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Abstract
This paper investigates the determinants of environmental values across countries. Its purpose is to put the role of economic affluence into perspective by challenging the conventional wisdom that states that the level of economic affluence influences the level of environmental concern expressed by the population. While this paper does not question the fact that large scale environmental defensive activities are likely to be influenced by the level of income in a country, it is hypothesized that environmental awareness and individual involvement in environmental protection need not be a function of the level of economic affluence. To test this hypothesis, three variables are created—Positive Environmental Attitudes, Willingness to Pay to Protect the Environment, and Human-Environment Relationship—using data from the World Values Survey (1995-1997). The variables are regressed against a set of economic, demographic, political, psychological and education variables. The results show that economic affluence has, at best, a marginal direct influence on environmental awareness and no direct impact on environmental behavior. The paper demonstrates that the degree of urbanization, the level of subjective well-being and the level of income equality have direct effects on awareness, while education, population pressure and happiness are significantly correlated with environmental behavior.

1. Introduction

The literature on the environmental impact of economic development often assumes that the emergence of environmental awareness is correlated with affluence. Environmental quality is perceived as a luxury good that becomes of concern only when basic needs have been met. Thus wealthy countries are more likely to exhibit a strong demand for environmental quality than developing ones. This argument is often advanced as one of the explanatory factors behind the environmental Kuznets curve (EKC). The EKC hypothesis postulates the existence of an inversed U-shaped relationship between economic well-being and environmental degradation. Panayotou explained the occurrence of the declining section of the curve as follows:

> At higher levels of development, structural change towards information-intensive industries and services, *coupled with increased environmental awareness*, enforcement of environmental regulations, better technology and higher environmental expenditures, result in leveling off and gradual decline of environmental degradation. (quoted in Perman et al 1996, p.33, emphasis mine)

Analyses in political science and psychology lend support to this hypothesis. Evidence indicates that as western countries have entered a post-industrialization phase, they have become concerned with postmaterialist values, such as environmental attitudes and behavior, focused on increased quality of life rather than material gain alone (Inglehart 1990 and 1997). Dunlap and Mertig (1995) argued that this perspective coincides with the hierarchy of needs theory first developed by Maslow (1954) stating that higher order needs are more fulfilling than lower order ones but cannot occur until all lower order or basic needs have been met (food, shelter, etc). Thus citizens of poorer countries are less likely to exhibit positive environmental attitudes and behavior because they lack the resources necessary to meet their basic needs. While this view has largely become the conventional wisdom in the social sciences[1], it has been challenged in some

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[1] This view is referred to as "the conventional wisdom" in the remainder of the paper.

instances. For example, local concern for the environment among residents of developing nations has been shown to be stronger than that of residents in industrialized countries (see Brechin and Kempton 1994, Martinez-Alier 1995, Dunlap and Mertig 1995). This suggests, contrary to the conventional wisdom, that it is erroneous to imply that less developed nations are not concerned with environmental issues. While large scale environmental defensive activities are likely to be strongly correlated with a nation's income level (e.g. wealthier nations are more likely to have the resources to deal with environmental protection), environmental awareness (i.e. concern for the environment that does not necessarily result in action) and individual involvement in environmental protection might exist independently of the level of economic development.

This paper is concerned with values expressed by people regardless of the level of environmental regulation and/or involvement of the State in environmental protection. It seeks to assess what factors, across countries, tend to influence (1) people's level of awareness regarding environmental quality and (2) people's actual involvement in the protection of the environment. The purpose of this paper is to put the role of economic affluence into perspective in a model of the determinants of environmental values.

The model consists of three equations with three distinct measures of self-reported environmental values. The dependent variables, built using data collected in the World Values Survey (1995), are designed to capture popular attitudes with regard to the environment in 40 nations. They are: Positive Environmental Attitudes, Willingness to Pay to Protect the Environment and people's view of the Human-Natural Environment Relationship. It is hypothesized that population density, the percentage of urban population, the levels of political freedom and economic equality, the level of perceived subjective well-being and the level of education will matter. By testing each dependent variable on the same set of regressors, it is

possible to determine what factors matter the most under what circumstance. The model will show that environmental behavior is not only correlated with economic factors but also with demographic, psychological and education variables. It will also demonstrate that economic affluence is not a sine qua non to environmental awareness. The results are limited by the availability of data on cross-country environmental values. Nevertheless, this paper provides a preliminary look at a research area that has been rarely investigated in economics.

