

Original Research

Exploring the Changes and Influencing Factors of Chinese Public Environmental Awareness: a Diachronic Analysis Based on CSS2006, 2013, and 2019

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Abstract

This paper explores the changes and influencing factors of public environmental awareness in China using data from the Chinese Social Survey (CSS) in 2006, 2013 and 2019. It was found that: 1) Chinese public environmental awareness showed a significant increase in 2013 and 2019 compared to 2006. 2) The increase in personal income is an important factor influencing public environmental awareness; 3) There are significant intergenerational differences in public environmental awareness. The younger generation is more environmentally conscious than the older generation, showing distinctive characteristics of post-materialist values. 4) Educational attainment has a significant positive effect on public environmental awareness. The results of this study show that with China's economic and social development, the public has shifted from a preference for economic growth to a focus on environmental protection, and the Chinese public's environmental awareness has shifted from materialism to post-materialism. In order to improve the effectiveness of China's environmental protection policies, it is important to respond to this change in the Chinese public's environmental awareness.

Keywords: environmental awareness, post-materialism; pro-environmental behavior, environmental protection willingness, sustainable development

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Introduction

Environmental awareness is an important component of civic values and citizenship, and refers to the degree to which people are aware of environmental problems and support their solution, or the willingness of people to make personal efforts to solve these problems [1]. For individuals, environmental consciousness is the subjective perception and behavioral tendencies of members of society regarding the relationship between people and the environment, and is the result of a series of complex psychological processes [2, 3]. For groups, environmental consciousness is the average level of awareness and behavioral tendency of people with certain spatial or attribute characteristics about the relationship between people and the environment, which is expressed as intergenerational differences in the level of environmental consciousness [4, 5], urban-rural differences [6, 7], and other group differences. As an important value, environmental awareness reflects the public's value orientation on environmental issues, and the essence of this value orientation is the degree of importance attached to environmental protection [1]. According to the existing research literature, public environmental awareness is influenced by the economic and social development environment in which they live. At different stages of economic and social development, there are significant differences in public environmental awareness, showing two completely different value orientations. It is a common phenomenon that in the initial stage of a country's development, the government and the public tend to support the policy of prioritizing economic growth, but after the economic development has achieved significant results, with the increasing public awareness of the environment, environmental protection is reinforced and even placed in a more important position as the usual choice of the government [8, 9].

Since 1978, China has moved from a low-income country to a middle- to high-income country. In this context, what is the state of public environmental awareness and has it changed accordingly with the stage of economic and social development? A number of studies have given a positive answer to this question. Scholars have identified the factors influencing public environmental awareness in China, mainly based on questionnaire surveys of a sample of local areas or specific groups or using national sample survey data from CGSS and CSS. From the existing research literature, the Chinese public's environmental awareness has shown an increasing trend [10–12]. Researchers have explored the reasons for the increase in public environmental awareness from different perspectives. Some studies have pointed out that public environmental awareness is influenced by various economic, political, environmental, and social factors [13, 14], and that environmental degradation, government education and publicity on environmental issues, urban elite actions, and media and civil environmental organizations'

mobilization all contribute to the increase of public environmental awareness [12, 15]. Meanwhile, it has been noted that the improvement of public quality also has an important impact on the increase of environmental awareness, highlighted by the corresponding increase in public environmental awareness with the increase of educational level [7, 16]. In addition, it has also been suggested that as economic development and income increase, the public becomes more concerned about the quality of life and becomes more environmentally conscious [13, 16]. Of course, there are also studies that suggest a U-shaped relationship between income and environmental awareness: as income improves, people's environmental awareness shows a first decline and then an increase [17, 18].

In summary, the existing studies have provided important insights into the understanding of public environmental awareness, but there are two aspects that need to be further explored. First, environmental consciousness as a value orientation is the basic value position and attitude of the public based on their own values in the face of various conflicts and contradictions. When analyzing the change of public environmental consciousness, we should also reflect whether the public's value orientation changes when environmental protection conflicts with other economic and social activities, which has not been more developed and discussed in previous studies. Secondly, in terms of the factors influencing the change of environmental awareness, most of the existing studies are based on the objective environment (e.g., environmental degradation, government attention, etc.) or on the public's own situation (e.g., increase in income and education), and lack the necessary theoretical overview and integration. In this paper, we propose to respond to these two questions using survey data from a nationally representative sample, and to explore the factors influencing the change in public awareness of the environment in China.

