely to be concerned about global environmental problems. This is a surprising finding as there is no literature that supports this. It is possible that this may just be an anomaly in the data. Furthermore, it is important to note that there is no income effect for overall environmental concern.

Conclusion

Despite different culture, history and pace of development, Chinese public opinion on the environment resembles many aspects of American public opinion, and by extension, the Western world. For example, there tends to be an age effect in both countries, especially for national environmental issues. In the United States three to four decades ago, national environmental issues, such as water and air pollution, were a quintessential postmaterialist concern (see literature review above). In contemporary China, national environmental issues are similarly a postmaterialist issue.

As described above, in the past three to four decades in the United States, concern for national environmental issues became mainstream and no longer concentrated in isolated groups of people, such as postmaterialists. Postmaterialists have moved beyond national environmental issues, in part because of the efficacy of governmental controls on pollution. The issue of the day in the United States, especially for postmaterialists, is now global environmental issues, such as climate change. If China follows a trajectory similar to the United States, it is plausible that global environmental issues might become a principle issue for postmaterialists there in the coming decades. Of course, it is not possible to predict whether this shift will happen with any certainty. However, it is conceivable that this shift to greater concern for global environmental

problems may occur.

Postmaterialism arose in the West following an unprecedented period of affluence and stability that began in the 1950s. Over the past few decades, Chinese wealth exploded broadly and there was stability and affluence for the youth of China. Due to the One Child Policy of the last three decades, and because of cultural mores and an overall increase in national wealth, contemporary Chinese youth live more comfortably than their parents did. As evidence of this trend, members of the current generation are nicknamed "little princes." Given that postmaterialism is a product of stability and wealth during youth, there might be a substantial increase in the proportion of postmaterialists in China in the coming decades.

If there is indeed an increase in the proportion of postmaterialists, there might be a considerable increase in Chinese concern for national, and possibly global, environmental issues. The Chinese government would be well advised to be aware of this possibility. The Chinese government is committed to a "Harmonious Society." To ensure the harmony, the government must be aware of public concerns. The government takes these concerns seriously, as demonstrated in the 2011-2015 Five-Year Plan that seeks to address national environmental protection. Since the Chinese public might soon demand action on global environmental issues, and because the Chinese government employs long-term planning, it would be prudent for the government to begin to plan for this scenario.

If social and economic forces engender this change, Chinese nongovernmental organizations might be best positioned to shape and influence the debate on global environmental issues. There is of course no guarantee that there will be a substantial increase in Chinese concern for global environmental issues, especially amongst certain groups, such as postmaterialists. However, the Chinese government and environmental NGOs would benefit from preparing for

this likelihood. By doing this, these entities could help ensure a harmonious—and green—society.

Appendix

Table 1: Descriptive statistics for water concern

	Observations	Mean	Standard Deviation	Min	Max
China	1937	2.348	1.116	1	4
US	1221	2.822	1.079	1	4

Table 2: Descriptive statistics for air concern

	Observations	Mean	Standard Deviation	Min	Max
China	1932	2.082	1.040	1	4
US	1218	2.943	1.015	1	4

Table 3: Descriptive statistics for sewage concern

	Observations	Mean	Standard Deviation	Min	Max
China	1720	2.433	1.082	1	4
US	1212	2.722	1.089	1	4

Table 4: Descriptive statistics for global warming concern

	Observations	Mean	Standard Deviation	Min	Max
China	1246	3.173	0.776	1	4
US	1216	3.220	0.883	1	4

Table 5: Descriptive statistics for biodiversity loss concern

	Observations	Mean	Standard Deviation	Min	Max
China	1298	3.218	0.781	1	4
US	1215	3.245	0.799	1	4

Table 6: Descriptive statistics for concern for world's oceans and other large bodies of water

	Observations	Mean	Standard Deviation	Min	Max
China	1335	3.231	0.839	1	4
US	1212	3.581	0.625	1	4

Table 7: Descriptive statistics for income

	Observations	Mean	Standard Deviation	Min	Max
China	1599	3.965	1.874	1	10
US	1153	5.042	1.863	1	10

Table 8: Descriptive statistics for age

	Observations	Mean	Standard Deviation	Min	Max
China	2015	44.757	13.322	18	70
US	1249	47.958	17.026	18	91

Table 9: Age cohorts, corresponding birth years and proportion of sample

	Age	Birth year	Proportion of sample
2000s Cohort	18-25	1982-1989	9.4%
1990s Cohort	26-35	1972-1981	16.0%
1980s Cohort	36-45	1962-1971	28.7%
1970s Cohort	46-55	1952-1961	21.3%
1960s Cohort	56-65	1942-1951	18.4%
1950s Cohort	66-70	1937-1941	6.2%

Table 10: Descriptive statistics for education

	Observations	Mean	Standard Deviation	Min	Max
China	1990	3.518	2.312	1	8
US	1249	4.766	1.342	2	8

Table 11: Descriptive statistics for gender

	Observations	Mean	Standard Deviation	Min	Max
China	2015	1.542	0.498	1	2
US	1249	1.500	0.500	1	2

Table 12: Chinese coastal and inland provinces, American coastal and inland regions

	Coastal	Inland
China	Beijing	Shanxi
	Tianjin	Inner Mongolia
	Shanghai	Jilin
	Liaoning	Heilongjiang
	Hebei	Anhui
	Jiangsu	Jiangxi
	Zhejiang	Henan
	Fujian	Hubei
	Shandong	Hunan
	Guangdong	Sichuan
	Guangxi	Guizhou
		Yunnan
		Shaanxi
		Gansu

		Qinghai Ningxia Xinjiang
US	New England Middle Atlantic South Atlantic California Northwest	East South Central West South Central East North Central West North Central Rocky Mountains

Table 13A: Descriptive statistics for Chinese coastal province variable

	Observations	**Mean**	**Standard Deviation**	**Min**	**Max**
China	2015	0.492	0.500	0	1

Table 13B: Descriptive statistics for American coastal region variable

	Observations	**Mean**	**Standard Deviation**	**Min**	**Max**
US	1249	0.571	0.495	0	1

Table 14: Descriptive statistics for political party membership

	Observations	**Mean**	**Standard Deviation**	**Min**	**Max**
China	2000	0.060	0.238	0	1
US	1232	0.179	0.384	0	1

Table 15: Descriptive statistics for environmental group membership

	Observations	**Mean**	**Standard Deviation**	**Min**	**Max**
China	1993	0.102	0.303	0	1
US	1232	0.166	0.372	0	1

Table 16: F-Tests (for joint significance) for coefficients of cohort variables, model 1

	China	**US**
National environmental concern	0.000*	0.000*
Global environmental concern	0.109	0.356
Overall environmental concern	0.019*	0.002*

Note: Statistically significant effects ($p < 0.05$, two-tailed test) are noted by a shaded cell and an asterisk. The 1950s cohort was omitted.

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