

# Do We Trust the Data?

## On the Validity and Reliability of Cross-National Environmental Surveys\*

Eric Neumayer, *London School of Economics*

*Objective.* This article provides evidence on the validity and reliability of cross-national environmental surveys, an aspect that has not found much attention so far. *Methods.* Validity can be checked in examining whether cross-national differences in environmental attitudes are in accordance with theoretical hypotheses. For example, a study can claim some validity if concern about inadequate sanitation is strongly negatively correlated with the actual extent of access to sanitation in a country. *Results.* Several validity checks were undertaken for the Gallup, Gallup, and Dunlap (1993) survey, all of which tend to support its validity. Next, the reliability of cross-national environmental surveys was checked. Both Pearson and Spearman rank correlations were run for similar questions from differing studies. Most correlations were low and statistically insignificant, however, thus putting some doubt on the reliability of cross-national environmental surveys, at least with respect to the questions examined. *Conclusions.* The findings support the validity of cross-national environmental surveys, but not their reliability. Future surveys should be designed such that validity and reliability checks become easier to undertake.

Some time ago, this journal (Volume 78, Number 1, March 1997) served as a forum for a fierce debate about what determines differences in international environmental attitudes. The debate was triggered by Brechin and Kempton's (1994) and Dunlap and Mertig's (1995) critique of the "post-materialism thesis" for explaining "global environmentalism" as well as Kidd and Lee's (1997) countercritique and defense of the theory that environmental concern is strongly correlated with postmaterialist values. I have nothing to add to this debate. Instead, this short article is concerned with another issue that was raised by Brechin and Kempton (1994:260f.) but did not find any subsequent attention: the validity and reliability of cross-national survey data with respect to the environment.<sup>1</sup>

\*Direct all correspondence to Eric Neumayer, Department of Geography and Environment, London School of Economics and Political Science, Houghton Street, London WC2A 2AE, United Kingdom <e.neumayer@lse.ac.uk>. I am thankful to three reviewers for helpful comments. Contact the author if you wish to replicate the study.

<sup>1</sup> Validity refers here to the degree to which the empirical data genuinely or truly measure the theoretical construct of interest (internal validity). Given that we do not know the "true" attitudes of respondents, the only way to check validity is to examine whether the answers

Brechin and Kempton (1994:260) rightly ask the question whether data from cross-national environmental surveys “can be truly comparable across diverse languages and nations. That is, even after checking the survey questionnaire via back-translation, how comparable are the cultural contexts in which the questions are interpreted, and how comparable are the meanings of the resulting answers?” Given the absence of ethnographic studies and pretests, they propose to examine whether “existing independent evidence . . . supports the validity of answers to the environmental questions.” They go on presenting some very casual observations on

- forestry being a high-profile issue in West Germany and Norway, in accordance with citizens of these countries being strongly concerned about world forest issues
- citizens from Chile and Uruguay being more concerned about ozone depletion than any other global environmental problem, in accordance with these countries being nearer the Antarctic and thus more exposed to increased ultraviolet radiation due to ozone layer depletion
- the local ecology being impoverished in Saudi Arabia, in accordance with the low environmental concern among Saudi Arabians
- the growth in grassroots environmental groups in the Third World, in accordance with high developing-country environmentalism.

Interestingly, Inglehart (1995), the major proponent of the “postmaterialist thesis” under attack from Brechin and Kempton (1994), puts forward arguments in a similar vein—without explicitly intending to corroborate the validity of cross-national surveys, however. Inglehart reports some casual evidence on the seriousness of environmental problems in developing and Eastern European countries, which he links to high approval rates for the ecology movement in these countries. More systematically, Inglehart (1995:68) constructs an index of pollution levels (which is in effect an index of urban air pollution) and a measure of the extent of postmaterialist values held by citizens of a country. His multiple-classification analysis finds that both variables have a strong impact upon support for environmental protection as measured by a composite index constructed by Inglehart from results of the 1990–1993 World Values Survey (Inglehart, Basanez, and Moreno, 1998). Furthermore, Bloom (1995) observes that individuals in developing countries express stronger concern over local environmental problems, which he regards as consistent with “comparisons of objective measures of environmental quality between developing and industrial countries,” without offering any systematic evidence or statistical testing, however.