The paper is organized as follows: Section 2 is devoted to the interdisciplinary literature review on environmental awareness and behavior. Section 3 introduces the hypotheses, the data and the model. Results are presented in Section 4 and discussed in Section 5. Finally Section 6 concludes the paper.

2. Literature Review

The rise of environmentalism and green parties in the western world can be dated back to the 1960s and 1970s[2]. That such a movement failed to occur in other parts of the world at the same time may indicate that the level of political freedom and economic development reached in industrialized countries played an important role. It is rather intuitive that concerns about the global environment would not constitute a priority for developing nations. This is confirmed by Dunlap and Mertig (1995) who reported a lack of support and concern amongst members of poorer countries for the 1972 UN Conference on the Human Environment. Moreover, Inglehart (1990, 1997) found that concern about the environment was a postmaterialist value that was more likely to occur in post-industrialized nations. He argued that a greater focus on quality of life was the privilege of economically affluent nations. This argument is reminiscent of Maslow's hierarchy of needs theory (1954). While higher order needs (love, quality of life, etc.)

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[2] Rachel Carson's book (1962) constitutes an early example of the emergence of the movement.

are more fulfilling they are contingent upon meeting all lower-order needs (food, shelter, physical security, etc.). In so far as environmental quality can be viewed as a higher-order need or luxury good then it is only logical to witness the emergence of popular and political environmentalism in the western world. The literature on environmental sociology furthermore found that at the national level, concern for the environment in western countries was stronger among higher social classes thus emphasizing the higher-order status of environmental quality (see, for instance, Van Liere and Dunlap 1980, and Buttel 1987).

However, Martinez-Alier (1995) and Brechin and Kempton (1994), among others, contested the view that the rise of environmentalism was a function of economic affluence. These authors observed the development of grass-root environmental movements in third world countries that seemed to go against the postmaterialist thesis and the hierarchical needs theory. These studies point to an important dichotomy which does not contradict Maslow's theory. Indeed the type of environmental concern expressed in wealthier countries is focused more on global issues such as climate change and ozone depletion, while in poorer countries it tends to be more local (industrial development threatening traditional activities in certain communities). In the latter case, protection of the local environment is a lower-order need because it directly affects subsistence needs. This analysis is confirmed by Dunlap and Mertig (1995) in their study of an international survey regarding environmental quality in 24 countries. The authors found that concerns about the quality of the local environment (at the community and national levels) were negatively correlated with GNP per capita (i.e. stronger in relatively poorer nations), while the correlation was positive for concerns over the quality of the world's environment (i.e. stronger in relatively wealthier countries).

The difference in the scale of environmental concern between industrialized and developing countries suggests that environmental awareness need not be correlated with national income. In fact the level of environmental awareness in a particular nation can stem from five potential sources: threatened means of subsistence, the biological and psychological need to live in harmony with nature (biophilia hypothesis), the education level, cultural differences and/or economic affluence. First, Brechin and Kempton (1994) reported the case of the Chipko movement in India where villagers stopped loggers from clear cutting a forest which they depended upon for wood and hunting. Similar grass-root environmental movements have occurred in many developing areas around the world, indeed Schneider (1988) estimated that up to 100 million people took part in these movements in third world countries. Here environmental awareness and action are a direct result of industrial and demographic development exerting pressure on subsistence means. Second, Wilson (1984)'s biophilia hypothesis[3] states that there is a biological need for human beings to live in harmony with nature. This need is likely to be stronger for people removed from nature (city dwellers, etc.). Therefore, increased population pressure and a growing urban population are likely to make people aware of their distance from the natural environment and thus make them express a strong awareness to environmental values. Third, Goetz et al. (1998) found that, after controlling for income level, highly educated populations expressed more concern about the environment. Fourth, culture might matter. Lal (1998) argued that people's cosmological beliefs or worldviews were determined by their surrounding environment. The relative scarcity or abundance of natural resources is likely to affect the way people react to nature. Thus a particular environmental attitude might be engrained in a specific culture regardless of its level of development. Finally, a certain level of

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[3] According to Kellert (1993, 20), "the biophilia hypothesis proclaims a human dependence on nature that extends far beyond the simple issues of material and physical sustenance to encompass as well the human craving for aesthetic, intellectual, cognitive, and spiritual meaning and satisfaction."

wealth associated with relative income equality is likely to influence environmental concern (Magnani 2000). Therefore, any one or a combination of these sources might explain the emergence of environmental awareness and behavior. This will be examined below.

