

## The Implementation of Sustainable Development vs. Environmental Attitudes in International Comparative Studies

### Wprowadzanie rozwoju zrównoważonego a postawy wobec środowiska naturalnego w międzynarodowych badaniach porównawczych

**Paweł Rydzewski**

*College of Enterprise and Administration in Lublin (Wyższa Szkoła Przedsiębiorczości  
i Administracji w Lublinie), ul. Bursaki 12, 20-150 Lublin,  
E-mail: p.rydzewski@wsipa.pl*

---

#### **Abstract**

Praktyczna realizacja rozwoju zrównoważonego zależy nie tylko od przyjmowanych strategii, ale także od codziennych wyborów dokonywanych przez każdego człowieka. To, jak się zachowujemy, co kupujemy, czy też z czego skłonni jesteśmy zrezygnować – przekłada się na zmiany globalnego zużycia surowców i nośników energii. Dlatego badanie postaw ludzkich i czynników je warunkujących jest istotnym wskaźnikiem realnych możliwości wprowadzania rozwoju zrównoważonego.

W badaniach postawiono następujące dwie główne hipotezy: (1) deklaracje zachowań proekologicznych, zachowania proekologiczne oraz obawy związane z zagrożeniami ekologicznymi są zależne od cech społeczno-demograficznych (płci, wieku, wykształcenia, statusu zawodowego, orientacji politycznej i wielkości miejscowości zamieszkania), (2) deklaracje zachowań proekologicznych, zachowania proekologiczne oraz obawy związane z zagrożeniami ekologicznymi są zróżnicowane międzynarodowo. Hipotezy przetestowano na danych ISSP Environment III z 2010 r. Pierwsza z postawionych hipotez została w przeważającym zakresie potwierdzona (tylko płeć okazała się nie mieć wpływu na poziom deklaracji zachowań proekologicznych). W pełni potwierdzona została druga hipoteza. Krajami o najwyższych wskaźnikach zarówno deklaracji, jak też zachowań proekologicznych są: Szwajcaria, Korea Południowa, Tajwan, Dania i Niemcy. W tej klasyfikacji ostatnie miejsca zajmują zaś: Łotwa, Bułgaria, Rosja, Słowacja i Izrael. Wysoki poziom zagrożenia ekologicznego występuje najczęściej wśród mieszkańców Chile, Turcji, Argentyny, Chorwacji i Rosji.

**Słowa kluczowe:** środowisko naturalne, postawy, ISSP

#### **Abstract**

The practical implementation of sustainable development depends not only on the strategies adopted, but also on everyday choices made by each individual. How we behave, what we buy, or what we are willing to sacrifice – all this translates into changes in the global consumption of natural resources and energy. Therefore, the study of human attitudes and behaviour, and of the factors that determine them, is an important indicator of the real possibilities for implementing sustainable development.

Two main hypotheses were put forward in the research: (1) declared pro-environmental behaviour, displayed pro-environmental behaviour, and ecological concerns are dependent on social and demographic factors (gender, age, education, employment status, political orientation, and size of place of residence), (2) declared pro-environmental behaviour, displayed pro-environmental behaviour, and ecological concerns differ between countries. The hypotheses were tested on the data from the ISSP Environment III, 2010. The first hypothesis was

largely confirmed (only gender proved to have no impact on the declared pro-environmental behaviour). The second hypothesis was fully confirmed. Countries with the highest indicators of both declarations and pro-environmental behaviour include: Switzerland, South Korea, Taiwan, Denmark, and Germany. On the other hand, Latvia, Bulgaria, Russia, Slovakia, and Israel rank at the bottom of this classification. A high level of concern about environmental threats is most common among residents of Chile, Turkey, Argentina, Croatia, and Russia.

**Key words:** environment, attitudes, ISSP

## Introduction

Sustainable development is development that *meets the needs of the present without compromising the abilities of future generations to meet their own needs* (WCED, 1987). This concept is strongly promoted in the United Nations documents, European Union legislation, and it is the constitutional norm in Poland. This is an optimistic, *green* vision of our civilization's future (Fiut, 2012; Pawłowski, 2011). The implementation of this vision is determined not only by accuracy of the adopted strategies and possibilities of applying them. The essence of sustainable development is our obligation to assume responsibility for future generations, which means the necessity to take care of the environment and its resources (Kras, 2011; Papuziński, 2011). The implementation of sustainable development is hindered, or simply made impossible, by ever-increasing energy and resource consumption, mostly related to the production of consumer goods (Borys, 2011). It is consumers, however, that make the final decisions which of those goods will be purchased. Are they – and to what extent – willing to make sacrifices for the benefit of future generations?