Unfortunately, both Brechin and Kempton’s (1994) explicit and Inglehart’s (1995) as well as Bloom’s (1995) implicit attempt to verify the validity

---

given are consistent with strong theoretical hypotheses. Reliability refers here to the consistency of data coming from different surveys (comparative reliability).

of cross-national environmental survey data are deficient in at least two respects: first, mostly very casual, instead of systematic, empirical evidence is used. Apparently, Inglehart's pollution index analysis is an exception. It suffers from a second kind of deficiency, however, which is that it addresses the wrong type of questions to test for validity. Given that Inglehart's pollution index is effectively an index of urban air pollution from mostly one or two cities in each country and nothing else, he should have looked for correlation with concern about local air pollution in these same cities. Unfortunately, the database he uses is not apt for such a test because only very broad and general questions on support for environmental protection are asked in this survey. Similarly, Brechin and Kempton's attempt, for example, to link *national* forestry issues in West Germany and Norway with concern of these countries' citizens about *world* forest issues is not very convincing, as national concern need not extend to the global level.

### Checking for Validity

Instead what we need are validity checks using hypotheses for which we have strong a priori expectations from theoretical reasoning and using systematic data instead of casual observations. Unfortunately, of the four major international surveys that include questions concerning the environment—Louis Harris and Associates (1989), Gallup, Gallup, and Dunlap (1993), the World Values Survey (Inglehart, Basanez and Moreno, 1998), and the International Social Survey Programme (Frizzell and Pammett, 1997)—only Gallup, Gallup, and Dunlap's (1993) study asks questions that are appropriate for such validity checks. The Louis Harris and Associates (1989) survey asks a few questions about the seriousness of environmental problems that would be amenable for validity checks if they clearly focused on the interviewee's country of origin. Unfortunately, it asks for whether a specific environmental degradation presents a problem "in this country *or in other countries such as this around the world*" (emphasis added). As mentioned, the World Values Survey provides only very broad and general data on support for environmental protection. It asks only a few questions on the environment, and the ones it asks are too broad and unfocused for validity tests. The environmental module of the International Social Survey Programme asks many more questions on the environment. However, it asks questions mainly about what people believe about the environment and the extent of their knowledge about ecological facts.

The Gallup, Gallup, and Dunlap (1993) survey, on the other hand, asks many questions about environmental concern, causes of environmental degradation, and support for environmental measures.<sup>2</sup> For a few of these questions we have good theoretical hypotheses. For example, the survey asks

<sup>2</sup>The study, comprising 12 developed and 12 developing countries, was undertaken in 1992.

TABLE 1

## Validity Test for Sanitation and Aspects of Environmental Pollution

| First variable      | Seriousness inadequate sanitation <sup>a</sup> | Seriousness air pollution <sup>b</sup> | Seriousness water pollution <sup>c</sup> | Seriousness noise pollution <sup>d</sup> | Bad quality of nation's environment <sup>e</sup> |
|---------------------|--|--|--|--|--|
| Second variable     | Access sanitation <sup>f</sup>                 | GDP per capita <sup>g</sup>            | GDP per capita <sup>g</sup>              | GDP per capita <sup>g</sup>              | GDP per capita <sup>g</sup>                      |
| Pearson correlation | -.544  | -.530                                  | -.666                                    | -.619                                    | -.505  |
| Significance        | .009   | .008                                   | .000                                     | .001                                     | .012   |
| N                   | 22   | 24                                     | 24                                       | 24                                       | 24   |

<sup>a</sup>Percentage who say inadequate sanitation is "very serious" in local community (Gallup, Gallup, and Dunlap, 1993: Figure 7d).

<sup>b</sup>Percentage who say air pollution is "very serious" in local community (Gallup, Gallup, and Dunlap, 1993: Figure 7b).

<sup>c</sup>Percentage who say water pollution is "very serious" in local community (Gallup, Gallup, and Dunlap, 1993: Figure 7a).

<sup>d</sup>Percentage who say noise pollution is "very serious" in local community (Gallup, Gallup, and Dunlap, 1993: Figure 7f).

<sup>e</sup>Percentage who say quality of nation's environment is "very bad" or "fairly bad" (Gallup, Gallup, and Dunlap, 1993: Figure 4b).

<sup>f</sup>Percentage of population with access to sanitation in 1995 (World Bank, 1998: Table 1.2).