3. Hypotheses, Data and Model

3.1 Dependent variables

In order to determine what factors affect the emergence of environmental preferences, across nations, the first step is to develop indicators which reflect those preferences. These indicators can be built using self-reported values of environmental concern contained in international surveys. However, relatively few international surveys of environmental issues exist. The Health of the Planet Survey conducted in 1992 by the Gallup Institute asked a range of questions relating to the environment in 24 countries. Environics has developed a similar survey conducted annually in 28-30 countries. The World Values Survey (WVS), designed by Ronald Inglehart, has also included in its third wave (1995-1997) a section addressing environmental issues. Even though the breadth of issues dealt with in WVS is not as wide as in the other two surveys, it was selected for this paper, for it represents the most extensive survey in terms of countries included (40 retained for this analysis) and thus provide more data points for the analysis. The environmental section of WVS is comprised of the following questions:

V38: I would agree to an increase in taxes if the extra money were used to prevent environmental damage.
V39: I would buy things at 20% higher than usual prices if it would help protect the environment.
V40: [My country's] environmental problems can be solved without any international agreements to handle them.
V42: Have you chosen household products that you think are better for the environment?
V43: Have you decided for environmental reasons to reuse or recycle something rather than throw it away?
V44: Have you tried to reduce water consumption for environmental reasons?
V45: Have you attended a meeting or signed a letter or petition aimed at protecting the environment?
V46: Have you contributed to an environmental organization?
V49: 1. Humans should master nature, or
2. Humans should coexist with nature.

To represent positive and negative values towards the environment, answers to those questions were formatted to fit a -1 to 1 scale (see Appendix 1). Since indicators reflecting national preferences are sought, answers were aggregated over the sample size for each nation. Nine continuous variables were obtained for a total of 40 countries (for a list of the countries see Appendix 2). A factor analysis, using a principal component analysis, was subsequently conducted to determine the pattern of correlation between the variables and thus to examine the possibility of reducing them to a smaller set of factors. The results are reported in Table 1. The analysis retains four components explaining 81% of the total variance. The first component (factor) is comprised of variables 42, 43 and 45, as they are unequivocally correlated to each other. Although variable 46 is not as strongly correlated (usually the cut-off point is a factor loading of .5 (Siegel et al. 1997)) it is included in the first component based on its lack of correlation with any of the variables in the other components. The second component is made up of variables 38 and 39, the third of variable 49 and the fourth of variables 40 and 44.

The first factor represents individual attitudes and behavior with regard to the environment (propensity to recycle/reuse, purchase environment-friendly goods, participate in environmental causes, etc). The second factor expresses the willingness to pay to protect the environment (it is hypothetical and is not an actual commitment). The third factor is a country's worldview concerning the relationship between human beings and nature. Finally there is no clear rationale for including variables 40 and 44 in the same factor and since the percentage of variance they explain is relatively marginal, this component is dropped. As a result, only the first three factors are selected as environmental indicators in this paper.

Factor 1, Positive Environmental Attitudes, represents actual behavior designed to protect the environment while factors 2 and 3 correspond to environmental awareness: Willingness to

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Pay to Protect the Environment reflects a hypothetical commitment to protect the environment, in that sense it denotes a relative awareness to environmental issues that does not necessary lead to an actual commitment; countries that tend to believe that humans and nature should coexist are also more likely to express a greater environmental awareness (factor 3 is referred to as Human-Environment Relationship). Those three indicators are used as dependent variables and are included in three distinct equations.