These questions can be answered on the basis of the research into attitudes. The necessity of such research is obvious from a perspective of sustainable development, as its objectives cannot be fully realised if people do not display the right attitudes and behaviour towards others and the environment. Such research is usually conducted on populations of different sizes, from a local to a national level. It is rare, however, that cross-national research that is not limited to a comparison of two or several countries (usually neighbouring ones), but involves a large scale international comparative studies, is undertaken. ISSP Environment is exactly this type of a research programme. Additionally, it enables to observe the dynamics of changes, as the research is repeated in a few year cycles.

## Methodology

The International Social Survey Program is a long-term international research program carried out annually in participating countries. It is aimed at regular measurement of variables covering a broad scope of social life. ISSP surveys are repeated every few years, which enables the observation of

changes in the measured phenomena. One of ISSP modules is the ISSP Environment, which was implemented three times – in 1993 (with Poland's participation), and in 2000 and 2010 (without Poland)<sup>1</sup>. ISSP questionnaire surveys are carried out on random samples, and make use of both interview techniques and survey techniques.

Table 1. Sample structure countries included in the study. Source: own analysis based on ISSP Environment 2010.

Country	Frequency	Percentage
Argentina	1130	2,7
Austria	1019	2,4
Belgium	1142	2,7
Bulgaria	1003	2,4
Canada	985	2,3
Chile	1436	3,4
Taiwan	2209	5,3
Croatia	1210	2,9
Czech Republic	1428	3,4
Denmark	1305	3,1
Finland	1211	2,9
Germany	1407	3,4
Israel	1216	2,9
Japan	1307	3,1
South Korea	1576	3,8
Latvia	1000	2,4
Mexico	1637	3,9
New Zealand	1172	2,8
Norway	1382	3,3
Philippines	1200	2,9
Russia	1619	3,9
Slovakia	1159	2,8
Slovenia	1082	2,6
South Africa	3112	7,4
Spain	2560	6,1
Sweden	1181	2,8
Switzerland	1212	2,9
Turkey	1665	4,0
United Kingdom	928	2,2
United States	1430	3,4
Total	41923	100,0%

<sup>1</sup> ISSP was initiated as a bilateral cooperation of the German ALLBUS program (Allgemeinen Bevölkerungsumfragen der Sozialwissenschaften), and the American GSS (General Social Survey). Later the program was joined by the British BSA (British Social Attitudes Survey), and the Australian National University, represented by the Research School of Social Sciences. Currently ISSP covers 45 countries. More information and a questionnaire form can be found on the ISSP website: <http://www.issp.org>.

The data from the International Social Survey Programme 2010: Environment III was made available in June 2012, and it contains 339 variables, characterizing 30 countries<sup>2</sup>. The total sample size is almost 42 thousand observations, on average 1200 in each country (tab. 1).

The sample includes 22,613 women and 19,067 men, the average age of respondents is about 47 years old (tab. 2).

Table 2. Sample structure: gender and age of respondents. Source: own analysis based on ISSP Environment 2010.

Gender	Average age	N	Standard deviation
Male	46,30	19067	17,412
Female	46,86	22613	17,454
Total	46,60	41680	17,437

An important question arises: to what extent can these results be generalized? For what population can the sample obtained be regarded as representative (or more precisely, of a high degree of representativeness)? Certainly, it is not representative of the global population, or even of the continental one. In the sample, African countries are represented only by inhabitants of South Africa; China and India are not taken into account in Asia, and no Arab countries are represented (with the exception of the Arab population of Israel). The majority of respondents come from Europe and only North America is fully represented<sup>3</sup>. What is common for the countries studied is the possibility to carry out such research there. Needless to say, social surveys (as a fully sovereign research method not limited in terms of publicising the results) are conducted in democratic countries (or, at least those that want to be regarded as democratic)<sup>4</sup>. Another question is whether it is possible to generalize the research results if the sample does not include countries such as Australia or India. Despite these shortcomings, it seems that this direction of a possible generalization is more justified than any others. Let us as-

<sup>2</sup> In the original national data set, there are more research units, but for the purposes of this analysis, some of them have been combined: the eastern and western parts of Germany, and the Jewish and Arab parts of Israel.

<sup>3</sup> These remarks are not meant to be a criticism of ISSP. On the contrary, undertaking such research and organisational effort deserves credit. This is just to draw attention to the question to what extent the research results can be generalised.