<sup>g</sup>Real GDP per capita in purchasing power parity in 1992 (UNDP, 1995: Table 1).

for concern about specified local (as opposed to global) environmental problems. We would expect that the extent of this specific concern is clearly linked to objective conditions in a country with respect to this aspect of the environment. We would not expect that this link is perfect, as many factors presumably affect concern about local environmental problems. But we could give international data some validity if people express greater concern about *local* environmental problems if they are actually faced with more severe environmental problems. Alternatively, given the often spurious existence of good data on these conditions, we would expect a clear link of *local* environmental concern to levels of income, either because *local* environmental problems become ameliorated with higher income levels (see Neumayer, 1999:77–79) or because richer people are better able to defend themselves against environmental nuisances. Again, we would not expect a perfect relationship, however. Also, this hypothesis does not rule out that individuals from rich countries are as much concerned as poor individuals about the environment more generally, as their concern might stem from more global environmental problems (see again the debate in Volume 78, Number 1).

Table 1 presents evidence for an environmental problem for which we have relatively good data: access to sanitation. Gallup, Gallup, and Dunlap (1993) asked for the seriousness of inadequate sanitation in the local com-

TABLE 2  
Validity Test for Overpopulation

| First variable      | Seriousness<br>overpopulation <sup>a</sup> | Effect of<br>overpopulation <sup>b</sup> |
|---------------------|--|--|
| Second variable     | Population<br>growth rate <sup>c</sup>     | Population<br>growth rate <sup>c</sup>   |
| Pearson correlation | .710                                       | .791                                     |
| Significance        | .000                                       | .000                                     |
| N                   | 24   | 24                                       |

<sup>a</sup>Percentage who say overpopulation is "very serious" in local community (Gallup, Gallup, and Dunlap, 1993: Figure 7e).

<sup>b</sup>Percentage who say that overpopulation contributes a "great deal" to the nation's environmental problems (Gallup, Gallup, and Dunlap, 1993: Figure 9a).

<sup>c</sup>1990–1994 average annual growth of population (World Bank, 1996: Table 4).

munity. As can be seen from Table 1, concern about inadequate sanitation is strongly negatively correlated with the extent of access individuals have to sanitation. The correlation is statistically significant at the .01 level. Similarly, Gallup, Gallup, and Dunlap (1993) asked for the seriousness of air, water, and noise pollution in the local community. For these types of pollution, there do not exist good representative and comparable international data, however. As a substitute, per capita income in purchasing power parity was correlated against concern for local air, water, and noise pollution. As can be seen from Table 1, all three correlations are negative as expected and highly statistically significant. What is true for specific *local* environmental problems also applies to the state of the *national* environment more generally. Gallup, Gallup, and Dunlap (1993) asked individuals to rate the national environmental quality. Again, there does not exist an aggregate index of a country's objective environmental conditions, so per capita income was correlated against this variable. Table 1 shows that this correlation is also negative as expected and is statistically significant at the .05 level.

Gallup, Gallup, and Dunlap (1993) also asked two questions on overpopulation. One asked for the seriousness of overpopulation in the *local* community, the other for the contribution of overpopulation to the *nation's* environmental problems. We would expect approval of these questions to be clearly correlated with population growth rates. Table 2 presents the evidence. As can be seen, population growth rates are very strongly correlated with both of these variables, and both correlations are statistically significant at the .001 level.

Additionally, Gallup, Gallup, and Dunlap (1993) asked a number of further questions on which factors contribute to the nation's environmental problems. Of these questions two are amenable for validity checks: the first one asks whether the interviewee thinks that a lack of education contributes a "great deal" to the nation's environmental problems. We would expect an

affirmative answer to this question to be strongly negatively correlated with an index of educational attainment in each country. The second question asks for the contribution of government to a nation's environmental problems. We would expect affirmative answers to this question to be clearly negatively correlated with the extent of political freedom in a country. This is because the more autocratic and the less accountable a political system is, the more likely it is that a country's government is perceived as a major contributor to environmental degradation. We would expect a similar link to the perceived extent of corruption among public servants. The evidence is given in Table 3. As can be seen in the table, the perceived contribution of a lack of education is strongly negatively correlated with an index of educational attainment within a country and significantly so at the .01 level. The perceived contribution of government to a nation's environmental problems is very strongly negatively correlated and very significantly so with the extent of political freedom within a country. A similar, but positive, correlation exists with the perceived corruption of its civil servants. All these results are encouraging and comforting, as they support the presumption that the validity of cross-national environmental survey data, at least for the Gallup, Gallup, and Dunlap (1993) study, is not severely hampered by cultural differences or language barriers. In order to check more systematically for validity, it would be helpful if all future studies included a number of questions that are easily amenable for validity checks.