Table 1 Factor Analysis

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	2.896	32.182	32.182	2.896	32.182	32.182
2	1.824	20.271	52.453	1.824	20.271	52.453
3	1.375	15.281	67.734	1.375	15.281	67.734
4	1.218	13.536	81.271	1.218	13.536	81.271
5	.644	7.160	88.431			
6	.403	4.480	92.910			
7	.329	3.660	96.570			
8	.178	1.978	98.548			
9	.131	1.452	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component			
	1	2	3	4
V42	.887	-.154	-.160	-2.75E-02
V43	.840	-.238	-.167	-4.36E-02
V45	.752	.130	-4.78E-02	.268
V39	.165	.873	.320	3.374E-02
V38	.180	.831	.167	-.379
V49	.404	-.237	.737	-8.90E-02
V46	.458	.319	-.694	-.198
V44	.475	7.694E-02	.266	.705
V40	-.424	.332	-.306	.674

Extraction Method: Principal Component Analysis
[a]4 components extracted

3.2 Independent Variables

The three dependent variables are regressed against the same set of independent variables to determine if the factors that affect the emergence of environmental awareness and environmental behavior are different. Since the environmental and development economic literature assumes that environmental values are a function of economic affluence (Panayotou 1993), GDP per capita[4] (natural log) is used as a proxy and first regressor. According to the conventional wisdom, GDP per capita should be positively correlated with the three indicators, however if critics are right it should not be correlated with measures of environmental awareness. The second variable represents Income Inequality. It tests the hypothesis that societies characterized by a relatively equal distribution of income are more likely to express environmental awareness and to commit to protecting the environment: the resources that would be spent on fighting inequality can be used to raise awareness and protect the environment (Magnani 2000). The Gini coefficient[5] is used as a measure of economic inequality: a low coefficient corresponds to a more equal distribution of income, thus it is expected to be negatively correlated with the dependent variables. Third, Political Freedom is considered to encourage the emergence of environmental awareness and behavior (Welsch 2002). The Democracy Score[6] of the nations included in the analysis is used to represent Political Freedom. If the hypothesis holds true, the Democracy Score should be positively correlated with the environmental indicators. Fourth, Goetz et al. (1998) found that highly educated populations had better environmental conditions. Thus a variable measuring education (Enrollment in Tertiary Education[7]) is included in this paper to test

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[4] Data source: 1995 PPP US$ GDP per capita—US Energy Information Agency.
[5] Data source: 1994-1997 Gini coefficients—World Bank.
[6] Data source: 1995 Democracy Score—Freedom House. Countries are rated on a scale from 1 to 7, from more democratic to less democratic. The data are reformatted to fit a 0 to 1 scale (by taking the inverse of the score) where 1 expresses the highest level of democracy/freedom.
[7] Data Source: 1995 Enrollment in Tertiary Education—World Bank.

whether higher levels of education are indeed correlated with environmental values. Fifth, the critics of the conventional wisdom (Brechin and Kempton 1994, Martinez-Alier 1995, etc.) claimed that population pressure and industrial development are responsible for the emergence of environmental movements in third-world countries. Thus it can be hypothesized that countries with greater Population Density[8] (included as a logarithm in this paper) are more likely to create pressure on their environment and generate greater environmental concern. Sixth, in their seminal study, <u>Happiness and Economics</u>, Frey and Stutzer (2002) asserted that people expressing a higher level of subjective well-being were more likely to be aware of environmental problems and more likely to actively try to commit to fighting them. A self-reported measure of subjective well-being[9] is included here to test the validity of this claim. Finally, if the biophilia hypothesis (Wilson 1984 and Kellert and Wislon 1993) holds true, then it results that environmental awareness can occur regardless of the level of development. People further removed from the natural environment may be more likely to express a need to preserve it (as they might feel the negative impact of its absence). The percentage of Urban Population[10] is used as a proxy to test for the biophilia hypothesis: urban populations are more likely to be removed from nature.

3.3 Model

The model consists of three equations, one for each of the dependent variables presented above. Each equation is estimated by several multivariate regressions of the independent variables on the left hand side variable. The method utilized is a traditional OLS. This method assumes the

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[8] Data source: 1995 Population density: CIA World Factbook and US Energy Information Agency.
[9] Data Source: World Values Survey 1995-1997. Question 10 asks people to rate their happiness: very happy, quite, not very or not at all. The answers are given the values 2, 1, -1, and -2 respectively. They are aggregated over the sample size to represent the level of happiness in each nation.
[10] Data Source: 1995 Percentage of Urban and Rural Population—World Bank.

existence of a linear relationship between the dependent variables and their regressors. The potential for non-linearity is, consequently, not investigated in this paper. Because of the nature of the independent variables, some colinearity is expected. This is explored via a correlation matrix. The results of the correlation matrix and the regressions are presented below.