<sup>4</sup> This can be a subject of a broader discussion, and some questionable cases can be pointed out. It does not change the general rule, though. The importance of social surveys for democracy was aptly described by Elmo Roper (who co-founded, together with George Gallup, The Roper Center for Public Opinion Research): *Public opinion polls have a natural appeal in a democratic society. While many political figures claim to speak for the people, when they are done well, public opinion polls let the people speak for themselves*, [http://www.ropercenter.uconn.edu/center/roper\\_history.html#UJKF2IKIR](http://www.ropercenter.uconn.edu/center/roper_history.html#UJKF2IKIR) 8E.

sume, therefore, that the obtained sample shows at least a satisfactory level of representativeness of the democratic world's population. Taking into account the role that the democratic countries play on our planet (in terms of economy, finance, media attention, and the military), it can be stated that we obtained a considerable sample of the global population<sup>5</sup>.

### Hypotheses and indicators

Two main hypotheses were put forward in the research: (1) declared pro-environmental behaviour, displayed pro-environmental behaviour, and ecological concerns are dependent on social and demographic factors (gender, age, education<sup>6</sup>, employment status, political orientation, and size of place of residence), (2) declared pro-environmental behaviour, displayed pro-environmental behaviour, and ecological concerns differ between countries.

In order to verify these hypotheses, it was necessary to construct indicators of attitudes<sup>7</sup> towards the natural environment, which would include: declarations of environmentally friendly behaviour, pro-environmental behaviour, and concerns about environmental threats. The selection of indicators was somewhat arbitrary, as it is the case in many other studies. However, as Stefan Nowak writes, *out of a range of indicators, we can often choose the one that suits us best from the standpoint of maximizing*

<sup>5</sup> Obviously, these are not all the issues related to the sample representativeness. It remains to be answered how representative national samples are in relation to their populations, and if we can unreservedly accept disproportion between them (e.g. the sample size from the United States is the same as that of the Czech Republic).

<sup>6</sup> Due to different and incomparable education systems in different countries, length of education (in years) is adopted as a measurement of education.

<sup>7</sup> According to S. Nowak, an attitude is a relatively permanent structure composed of three elements: emotional and evaluative, cognitive, and behavioural. The emotional and evaluative element assumes fundamental significance, as it is a necessary component constituting the attitude. It corresponds to one's opinions and thoughts, particularly those assessing the object of the attitude. The second, cognitive component refers to positive, negative, and neutral feelings towards the object of the attitude. Finally, the behavioural component determines the predisposition for positive or negative action towards the object of the attitude, as well as the observed behaviour towards the object of the attitude (Nowak, 1973). Complete attitudes include all three components. However, there are also incomplete attitudes in which one (or even two) elements are missing (except for the emotional and evaluative element). In the research described here, the emotional and evaluative component is represented by concerns and anxieties about environmental threats, the behavioural component – by pro-environmental behaviour and willingness to act in an environmentally responsible way, that is declarations of pro-environmental behaviour. The cognitive element is not considered here.

*a particular type of indicator* (Nowak, 1985). In empirical studies, indicators and their *indicata* are seldom equivalent and the indicators' ranges are most often narrower than their theoretical counterparts. In the case of the indicators used in these analyses, we are dealing with the situation *when some phenomenon is treated as an indicator of a set of phenomena, a kind of syndrome understood in such a way that an indicator is one of its elements* (Nowak, 1985).

The data set of the International Social Survey Programme 2010: Environment III included several variables that were considered to be potentially suitable for the construction of indicators. If each variable was used separately, it would not provide as much information as combining them together in the form of indexes. The formation of indexes as measurement tools in social sciences is the effect of reflection on the nature of studied empirical reality which is so complex that it often hinders its exploration with the use of a single indicator. It is often difficult to conduct a reliable research into complex reality with a single and simple research tool. Therefore, we need to look at the studied objects from a broader perspective, taking into account at least a few important aspects. According to Stefan Nowak (Nowak, 1985), *employing a whole set (battery) of indicators to identify a homogeneous indicatum helps to raise its adequacy, as a rule. Batteries and indexes are usually more precise than single indicators, treated individually.*