Literature Review and Research Hypothesis

Inglehart found that when a society moves from a stage of relative poverty to a more affluent stage, there is a tendency for the environmental emphasis to begin to come to the fore [19]. In this regard, he explained it with the theory of post-materialism. Post-materialism theory is a theory proposed by Inglehart to explain the change in intergenerational values of members of society, which suggests that as the problem of survival is solved, public values shift from an emphasis on material well-being and personal security to a quest for quality of life, and this shift has far-reaching effects on the economic and social order [19]. Based on an empirical study of 43 countries, Inglehart found a general shift in values toward post-materialism in countries with different social systems and cultural backgrounds [20]. For the reasons of the shift, he believes that there are two main

aspects. One is the improvement of people's material living conditions. The prioritization of individual values reflects the conditions of the economic and social environment in which they live. When society is in a situation of scarcity, people will give it the highest attention and thus form priority values. In pre-industrial societies, people's priority values are survival and security due to the lack of resources and insecurity; in industrialized societies people seek to maximize profits and materialism centered on economic growth becomes a priority value; while in developed industrial societies, after people enjoy long-term political stability, economic prosperity and welfare policies, priority values shift to the pursuit of subjective personal happiness and In developed industrial societies, after enjoying long-term political stability, economic prosperity and welfare policies, the priority values have shifted to post-materialism, which is the pursuit of personal subjective happiness and self-expression and political participation. Second, there is intergenerational turnover. There is a time lag between the economic and social environment and the prioritization of values. A person's basic values largely reflect the situation before adulthood, and the basic values formed during adolescence set the values of a person's life. Although values in adulthood may change due to changes in the economic and social environment, these changes are only partial rather than fundamental. Thus, intergenerational differences in values are formed by the different life situations of each generation during adolescence, and intergenerational change drives the transformation of values in a society [19, 21]. Environmental consciousness is a manifestation of post-materialist values, and the change in public environmental consciousness in the process of economic and social transformation is, in the view of post-materialist theory, the result of the improvement of material living conditions and intergenerational change [22, 23].

Returning to the Chinese reality, has the economic situation of Chinese people improved significantly since the reform and opening up, and has there been a post-materialist shift in public values in this context? Has the public's environmental awareness been significantly raised? Based on the theory of post-materialism, this paper argues that in the process of China's economic and social development, the public's environmental consciousness has been increasing due to the continuous high growth of economic and social development, and the public's value orientation has shown a preference for environmental protection, showing the characteristics of post-materialist values. At the same time, the reason for the change of public environmental consciousness is the improvement of material living conditions and intergenerational change. In terms of material living conditions, if the environmental awareness of high-income earners is stronger than that of low-income earners, public environmental awareness will generally improve as income levels increase; in terms of generation, if the younger generation is more

environmentally aware than the older generation, public environmental awareness will increasingly exhibit post-materialist characteristics as generations change [24, 25]. Accordingly, the following research hypothesis is proposed in this paper:

H1: The public environmental awareness will be significantly improved by the forward development of economic and social development.

H2: The younger generation is more environmentally conscious than the older generation;

H3: The increase in income level has a positive effect on the increase of public environmental awareness;

H4: The higher the level of education, the stronger the environmental awareness.

Materials and Methods

Data Sources

This study uses data from the Chinese Social Survey (CSS) conducted by the Institute of Sociology, Chinese Academy of Social Sciences (CASS). 7,000-10,000 households aged 18-70 in 604 villages/residential committees in 151 districts, cities and counties in 31 provinces and autonomous regions were selected every two years by probability sampling for household interviews. questionnaire survey. Among them, the public was surveyed for environmental awareness in 2006, 2013 and 2019. In the survey, CSS asked the public about their values when economic growth conflicts with environmental protection. After screening, CSS2006 had 6396 valid samples, CSS2013 had 8435 valid samples, and CSS2019 had 4194 valid samples, for a total of 19025 valid samples.

Variable Settings

We chose the question "When faced with the dilemma of whether to develop the economy or protect the environment, economic development is more important than protecting the environment" (1 = strongly agree, 2 = agree, 3 = disagree, 4 = strongly disagree) in the CSS questionnaire, and the higher the score, the stronger the public's environmental awareness. Meanwhile, for robustness testing, we recoded "1" and "2" as "0" for respondents with no environmental awareness, and "3" and "4" as "1" for respondents with environmental awareness.

According to the post-materialist theory, the change in public environmental awareness is influenced by the improvement of material living conditions, generational change, and educational attainment, so these three variables are used as independent variables in this study. For the variables of improvement in material living conditions, the annual per capita income and annual household income were selected as the indicators of measurement in this study. For the manipulation of the generational turnover variable, the respondents were

divided into three generational groups according to their birth years: the young group (18-35 years old), the middle-aged group (36-59 years old), and the old group (60 years old and above).