4. Results

The correlation matrix indicates the existence of correlation between some independent variables (see Appendix 3). This means that univariate regressions of the independent variables that appear to be meaningful with respect to the three environmental indicators will yield results that are not interpretable (for instance, GDP appears to be positively correlated with Positive Environmental Attitudes and Human-Environment Relationship). Multivariate regressions are therefore used to control for the influence of the other variables and determine the marginal effect of each independent factor on the dependent variables.

Table 2 reports the results of four multivariate regressions on the first environmental indicator: Positive Environmental Attitudes. In Model 1, which includes all the independent variables, two variables are characterized by a statistically significant positive relationship with the dependent variable: Happiness and Education. Population Density exhibits a marginal positive correlation with Positive Environmental Attitudes. The remaining variables GDP per capita, Political Freedom, Income Inequality and Urban Population are not significant. The White heteroskedasticity test indicates that the null hypothesis cannot be rejected, therefore homoskedasticity can be assumed. The correlation matrix shows the existence of a correlation (0.80) between GDP per capita and Political Freedom and therefore the potential for multicolinearity in the model. Since the t-statistic associated with Political Freedom is low

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Table 2 – Multivariate Regressions: Positive Environmental Attitudes

Dependent Variable: Positive Environmental Attitudes
40 Observations
t-statistic in parentheses

	Model 1	Model 2	Model 3	Model 4
ln GDP per capita	-0.022	-0.0042	-0.0091	
	(-0.32)	(-0.091)	(-0.21)	
ln Population Density	0.045	0.043	0.038	0.049
	(1.19)	(1.17)	(1.24)	(1.83)
Urban Population	-0.20	-0.27	-0.20	
	(-0.53)	(-0.70)	(-0.68)	
Political Freedom	0.082			
	(0.35)			
Happiness	0.21	0.20	0.22	0.19
	(1.86)	(1.85)	(2.25)	(2.75)
Income Inequality	0.0020	0.0018		
	(0.42)	(0.39)		
Tertiary Education Enroll.	0.0089	0.0090	0.0083	0.0072
	(2.96)	(3.07)	(3.52)	(4.35)
Constant	-0.83	-0.87	-0.77	-0.96
	(-1.96)	(-2.16)	(-2.94)	(-6.25)
Adjusted R^2:	0.35	0.37	0.40	0.42
F-Statistic:				10.52
White Heteroskedasticy Test:				
F-statistic (*Probability*):	1.07 *(0.43)*	1.28 *(0.29)*	1.44 *(0.21)*	0.81 *(0.57)*

(0.35), the variable is dropped from the equation. Model 2 lists the results of the multivariate regression without Political Freedom. While the adjusted R^2 has slightly improved (as expected since a variable with a t-statistic less than 1 was dropped), the results of the model vary little: Happiness, Education and Population Density are still the only variables with statistically significant estimates. Since Income Inequality has a low t-statistic, it is in turn dropped from the model. Model 3 represents the regression without Political Freedom and without Income Inequality. The adjusted R^2 has improved, and the t-statistic associated with the three statistically

significant variable named above have become somewhat stronger. GDP per capita and Urban Population are still not significant. Finally, Model 4 tests a specification in which the four variables not significant in Model 1 (GDP per capita, Political Freedom, Income Inequality and Urban Population) are dropped. The F-Statistic (10.52) signals a fit specification for the model. The White heteroskedasticity test indicates that the null hypothesis cannot be rejected, therefore homoskedasticity can be assumed. The results of Model 4 show that Happiness and Education are highly correlated with the dependent variable. The estimate associated with Population Density becomes stronger and significant at the 90% confidence interval.