The ISSP 2010: Environment questionnaire included the following questions: (1) To what extent would you accept much higher prices in order to protect natural environment? (2) To what extent would you agree to pay higher taxes in order to protect natural environment? (3) To what extent would you agree to lower your living standards in order to protect natural environment. The scale of answers to each of these questions was the same, reading: (1) definitely yes, (2) rather yes, (3) neither yes, nor no, (4) rather no, (5) definitely no, (8) it is hard to say<sup>8</sup>. Questions formed in this way may be used to construct an index – a new variable, which is a synthesis of components. This is done by summing up the results ascribed to particular values of variables (Frankford–Nachmias, Nachmias, 2001)<sup>9</sup>. For the purpose of this analysis, this new variable constructed on the basis of the three questions given above was named *declarations of pro-environmental behavior*<sup>10</sup>. Since from the methodological

point of view, it is unacceptable to allow total freedom in selecting index elements, an important question arises: is such index reliable (methodologically speaking), i.e. is it justified to adopt the three above-mentioned questions as the basis of a synthetic indicator? One of the most frequent ways to study the reliability of scales and indexes is the estimation of internal consistency which is based on the calculation and interpretation of Cronbach's alpha, and simulation of variations of Cronbach's alpha when particular points of the index are removed. Cronbach's alpha also shows to what extent a given set of variables describes the construct hidden in them. Cronbach's alpha assumes values from 0 to 1<sup>11</sup>. The greater the alpha, the more reliable the scale or index (Rydzewski, 2010).

Other questions, interesting from a sustainability point of view, concerned pro-environmental behaviour. The questionnaire included the following questions: (1) How often do you make a special effort to separately store waste glass, metal, plastic, paper, etc. as recycled materials? (2) How often do you make a special effort to buy fruit and vegetables grown without the use of crop protection chemicals? (3) How often do you relinquish travel by car in order to protect natural environment? (4) How often do you save electricity or fuel out of environmental concern? (5) How often do you save water out of environmental concern? (6) How often do you avoid buying certain products in order to protect natural environment? Possible answers to each of the questions were: (1) always, (2) often, (3) sometimes, (4) never. Corrective answers were also possible, e.g. I do not have/drive a car, etc. Regardless of the informative value of individual questions, an attempt has been made to create an indicator, which could be called *the pro-environmental behaviour indicator*.

The last of the constructed indicators can be labelled *concerns about environmental threats*. The questions referred to the extent to which respondents consider the following phenomena to be dangerous to natural environment: (1) air pollution from cars, (2) pollution of the environment by industry, (3) pesticides and chemicals used in agriculture, (4) pollution of surface water, (5) global warming (6) genetically modified foods, (7) nuclear power plants. Possible answers were: (1) extremely

---

scheme: positive answers (1, 2) recoded to 0, other answers (neutral and negative) recoded to 1; second – creating a new variable (points obtained by respondents answering all three questions are added up and averaged). Therefore, the new variable can assume values from 0 to 1, where 1 is the maximum declared willingness for sacrifice for the benefit of the environment, and 0 – the lowest declared willingness for sacrifice for the benefit of the environment.

<sup>11</sup> Cronbach's alpha may also assume negative values, but only if the points of the scale are not positively correlated with one another (a positive correlation between points of the scale is one of the assumptions of the model).

<sup>8</sup> Obviously, a corrective answer, for example *is hard to say*, does not belong to the scale, but it is conventionally added to all questions about opinion.

<sup>9</sup> Indexes are often considered identical to scales, as they have much in common. However, from the methodological perspective, it seems important to make a distinction between indexes and scales.

<sup>10</sup> The development of such an index includes two stages: first – recoding of original variables (according to the

dangerous, (2) very dangerous, (3) dangerous to some extent, (4) not too dangerous, (5) not dangerous at all – and *do not know*<sup>12</sup>.

All constructed indicators are characterized by high values of Cronbach's alpha coefficient, which range between 0.71-0.77 (tab. 3). Simulation of the effect that removing individual elements of the indicators has on the overall alpha value, shows that the use of all elements constituting these indicators is validated (elimination of any one component does not increase the alpha value for the corresponding indicator). This constitutes a strong argument for the use of such indicators in further research (tab. 4). The indicators described here were used in two ways: the original quantitative variables were included in the regression models (as dependent variables), and the categorized ones (into typologies: low level, moderate level, and high level) were used in bivariate tables.

Table 3. Statistics on the indicators' reliability. Source: own analysis based on ISSP Environment 2010.

Indicators	Reliability	
	Cronbach's alpha	Position number
Declarations of pro-environmental behaviour	0,758	3
Pro-environmental behaviour	0,716	6
Concerns about environmental threats	0,769	7

Table 4. Statistics on the indicators' reliability after removing an item. Source: own analysis based on ISSP Environment 2010.