In addition, other related studies have shown that social structural factors, such as gender, household registration, age, social status, and living area, also have different degrees of influence on public environmental awareness [11, 15, 24]. In this regard, these variables, as well as the year of the survey, are used as control variables in this paper.

Based on the analysis of the changing status of public environmental awareness, this study explores the influencing factors of public environmental awareness changes based on OLS regression, and summarizes the main mechanisms of public environmental awareness changes by comparing the changes of influencing factors of public environmental awareness in 2006, 2013 and 2019. In addition, we further compare the influencing factors of environmental awareness of each income group and each generation group to summarize the main influencing mechanisms in order to test the research hypotheses proposed in this paper.

Results and Discussion

Results of Descriptive Statistical Analysis

Table 1 shows the changes in environmental awareness of the Chinese public as a whole, each generational group and each income group from 2006 to 2019, and in summary, the changes in public environmental awareness are mainly manifested in the following three aspects.

First, in general, public environmental awareness increased across all age groups and income classes from 2006 to 2019, especially peaking in 2013 and decreasing

in 2019, but still significantly higher than in 2006. This may be related to the continuous improvement of China's environment as a result of China's increasing efforts in environmental protection since 2010 [26, 27]. This changing trend indicates a significant shift in the value orientation of the Chinese public, from a preference for economic growth to an emphasis on environmental protection, and environmental awareness shows a shift from materialism to post-materialism. Thus, H1 was initially verified.

Second, there are significant differences in the environmental awareness of each generational group. From 2006 to 2019, the environmental awareness of the youth group is significantly higher than that of both the middle-aged group and the elderly group, and it shows the feature that the older the age, the weaker the environmental awareness. It is worth noting that from 2006 to 2019, the environmental consciousness of the youth group is increasing, while the environmental consciousness of the middle-aged and elderly groups shows an inverted U-shape in general, and the environmental of the elderly group in 2019 is even lower than that in 2006. It can be seen that the environmental consciousness of the Chinese public is in the process of changing to post-materialism, and the youth group is in the forefront of the times, while the values of the middle-aged group are also changing forward, but still maintain a certain materialistic character. Thus, H2 was initially verified.

Third, there are significant differences in the environmental awareness of each income group. 2006 to 2019, the environmental awareness of the Chinese public shows the characteristic of increasing with personal income, and the environmental awareness of the high-income group is significantly higher than that of the middle-income group and the low-income group, and the environmental awareness of the high-income group has increased the most from 2006 to 2019. It can

Table 1. Changes in environmental awareness among groups of different ages and income levels.

Variables	CSS2006		CSS2013		CSS2019	
	M	S. D	M	S. D	M	S. D
Youth group	2.649	0.839	2.809	0.776	2.870	0.806
Middle-aged group	2.500	0.817	2.678	0.803	2.593	0.941
Elderly group	2.395	0.776	2.574	0.794	2.368	0.981
Total	2.522	0.821	2.692	0.798	2.619	0.932
<i>F</i>	31.716***		41.223***		73.975***	
Low-income group	2.378	0.811	2.540	0.800	2.400	0.978
Middle-income group	2.487	0.810	2.657	0.794	2.547	0.955
High-income group	2.664	0.818	2.864	0.788	2.843	0.842
Total	2.522	0.821	2.688	0.802	2.616	0.939
<i>F</i>	60.961***		84.530***		68.620***	

be seen that the post-materialistic value orientation of environmental consciousness is more prominent among the high-income groups in the process of significant increase of environmental consciousness of all income groups. Therefore, H3 was initially verified.

Results of OLS Regression Analysis

Based on the preliminary indication of changes in environmental awareness across generations and income groups from the descriptive statistics of the data, Table 2 further analyzes the influencing factors of such changes. Table 2 presents the OLS regression statistics of the factors influencing public environmental awareness. Among them, models 1 to 3 analyze the influencing factors of public environmental awareness in 2006, 2013 and 2019, respectively, and by comparing these two models, we can observe the influencing factors leading to the change of public environmental awareness between 2006 and 2019. Models 4 to 6 analyze the factors influencing the environmental awareness of youth, middle-aged and elderly generations respectively,

and by comparing these three models, we can observe the main factors influencing the change of environmental awareness of each generation group. Models 7 to 9 analyzed the factors influencing environmental consciousness of three income groups: low income, middle income, and high income, respectively, and by comparing these three models the main influencing factors of environmental consciousness of each income group could be observed. Based on the analysis of standard coefficients, the following were found:

From the regression statistics of Model 1, public environmental awareness in 2006 was significantly influenced by social structural factors, cultural factors, intergenerational factors and economic factors. Regarding the social structure factor, the environmental awareness of urban residents is significantly higher than that of rural residents. Residents of central and western provinces have significantly lower environmental awareness than residents of eastern provinces, while residents of northeastern provinces have significantly higher environmental awareness than residents of eastern provinces. The possible reason for this result

Table 2. OLS regression model results.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
	2006	2013	2019	Youth group	Middle-aged group	Elderly group	Low-income group	Middle-income group	High-income group
	B(P)	B(P)	B(P)	B(P)	B(P)	B(P)	B(P)	B(P)	B(P)
Constant	2.242 (0.000)	2.331 (0.000)	2.113 (0.000)	2.167 (0.000)	2.370 (0.000)	0.885 (0.149)	3.087 (0.000)	1.567 (0.009)	1.764 (0.001)
Individual income	0.081 (0.004)	0.087 (0.000)	0.114 (0.000)	0.191 (0.015)	0.084 (0.022)	0.080 (0.232)	-0.110 (0.197)	0.253 (0.036)	0.171 (0.038)
Education level	0.060 (0.000)	0.047 (0.000)	0.123 (0.000)	0.106 (0.000)	0.066 (0.000)	0.032 (0.083)	0.065 (0.251)	0.121 (0.037)	0.122 (0.027)
Age	-0.084 (0.000)	-0.073 (0.001)	-0.012 (0.000)	-0.004 (0.320)	-0.008 (0.000)	0.019 (0.029)	-0.012 (0.000)	-0.014 (0.000)	-0.009 (0.000)
Male = 0									
Female	-0.014 (0.507)	0.001 (0.959)	-0.029 (0.345)	-0.045 (0.281)	0.000 (0.990)	-0.025 (0.633)	0.029 (0.664)	0.005 (0.926)	-0.076 (0.112)
Rural residents = 0									
Urban residents	0.061 (0.013)	0.112 (0.000)	0.167 (0.000)	0.080 (0.139)	0.057 (0.017)	0.020 (0.755)	0.092 (0.390)	0.134 (0.015)	0.182 (0.000)
Eastern Region = 0									
Central Region	-0.143 (0.000)	-0.102 (0.000)	-0.103 (0.015)	-0.077 (0.169)	-0.167 (0.000)	-0.161 (0.019)	-0.020 (0.817)	0.034 (0.585)	-0.086 (0.141)
Western Region	-0.097 (0.000)	-0.089 (0.000)	-0.120 (0.000)	-0.074 (0.169)	-0.101 (0.004)	-0.149 (0.027)	-0.037 (0.641)	-0.002 (0.969)	0.026 (0.661)
Northeast Region	0.102 (0.009)	-0.106 (0.002)	-0.104 (0.000)	0.066 (0.347)	-0.002 (0.958)	-0.076 (0.037)	-0.014 (0.911)	-0.067 (0.431)	0.019 (0.847)
R ²	0.175	0.053	0.075	0.051	0.049	0.031	0.045	0.057	0.041
Adjusted R ²	0.173	0.052	0.073	0.046	0.047	0.022	0.037	0.052	0.035
F	37.244	44.809	37.244	10.442	24.778	3.653	5.262	11.095	6.912

Table 3. Binary Logistic regression results.

	2006			2013			2019		
	Model 10			Model 11			Model 12		
	B	P	OR	B	P	OR	B	P	OR
Constant	1.026	0.002	0.358	0.230	0.476	1.258	0.569	0.194	0.566
Individual income	0.235	0.001	1.264	0.170	0.002	0.844	0.276	0.000	1.318
Education level	0.155	0.000	1.167	0.178	0.009	0.837	0.278	0.000	1.321
Age	-0.010	0.000	0.991	-0.015	0.000	1.015	-0.031	0.000	0.969
Male = 0									
Female	-0.005	0.927	0.995	-0.067	0.206	0.936	-0.040	0.589	0.961
Rural residents = 0									
Urban residents	0.151	0.016	1.163	0.544	0.000	0.580	0.449	0.000	1.567
Eastern Region = 0									
Central Region	-0.282	0.000	0.754	-0.260	0.000	1.297	-0.015	0.867	0.985
Western Region	-0.272	0.000	0.762	-0.309	0.000	1.362	-0.017	0.846	0.983
Northeast Region	0.051	0.542	0.950	-0.304	0.001	1.355	-0.253	0.057	0.776