Table 3 reports the results of two multivariate regressions on the second factor: Willingness to Pay to Protect the Environment. In Model 5, which includes all the independent factors, two variables are positive and statistically significant: Urban Population and Happiness. One variable is negative and marginally significant at the 85% confidence interval: GDP per capita. Three variables are very marginally significant (75%-80% confidence interval): Population Density, Income Inequality and Education. Political Freedom is not significant, because of its low t-statistic and correlation with GDP per capita it is dropped from the equation. Model 6 tests all the regressors but Political Freedom on the dependent variable. The White heteroskedasticity test indicates that the null hypothesis cannot be rejected, therefore homoskedasticity can be assumed. The results of Model 6 vary little from Model 5. This suggests that willingness to pay to protect the environment (WTPE) is contingent upon a certain level of subjective well-being and the degree of urbanization. They also show that WTPE is more strongly expressed in relatively poorer nations. Given the nature of the environmental indicator (one of the questions that makes up the dependent variable is related to a taxation issue), this outcome seems to suggest that developing countries would favor government's intervention in

environmental matters more than wealthy countries do. It might also mean that citizens of wealthier countries favor different alternatives to protect the environment. Moreover, citizens of a centralized state may be more likely to allow for a greater role of their government with regard to environmental issues and thus to respond positively to a potential tax raise[11]. Thus a certain cultural component underlies the response.

Table 3 - Multivariate Regressions: Willingness to Pay to Protect the Environment
Dependent Variable: Willingness to Pay to Protect the Environment
40 Observations
T-statistic in parentheses

	Model 5	Model 6
ln GDP per capita	-0.074	-0.050
	(-1.61)	(-1.64)
ln Population Density	0.029	0.026
	(1.14)	(1.06)
Urban Population	0.58	0.50
	(2.29)	(2.25)
Political Freedom	0.11	
	(0.69)	
Happiness	0.18	0.17
	(2.43)	(2.35)
Income Inequality	-0.0041	-0.0043
	(-1.28)	(-1.38)
Tertiary Education Enroll.	-0.0027	-0.0025
	(-1.34)	(-1.27)
Constant	0.25	0.20
	(0.90)	(0.75)
Adjusted R^2:	0.12	0.14
White Heteroskedasticy Test:		
F-statistic (*Probability*):	1.39 *(0.23)*	0.50 *(0.89)*

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[11] In a country like the USA, people, because of historical and cultural traditions, would be likely to be unfavorable to a tax increase even if it were geared towards a cause they believe in.

Table 4 reports the results of five multivariate regressions on the third factor: Human-Environment Relationship. In Model 7, which includes all the independent variables, two estimates have a statistically significant relationship to the dependent variable: Urban Population (positive) and Income Inequality (negative). GDP per capita has a positive but marginal correlation with Human-Environment Relationship. The White heteroskedasticity test indicates that the null hypothesis could be marginally rejected[12]. Political Freedom exhibits the lowest t-statistic and is dropped from the equation. A multivariate regression is conducted without Political Freedom. The results are shown in Model 8. The adjusted R^2 has improved, while the coefficients remain very similar to those of Model 7. Because the education variable is characterized by a relatively low t-statistic and is somewhat correlated with GDP per capita (0.70) it is in turn dropped from the model. Model 9 presents the results of a multivariate regression on the Human-Environment Relationship indicator without Political Freedom and without Education. Urban Population and Income Inequality remain strongly correlated to the dependent variables and GDP per capita has still a marginally significant coefficient. Model 10 tests a specification without the variables characterized by t-statistics lower than 1 in Model 7. The F-statistic (13.01) indicates a fit specification for the model. However, the results of the White heteroskedasticity test show that the null hypothesis can be rejected, suggesting the presence of heteroskedasticity. To correct the problem, Model 10's regression is estimated with White coefficients (or robust error coefficients). Model 11 lists the results and demonstrates that Urban Population and Income Inequality are statistically significant. GDP per capita remains marginally significant. The results imply that more equal nations are more likely to view the relationship between human beings and their natural environment as one of coexistence, this

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[12] Robust errors are used on the last specification of Table 4.4. Since the results do not change, it was decided not to use robust errors for the other four specifications of the table.

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confirms Magnani's (2000) findings. Moreover, the level of urbanization also positively affects the coexistence worldview. This suggests that a greater detachment from nature is likely to raise the degree of environmental awareness. This lends support to the biophilia hypothesis proposed by Wilson. Finally, the level of economic affluence marginally influences the emergence of environmental awareness.