Cronbach's alpha after removing an item						
Declarations						
D1	D2		D3			
,623	,637		,754			
Behaviour						
Z1	Z2	Z3	Z4	Z5	Z6	
,715	,695	,681	,645	,666	,655	
Concerns						
O1	O2	O3	O4	O5	O6	O7
,739	,731	,730	,737	,736	,745	,761

### Declarations of pro-environmental behaviour

The indicator shows the range of sacrifices (higher prices, higher taxes, lower standard of living) that the respondent would be willing to make in order to help to protect the environment. The CATREG

<sup>12</sup> In the construction of each indicator, the same recoding scheme was used: the first two responses were recoded to 1, the remaining ones to 0, corrective answers were treated as missing data. Then, the codes for all variables were summed up and averaged by dividing the result by the number of variables. With this procedure, the value of each indicator ranges between 0 and 1. The constructed variables have the quantitative level of measurement.

optimal scaling (regression for qualitative data) shows that the willingness for sacrifice for the benefit of the environment increases along with level of education<sup>13</sup>. Education is the strongest influencing factor in this set of variables. It is followed by employment status (people who are employed, students, trainees, and pupils are more likely to make sacrifices for the benefit of natural environment; on the other hand, people who are unfit for work, the unemployed, pensioners and home-makers are less likely to do so (tabs. 5 and 6). Declarations of pro-environmental behaviour are also related to political orientation (people with stronger left-wing views tend to display more willingness to sacrifice for the benefit of natural environment), and to age (declarations of pro-environmental behaviour become stronger with age). Size of place of residence has the weakest, yet significant, influence on the willingness to make sacrifices to protect the environment: people living in large cities and in the suburbs, or on the outskirts of cities are more likely to declare their readiness to sacrifice for the environment than people living in mid-sized and small towns, and those living in rural areas or farmers (tab. 7).

Generally speaking (and slightly simplifying), pro-environmental declarations are most often made by people who are educated, live in large cities or in the suburbs, work or study, and support left-wing politics. Those people are more often older than younger. The configuration of variables may lead to the conclusion that there is a connection between expressing pro-environmental declarations and income or, broadly speaking, the economic situation. Most of the factors taken into account (with the exception of political orientation, and partly age) are related to income. People who are better educated, live in big cities, and work, usually have higher incomes than those less educated, living in rural areas, and out of work. It also seems quite logical to presume the link between economic fac-

<sup>13</sup> It is possible to observe how influential each variable is by comparing the standardized beta coefficients. In the analyses described in the article, the higher the beta value, the stronger the positive association between the given factor and the given dependent variable (e.g. declarations of pro-environmental behaviour). Negative beta values indicate the inverse relationship. In the case of non-quantitative and non-dichotomous variables (such as employment status, size of place of residence), after the correlation between them and the dependent variable has been established, an additional analysis of the mean values is necessary to show the kind of this correlation. Interpretation of the effect of gender depends on the recoding scheme. In this set: 1 – male, 2 – female, so a positive beta means that being a woman is more strongly associated with higher value of the given dependent variable than being a man.

Table 5. CATREG optimal scaling: summary of the model. Source: own analysis based on ISSP Environment 2010.

Model - Summary				ANOVA	
Multiple R	R-squared	Adjusted R-squared	Prediction error	F	Significance
,214	,046	,045	,954	37,615	,000

Table 6. CATREG optimal scaling : regression coefficients. Source: own analysis based on ISSP Environment 2010.

Coefficients					
	Standardized coefficients		df	F	Significance
	Beta	Estimation of the standard error			
Gender	,012	,007	1	3,070	,080
Age	,043	,010	1	19,566	,000
Years of education	,179	,008	10	511,693	,000
Employment status	,075	,009	6	70,534	,000
Political orientation	-,069	,007	1	94,823	,000
Size of place of residence	,026	,007	4	13,417	,000

Dependent variable: declarations of pro-environmental behaviour

Table 7. Mean values of declarations of pro-environmental behaviour by employment status and size of place of residence. Source: own analysis based on ISSP Environment 2010.

Employment status			Size of place of residence		
Employed	,3229	21541	Big city	,3122	12073
Unemployed	,2489	2810	Suburbs or outskirts of big city	,3436	5304
Learning or studying	,3433	2369	Mid-sized or small town	,2957	9919
Trainee	,3198	123	Village	,2753	10088
Unable to work	,2351	794	Farm	,2743	1909
Retired or pensioner	,2499	6825			
Home-maker	,2806	3511			
Total	,2998	37973	Total	,3010	39293

tor and readiness to sacrifice for the environment<sup>14</sup>. A high level of declared pro-environmental behaviour (over 25%) is recorded in Switzerland, South Korea, and Denmark – as well as in Taiwan, the United States, and Mexico (over 20%). On the other hand, countries such as Latvia, Croatia, and the Czech Republic are characterised by low levels (over 75%), and over 70% in Bulgaria (tab. 8).