is that the three provinces in the northeast region (Heilongjiang, Jilin, and Liaoning) were the first regions in China to achieve concentrated industrialization and urbanization, and during the long-term industrial development, the local residents have a deeper awareness of environmental issues compared to other regions and, therefore, also have a higher environmental awareness [28]. Regarding the cultural and income factors, the increase in education and income both contribute to the increase in public environmental awareness; regarding the generational factor, public environmental awareness shows a decreasing trend with increasing age. From the regression statistics of Model 2 and Model 3, the factors influencing public environmental awareness in 2013 and 2019 showed little overall change compared with 2006, but the environmental awareness of residents in the central, western and northeastern provinces were significantly lower than those in the eastern provinces. Thus, H1, H2, H3 and H4 were further verified.

After that, the article further analyzed the factors influencing the environmental awareness of each intergenerational group. The regression statistics from model 4 to model 6 showed that there were differences in the formation mechanisms of environmental awareness among the generational groups. First, the environmental consciousness of the youth group was mainly influenced by cultural factors (education level) and economic factors (total annual personal income), while the influence of social structure factors (household registration, area of residence) on the environmental consciousness of the youth group was not significant. Secondly, the environmental awareness of the middle-aged group is influenced by both cultural and income factors, and the social structure factor

also has a certain degree of influence, especially the environmental awareness of residents living in the central and western provinces is significantly lower than that of residents living in the eastern provinces. Finally, the environmental consciousness of the elderly group is influenced by age and geographical area of residence, while personal income and education level do not have a significant effect on the environmental consciousness of the elderly group.

Further analysis of the influencing factors of environmental consciousness for each income group. The regression statistics from model 7 to model 9 show that there are differences in the influencing factors of environmental awareness for each income group. First, only age significantly influences the environmental awareness of the low-income group, while other factors do not have significant effects on the environmental awareness of this group. In contrast, the environmental awareness of the middle-income group and the high-income group is influenced by multiple factors such as personal income, age, education level and residence area.

Robustness Test Results

We performed robustness tests using binary logistic regression to ensure that the hypothesis testing results were reliable. The results of the robustness test are shown in Table 3. Model 10, Model 11, and Model 12 in Table 3, are highly consistent with the results of Model 1, Model 2, and Model 3 in Table 2, respectively, which indicates that the hypothesis test results are robust.

Conclusions

This paper explores the changes in public environmental awareness and the influencing factors using CSS survey data, and the four research hypotheses proposed were tested. The main findings are as follows.

First, with the development of economy and society, public environmental awareness has been characterized by a rise. Compared with 2006, the environmental awareness of the Chinese public has been significantly increased in 2013 and 2019, especially peaking in 2013.

Second, the improvement of material living conditions is an important factor influencing the increase of public environmental awareness. The results of the study show that environmental awareness tends to increase with the increase of public income, which indicates the positive significance of the improvement of material living conditions for the increase of environmental awareness.

Third, there are significant intergenerational differences in public environmental awareness. The younger generation is more environmentally conscious than the older generation, showing distinctive characteristics of post-materialistic values. Fourth, cultural factors are another important factor influencing the change of public environmental awareness. Since the reform and opening up, the rapid development of education has greatly improved the public's education and cultural quality. In particular, the expansion of colleges and universities since the late 1990s has transformed higher education from elite education to mass education, and more people have been given the opportunity to receive higher education, which can have an important impact on the change of public values. The group receiving higher education is often the advocate and implementer of new social values.

In addition, this paper also finds that the factors influencing environmental awareness vary across social groups. In comparison, generational and cultural factors generally have significant effects on environmental awareness in different social groups, while the effects of material living conditions and social structure factors are localized and relatively weaker. Among the intergenerational groups, the environmental consciousness of youth and elderly is less affected by social structure and income factors and has no significant effect; among the different income groups, the environmental consciousness of low-income groups is affected by age factors, while the environmental consciousness of middle-income and high-income groups is affected by multiple factors such as personal income, age, education level and geographical residence.

The above findings suggest that the public's environmental awareness in China has shifted from materialism to post-materialism, and that the public's priority values have changed. It can be seen that in this new stage of development, when economic growth and environmental protection are in conflict, the public's value orientation has changed from favoring economic

growth in the past to emphasizing environmental protection, which indicates that economic growth and environmental protection are no longer "optimized" and "balanced" but equally important. This explains why in recent years there have been public protests against the destruction of the environment due to economic development in some places. Therefore, an accurate grasp of the changes in public awareness of the environment is of practical importance in promoting the construction of ecological civilization and environmental protection in China.

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Conflict of Interest

The authors declare no conflict of interest.

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