Table 4 - Multivariate Regressions: Human-Environment Relationship
Dependent Variable: Human-Environment Relationship
40 Observations
t-statistic in parentheses

	Model 7	Model 8	Model 9	Model 10	Model 11
ln GDP per capita	0.079 (1.20)	0.073 (1.64)	0.057 (1.38)	0.032 (1.09)	0.032 (1.37)
ln Population density	0.0046 (0.13)	0.0053 (0.15)	0.015 (0.48)		
Urban population	0.65 (1.81)	0.67 (2.13)	0.635 (2.06)	0.69 (2.68)	0.69 (2.29)
Political freedom	-0.026 (-0.12)				
Happiness	-0.096 (-0.93)	-0.094 (-0.94)	-0.085 (-0.86)		
Income Inequality	-0.0097 (-2.16)	-0.0097 (-2.20)	-0.0076 (-2.06)	-0.0093 (-2.93)	-0.0093 (-2.76)
Tertiary Educ. Enroll.	-0.0024 (-0.84)	-0.0025 (-0.87)			
Constant	0.15 (0.36)	0.164 (0.41)	0.097 (0.25)	0.33 (1.45)	0.33 (1.53)
Adjusted R^2:	0.47	0.49	0.50	0.51	0.51
F-Statistic:				13.01	13.01
White Hetero. Test: F-statistic (*Probability*):	1.83 *(0.11)*	2.31 *(0.04)*	3.46 *(0.01)*	3.09 *(0.01)*	Robust Errors

5. Discussion

The results presented above lend little support to the conventional wisdom that states that the level of economic affluence influences the level of environmental concern expressed by a population. In fact, the results of the first equation show that actual individual commitment to protect the environment is a function of the level of education, the degree of subjective well-being, and to a lesser extent the level of population pressure. This demonstrates what Goetz et al. (1998) argued: highly educated populations are more likely to be actively involved in environmental protection. It also confirms, Frey and Stutzer's (2002) claim that happier people are more likely to commit to environmental preservation, regardless of the level of economic development. Finally it also echoes claims by Brechton and Kempton (1994) and Martinez-Alier (1995) that population pressure raises environmental concern.

Moreover, the role of economic affluence with respect to environmental awareness is at best marginal. When awareness is proxied by a country's worldview regarding the relationship between human beings and nature, GDP per capita is shown to have a direct marginal effect. However, while the level of economic development seems to have a role with regard to environmental consciousness, it is of lesser significance than the impact of the degree of urbanization and of income equality. The effect of urbanization can be linked to the biophilia hypothesis: a greater detachment from nature is likely to positively affect people's view of the environment, as the need to be closer to nature increases. The negative coefficient associated with Income Inequality indicates that a more equal society is likely to yield a more environmentally conscious population.

However, the role of economic affluence is negative (marginally) with regard to willingness to pay to protect the environment (another proxy for environmental awareness). The

degree of urbanization and the level of subjective well-being are shown once again to be directly correlated with the dependent variable. Nevertheless, the hypothetical nature of the questions used to construct the indicator calls for caution. While it is reasonable to assume that this type of questions provides a good platform for respondents to express their views on the environment it can also lead people to overstate their concern (because no actual commitment is expected). Moreover the relatively low R^2 limits the scope of the findings.

Overall, this paper finds little statistical evidence of a direct influence of economic affluence on either environmental awareness or behavior. GDP per capita is at best marginally correlated with awareness. While it is maintained that wealthier countries are likely to be able to protect their environment more effectively than poorer nations (because they have more resources, because their citizens have met all their lower order needs and can now focus on higher order ones, because they are better educated in methods to protect the environment, etc.), it does not follow that poorer nations are not concerned about their environment. In fact, factors like subjective well-being, inequality within the country, population pressure and the degree of detachment from nature are more likely to influence environmental consciousness than income level. Therefore, a high level of economic development is not a sine qua non to the emergence or increase of environmental awareness and behavior.

6. Conclusion

This paper has investigated the determinants of environmental values across countries. It has sought to assess what factors influence (1) people's level of awareness regarding environmental quality and (2) people's actual involvement in the protection of the environment. The purpose of the paper was to put the role of economic affluence into perspective by challenging the

conventional wisdom that states that the level of economic affluence influences the level of environmental concern expressed by the population.