TABLE 3

## Validity Test for Factors Contributing to a Nation's Environmental Problems

| First variable      | Effect of lack of education <sup>a</sup>     | Effect of government <sup>b</sup>       | Effect of government <sup>b</sup>          |
|---------------------|--|---|--|
| Second variable     | Index of educational attainment <sup>c</sup> | Index of political freedom <sup>d</sup> | Index of perceived corruption <sup>e</sup> |
| Pearson correlation | -.528  | .590                                    | -.777                                      |
| Significance        | .008   | .002                                    | .000                                       |
| N                   | 24   | 24                                      | 24   |

<sup>a</sup>Percentage who say that people not knowing what to do contributes a "great deal" to the nation's environmental problems (Gallup, Gallup, and Dunlap, 1993: Figure 9d).

<sup>b</sup>Percentage who say that government contributes a "great deal" to the nation's environmental problems (Gallup, Gallup, and Dunlap, 1993: Figure 9b).

<sup>c</sup>Educational Attainment Index. The index is a combined index of adult literacy (weight two-thirds) and the combined primary, secondary, and tertiary enrollment ratio (weight one-third) (UNDP, 1995: Table 1).

<sup>d</sup>1992 Index of Political Freedom, covering existence and fairness of elections, existence of opposition, and possibility of taking over power via elections. The index is measured on a 1-to-7 scale (Freedom House, 1999).

<sup>e</sup>1988-1992 Index of Perceived Corruption, defined as the perceived corruption in the public sector in terms of abuse of public office for private gain. The index is measured on a 0-to-10 scale (Transparency International, 1998).

TABLE 4

## Reliability Tests

| First variable            | Higher Prices<br>(Gallup) <sup>a</sup>    | Higher Prices<br>(Gallup) <sup>a</sup> | Much Higher Taxes<br>(ISSP) <sup>b</sup> |
|---------------------------|---|--|--|
| Second variable           | Much Higher Prices<br>(ISSP) <sup>c</sup> | Higher Taxes<br>(WVS) <sup>d</sup>     | Higher Taxes<br>(WVS) <sup>d</sup>       |
| Pearson correlation       | .467                                      | .448                                   | .303                                     |
| Significance              | .126                                      | .048                                   | .238                                     |
| Spearman rank correlation | .442                                      | .508                                   | .089                                     |
| Significance              | .150                                      | .022                                   | .733                                     |
| N                         | 12  | 20                                     | 17                                       |

<sup>a</sup>Percentage who say they are "willing" to pay higher prices to protect the environment (Gallup, Gallup, and Dunlap, 1993: Figure 16b).

<sup>b</sup>Percentage who say they are "very willing" or "fairly willing" to pay much higher taxes in order to protect the environment (Frizzell and Pammett, 1997: Table 8b).

<sup>c</sup>Percentage who say they are "very willing" or "fairly willing" to pay much higher prices in order to protect the environment (Frizzell and Pammett, 1997: Table 8a).

<sup>d</sup>Percentage who "strongly agree" or "agree" to an increase in taxes if the extra money is used to prevent environmental pollution (Inglehart, Basanez, and Moreno, 1998: Table V13).

### Checking for Reliability

Apart from testing the validity of international environmental survey data in checking the consistency of data with strong theoretical hypotheses, one can also test for reliability of data coming from different studies. If various studies asked very similar questions and we found that the answers to these questions were strongly correlated with each other or at least that the ranking of countries was strongly correlated for similar questions, then we could give these studies more credibility than we would in the absence of such a correlation.

Unfortunately, to perform such a test is not easy, for three reasons: first, questions asked in different studies are hardly ever the same or even very similar; second, the number and range of countries in which surveys are conducted usually differs from study to study; and third, existing studies are usually undertaken in different years, and asymmetric changes in the countries under investigation could have changed the attitudes of citizens toward environmental questions in the intervening time. As we will see shortly, for the existing studies, the first aspect presents a severe problem and the second aspect decreases the number of observations, whereas the third aspect is negligible, as all studies have been undertaken in the late 1980s and early 1990s.