### Pro-environmental behaviour

The pro-environmental behaviour indicator included behaviours such as segregating waste, buying health food, avoiding buying certain products, reducing exhaust gas emission, saving energy and water – assuming that they were propelled by environmental concern.

<sup>14</sup> The ISSP data set includes variables referring to the respondents' incomes, but they are not directly comparable. Applying the procedure of ranging incomes seems too risky, as well. Low income ranges in wealthier countries do not mean the same as in poorer countries (for example, crossing the poverty threshold), especially taking into account the possibility of satisfying basic needs, and to a lesser extent, a sense of being at the bottom of the *social ladder*. For these reasons, the variable of *income* was not used in the analysis. This would be possible if the research was limited to one country or a group of countries similar in terms of gross domestic product per capita, purchasing power, the scope of economic stratification, etc.

The regression model shows that the pro-environmental behaviour indicator is dependent on all the independent variables included in it. The variables with the strongest impact include (decreasing in relevance): age, years of education, size of place of residence, gender, political orientation, employment status (tabs. 9 and 10).

The frequency of pro-environmental behaviour increases with age and education, it correlates with more left-wing political orientation, and it is higher among women than among men. Pensioners, home-makers, people unfit for work and trainees are more likely to engage in pro-environmental behaviour. A slightly weaker pro-environmental behaviour indicator characterises people who are employed, and it is the weakest among pupils, students and the unemployed. People who live in the suburbs and outskirts of big cities are most likely to display pro-environmental behaviour. Residents of medium-sized cities, small towns and villages are less likely to do so, and residents of big cities and farmers are the least likely to adopt such behavior (tab. 11).

There are some discrepancies between declarations of pro-environmental behaviour and pro-environmental behaviour, for example pupils or students are characterised by high levels of declared pro-environmental behaviour, but low levels of displayed pro-environmental behaviour. This is also true about inhabitants of large cities and (to a slightly lesser extent) people who work. By contrast, pensioners are characterized by a low level of

Table 8. Declarations of pro-environmental behaviour by country. Source: own analysis based on ISSP Environment 2010.

Country		Declarations of pro-environmental behaviour			Total
		Low level	Moderate level	High level	
Argentina	N	701	244	129	1074
	%	65,3%	22,7%	12,0%	100,0%
Austria	N	405	436	112	953
	%	42,5%	45,8%	11,8%	100,0%
Belgium	N	566	365	137	1068
	%	53,0%	34,2%	12,8%	100,0%
Bulgaria	N	699	189	89	977
	%	71,5%	19,3%	9,1%	100,0%
Canada	N	418	343	180	941
	%	44,4%	36,5%	19,1%	100,0%
Chile	N	748	413	192	1353
	%	55,3%	30,5%	14,2%	100,0%
Taiwan	N	541	1187	464	2192
	%	24,7%	54,2%	21,2%	100,0%
Croatia	N	928	165	67	1160
	%	<b>80,0%</b>	14,2%	5,8%	100,0%
Czech Republic	N	1066	217	98	1381
	%	77,2%	15,7%	7,1%	100,0%
Denmark	N	511	388	312	1211
	%	42,2%	32,0%	<b>25,8%</b>	100,0%
Finland	N	607	385	152	1144
	%	53,1%	33,7%	13,3%	100,0%
Germany	N	610	434	202	1246
	%	49,0%	34,8%	16,2%	100,0%
Israel	N	624	385	164	1173
	%	53,2%	32,8%	14,0%	100,0%
Japan	N	608	481	155	1244
	%	48,9%	38,7%	12,5%	100,0%
South Korea	N	453	630	467	1550
	%	29,2%	40,6%	<b>30,1%</b>	100,0%
Latvia	N	792	94	32	918
	%	<b>86,3%</b>	10,2%	3,5%	100,0%
Mexico	N	651	529	306	1486
	%	43,8%	35,6%	20,6%	100,0%
New Zealand	N	560	351	192	1103
	%	50,8%	31,8%	17,4%	100,0%
Norway	N	657	412	225	1294
	%	50,8%	31,8%	17,4%	100,0%
Philippines	N	547	453	181	1181
	%	46,3%	38,4%	15,3%	100,0%
Russia	N	973	389	89	1451
	%	67,1%	26,8%	6,1%	100,0%
Slovakia	N	683	297	74	1054
	%	64,8%	28,2%	7,0%	100,0%
Slovenia	N	553	322	115	990
	%	55,9%	32,5%	11,6%	100,0%
South Africa	N	1734	681	447	2862
	%	60,6%	23,8%	15,6%	100,0%
Spain	N	1446	650	341	2437
	%	59,3%	26,7%	14,0%	100,0%
Sweden	N	529	414	176	1119
	%	47,3%	37,0%	15,7%	100,0%
Switzerland	N	298	520	381	1199
	%	24,9%	43,4%	<b>31,8%</b>	100,0%
Turkey	N	1039	312	190	1541
	%	67,4%	20,2%	12,3%	100,0%
United Kingdom	N	554	198	113	865
	%	64,0%	22,9%	13,1%	100,0%
United States	N	559	482	278	1319
	%	42,4%	36,5%	21,1%	100,0%
Total	N	21060	12366	6060	39486
	%	53,3%	31,3%	15,3%	100,0%