While this paper did not question the fact that large scale environmental defensive activities are likely to be influenced by the level of income in a country, it was hypothesized that environmental awareness (i.e. concern for the environment that may or may not lead to action) need not be a function of the level of economic affluence.

To test this hypothesis, three equations were developed based on three indicators of environmental concern. These indicators were built using data from the World Values Survey (1995-1997). Through a factor analysis, it was possible to capture people's levels of environmental awareness and behavior in 40 countries worldwide. The three variables created— Positive Environmental Attitudes, Willingness to Pay to Protect the Environment, and Human-Environment Relationship—were then regressed against a set of economic, demographic, political, psychological and education variables. The results show that economic affluence (proxied by GDP per capita) has, at best, a marginal direct influence on environmental awareness and no direct impact on environmental behavior. It was demonstrated that the degree of urbanization, the level of subjective well-being and the level of income inequality have direct effects on awareness, while education, population pressure and happiness are significantly correlated with environmental behavior. As a result this paper has challenged the conventional wisdom and demonstrated that claims that poorer nations are not concerned about the environment are erroneous.

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Appendix

1. Questions included in the factor analysis

Questions using the following original rating scale:
1: Strongly Agree, 2: Agree, 3: Disagree, 4: Strongly Disagree

V38: I would agree to an increase in taxes if the extra money were use to prevent environmental damage.
V39: I would buy things at 20% higher than usual prices if it would help protect the environment.
V40: [My country's] environmental problems can be solved without any international agreements to handle them.

The answer 1 was given a value of +1; 2 a value of +.5, 3 a value of -.5;
and 4 a value of -1.

Questions using the following original rating scale:
1: Have done, 2: Have not

V42: Have you chosen household products that you think are better for the environment?
V43: Have you decided for environmental reasons to reuse or recycle something rather than throw it away?
V44: Have you tried to reduce water consumption for environmental reasons?
V45: Have you attended a meeting or signed a letter or petition aimed at protecting the environment?
V46: Have you contributed to an environmental organization?

V49: 1. Humans should master nature, or
2. Humans should coexist with nature.

The answer 1 was given a value of +1, and the answer 2 a value of -1.

Each answer fits a -1 to +1 scale and is aggregated over the sample size (about 1,500 respondents) in each country to obtain an average value per nation. For instance a country in which most people favor using taxes to prevent environmental damage (V38) will have a value closer to 1: e.g. Brazil: 0.45. A country in which people do not recycle (at least for environmental reasons V43) will exhibit a value closer to -1, e.g. Turkey: -0.53.

2. List of countries included in the analysis:

Argentina
Armenia
Australia
Azerbaijan
Bangladesh
Belarus
Brazil
Bulgaria
Chile
China
Colombia
Dominican Republic
Estonia
Finland
Georgia
Germany
Ghana
India
Japan
Latvia
Lithuania
Mexico
Moldova
Nigeria
Norway
Peru
Philippines
Puerto Rico
Russia
South Africa
South Korea
Slovenia
Spain
Sweden
Switzerland
Turkey
Ukraine
Uruguay
USA
Venezuela

3. Correlation Matrix

	Factor 1	Factor 2	Factor 3	ln GDP	Urban Population	Political Freedom	Happiness	Income Inequality	Tertiary Education	ln Population Density
Factor 1	1.00									
Factor 2	.09	1.00								
Factor 3	.19	.10	1.00							
ln GDP	.49**	-.11	.62**	1.00						
Urban Population	.10	-.16	.48**	.53**	1.00					
Political Freedom	.46**	-.17	.48**	.80**	.41**	1.00				
Happiness	.44**	.15	.12	.58**	.13	.40**	1.00			
Income Inequality	-.28	.02	-.43**	-.26	-.02	-.40*	.12	1.00		
Tertiary Education	.55	-.23	.53**	.70**	.59**	.66**	.17	-.50**	1.00	
ln Population Density	-.18	.25	-.18	-.23	-.23	-.17	-.00	-.21	-.35*	1.00

** Correlation is significant at the 0.01 level
* Correlation is significant at the 0.05 level
Factor 1 = Positive Environmental Attitudes
Factor 2 = Willingness to Pay to Protect the Environment
Factor 3 = Human-Environment Relationship