The only questions across the various studies that are sufficiently similar to be useful in checking reliability are those asking for the interviewee's willingness to pay either higher prices or taxes for environmental protection. Table 4 presents the concrete wording of the questions together with the

correlation results.<sup>3</sup> The only correlations that, even if rather low, are at least statistically significant at the .05 level are the Pearson correlation and Spearman rank correlation for the Gallup, Gallup, and Dunlap (1993) study and the World Values Survey. Ironically, however, Gallup, Gallup, and Dunlap (1993) asked about the willingness to pay higher prices, whereas the World Values Survey asked about the willingness to pay higher taxes.

All other correlations are statistically insignificant. These results are rather discomfiting, but their implications are not altogether clear. It would be premature to conclude that these studies are unreliable, as the concrete wording of the questions could be responsible for the failure to find a statistically significant correlation. On the other hand, what these results do imply is that one cannot rely either on the concrete approval rates or on the ranking of countries from any single study, as they are likely to be extremely sensitive to the concrete wording of a particular question. This holds true at least for the questions examined here, and it severely restricts the usefulness of data from one study. In order to more systematically test for the reliability of studies, it would be helpful if future studies included a number of questions that are identical in their wording to former studies. Tests for reliability and interstudies consistency could then more adequately be undertaken.

## REFERENCES

- Bloom, David E. 1995. "International Public Opinion on the Environment." *Science* 269:354–58.
- Brechin, Steven R., and Willet Kempton. 1994. "Global Environmentalism: A Challenge to the Postmaterialism Thesis?" *Social Science Quarterly* 75:245–69.
- Dunlap, Riley E., and Angela G. Mertig. 1995. "Global Concern for the Environment: Is Affluence a Prerequisite?" *Journal of Social Issues* 51:121–37.
- Freedom House. 1999. *Annual Survey of Freedom Country Scores 1972–73 to 1998–99*. Washington, D.C.: Freedom House. Available online at <[www.freedomhouse.org](http://www.freedomhouse.org)>.
- Frizzell, Alan, and Jon H. Pammett, eds. 1997. *Shades of Green: Environmental Attitudes in Canada and Around the World*. International Social Survey Programme (ISSP) Series No. 2. Carleton, Mich.: Carleton University Press.
- Gallup, George H. Jr., Alec M. Gallup, and Riley E. Dunlap. 1993. *Health of the Planet—A George H. Gallup Memorial Survey*. Princeton, N.J.: Gallup International Institute.
- Inglehart, Ronald. 1995. "Public Support for Environmental Protection: Objective Problems and Subjective Values in 43 Societies." *Political Science & Politics* 145:57–72.
- Inglehart, Ronald, Miguel Basanez, and Alejandro Moreno. 1998. *Human Values and Beliefs: A Cross-Cultural Sourcebook—Political, Religious, Sexual, and Economic Norms in 43 Societies: Findings from the 1990–1993 World Values Survey*. Ann Arbor: University of Michigan Press.

<sup>3</sup>The Louis Harris and Associates (1989) study is not taken into account here for two reasons. First, contrary to the other three studies, its interviewees are not drawn from a representative sample of a country. Second, the range of countries in this study is quite different from those in the other three studies, so that the number of observations would become very low.



Kidd, Quentin, and Aie-Rie Lee. 1997. "Postmaterialist Values and the Environment: A Critique and Reappraisal." *Social Science Quarterly* 78:1–15.

Louis Harris and Associates. 1989. *Public and Leadership Attitudes to the Environment in Four Continents: A Report of a Survey in 16 Countries, Conducted for the United Nations Environment Programme*. Study No. 884002. New York: Louis Harris and Associates.

Neumayer, Eric. 1999. *Weak versus Strong Sustainability: Exploring the Limits of Two Opposing Paradigms*. Cheltenham, U.K.: Edward Elgar.

Transparency International. 1998. *Corruption Perceptions Index*. Berlin: Transparency International. Available online from the Internet Centre for Corruption Research at <[www.gwdg.de/~uwwv](http://www.gwdg.de/~uwwv)>.

United Nations Development Programme (UNDP). 1995. *Human Development Report*. Oxford: Oxford University Press.

World Bank. 1996. *World Development Report*. Oxford: Oxford University Press.

———. 1998. *World Development Indicators*. Washington, D.C.: World Bank.