Kruskal-Wallis H = 3353.240, df = 29, p < 0.0005. Values over 75% (low level) and over 25% (high level) are in bold.

Table 9. CATREG optimal scaling: summary of the model. Source: own analysis based on ISSP Environment 2010.

Model - Summary				ANOVA	
Multiple R	R-squared	Adjusted R-squared	Prediction error	F	Significance
,198	,039	,038	,961	25,244	,000

Table 10. CATREG optimal scaling : regression coefficients. Source: own analysis based on ISSP Environment 2010.

Coefficients					
	Standardized coefficients		df	F	Significance
	Beta	Estimation of the standard error			
Gender	,064	,008	1	61,680	,000
Age	,138	,012	1	136,947	,000
Years of education	,080	,009	10	83,637	,000
Employment status	,044	,009	6	25,731	,000
Political orientation	-,050	,008	1	39,991	,000
Size of place of residence	,074	,008	4	78,831	,000
Dependent Variable: pro-environmental behaviour					

Table 11. Mean values of declarations of pro-environmental behaviour by employment status and size of place of residence. Source: own analysis based on ISSP Environment 2010.

Employment status			Size of place of residence		
Employed	,4091	17428	Big city	,3875	8339
Unemployed	,3633	1771	Suburbs or outskirts of big city	,4406	4204
Learning or studying	,3534	1625	Mid-sized or small town	,4237	7665
Trainee	,4211	95	Village	,4266	7471
Unable to work	,4240	487	Farm	,3965	1416
Retired or pensioner	,4725	4535			
Home-maker	,4298	2148			
Total	,4151	28089	Total	,3875	29095

declared pro-environmental behaviour, but high level of displayed pro-environmental behaviour. Switzerland and Germany (with 50.1%, each), and Austria (with 45.4%) rank top as far as pro-environmental behaviour indicator is concerned. They are followed by Canada (38.5%), Japan (37.9%), Denmark (31.9%), Argentina (30.8%), and others. Countries where low levels of pro-environmental behaviour were recorded most frequently include: South Africa (80.5%), Israel (80.2%), and Bulgaria (79.5%) (tab. 12).

If we compare the levels of declarations and levels of pro-environmental behaviour, we can observe a correlation between them in half of the cases<sup>15</sup>. In 23% the levels of declaration exceed the levels of behaviour, and in 26.7% the levels of pro-environmental behaviour are higher than those declared<sup>16</sup> (tab. 13).

The closest correspondence between declarations and behaviour occurs for the lower values of both indicators (33.5%), and only less than 8% of the observations display high values of declarations and

behaviour. The table below shows the ranking of individual countries according to the percentage of high levels of both declarations and pro-environmental behaviour. Switzerland with almost 10% share of corresponding high values of both indicators tops the list. It is followed by South Korea (7.7%) and Taiwan (7.1%), and then by Denmark (6.9%), and Germany (6.2%). In the top five there are three European countries and two countries of South-east Asia. Latvia and Bulgaria (with 0.3% each), and Russia (0.4%), as well as Slovakia, Israel, and Chile (0.7%) rank at the bottom of the list (tab. 14).

### Concerns about environmental threats

Concerns about environmental threats may relate to different aspects. This research focuses on the threats resulting from pollution of surface waters, air pollution caused by cars, industrial pollution, the use of pesticides and chemicals in agriculture, the effects of global warming, consumption of genetically modified foods, and operation of nuclear power plants.

The sense of environmental threat is influenced by all social and demographic variables which were used in earlier analyses. The awareness of environmental threat is stronger among people of young age, with left-wing political views, living in larger cities (with the exception of residents of the suburbs or outskirts of large cities, which are characterised by a lower awareness of threat than those living in

<sup>15</sup> It cannot be forgotten that each of these indicators is based on a different set of questions. This is necessary, however, since repeating sets of questions leads to a common error of contaminating questions.

<sup>16</sup> Percentage values in the table: behaviour corresponding to the declarations is on the diagonal, above the diagonal – declaration levels are higher than displayed behaviour levels, under the diagonal – behaviour levels are higher than declaration levels.



Table 12. Declarations of pro-environmental behaviour by country. Source: own analysis based on ISSP Environment 2010.

Country		Pro-environmental behaviour			Total
		Low level	Moderate level	High level	
Argentina	N	134	64	88	286
	%	46,9%	22,4%	<b>30,8%</b>	100,0%
Austria	N	184	135	265	584
	%	31,5%	23,1%	<b>45,4%</b>	100,0%
Belgium	N	182	245	175	602
	%	30,2%	40,7%	<b>29,1%</b>	100,0%
Bulgaria	N	190	32	17	239
	%	<b>79,5%</b>	13,4%	7,1%	100,0%
Canada	N	226	148	234	608
	%	37,2%	24,3%	<b>38,5%</b>	100,0%
Chile	N	334	55	73	462
	%	72,3%	11,9%	15,8%	100,0%
Taiwan	N	572	327	347	1246
	%	45,9%	26,2%	<b>27,8%</b>	100,0%
Croatia	N	456	80	140	676
	%	67,5%	11,8%	20,7%	100,0%
Czech Republic	N	425	158	148	731
	%	58,1%	21,6%	20,2%	100,0%
Denmark	N	291	201	230	722
	%	40,3%	27,8%	<b>31,9%</b>	100,0%
Finland	N	303	159	180	642
	%	47,2%	24,8%	<b>28,0%</b>	100,0%
Germany	N	185	204	390	779
	%	23,7%	26,2%	<b>50,1%</b>	100,0%
Israel	N	495	86	36	617
	%	<b>80,2%</b>	13,9%	5,8%	100,0%
Japan	N	237	154	239	630
	%	37,6%	24,4%	<b>37,9%</b>	100,0%
South Korea	N	445	252	262	959
	%	46,4%	26,3%	<b>27,3%</b>	100,0%
Latvia	N	205	74	19	298
	%	68,8%	24,8%	6,4%	100,0%
Mexico	N	453	149	257	859
	%	52,7%	17,3%	<b>29,9%</b>	100,0%
New Zealand	N	422	172	160	754
	%	56,0%	22,8%	21,2%	100,0%
Norway	N	542	197	105	844
	%	64,2%	23,3%	12,4%	100,0%
Philippines	N	130	89	100	319
	%	40,8%	27,9%	<b>31,3%</b>	100,0%
Russia	N	267	60	40	367
	%	72,8%	16,3%	10,9%	100,0%
Slovakia	N	307	93	76	476
	%	64,5%	19,5%	16,0%	100,0%
Slovenia	N	253	180	143	576
	%	43,9%	31,2%	24,8%	100,0%
South Africa	N	1090	155	109	1354
	%	<b>80,5%</b>	11,4%	8,1%	100,0%
Spain	N	640	369	204	1213
	%	52,8%	30,4%	16,8%	100,0%
Sweden	N	373	162	117	652
	%	57,2%	24,8%	17,9%	100,0%
Switzerland	N	175	169	346	690
	%	25,4%	24,5%	<b>50,1%</b>	100,0%
Turkey	N	326	135	180	641
	%	50,9%	21,1%	28,1%	100,0%
United Kingdom	N	276	98	124	498
	%	55,4%	19,7%	24,9%	100,0%
United States	N	537	200	165	902
	%	59,5%	22,2%	18,3%	100,0%
Total	N	10655	4602	4969	20226
	%	52,7%	22,8%	24,6%	100,0%

Kruskal-Wallis H = 2108.081, df = 29, p < 0.0005. Values over 75% (low level) and over 25% (high level) are in bold.

Table 13 Levels of declared pro-environmental behaviour by levels of displayed pro-environmental behaviour. Source: own analysis based on ISSP Environment 2010

Pro-environmental behaviour		Declarations of pro-environmental behaviour			Total
		Low level	Moderate level	High level	
Low level	N	6441	2623	995	10059
	%	33,5%	13,6%	5,2%	52,3%
Moderate level	N	1889	1703	810	4402
	%	9,8%	8,9%	4,2%	22,9%
High level	N	1408	1837	1528	4773
	%	7,3%	9,6%	7,9%	24,8%
Total	N	9738	6163	3333	19234
	%	50,6%	32,0%	17,3%	100,0%

Gamma=0.442, p&lt;0.0005

Table 14. High level of declarations of pro-environmental behaviour and high level of pro-environmental behaviour by country. Source: own analysis based on ISSP Environment 2010.

Country	Frequency
Switzerland	9,9
South Korea	7,7
Taiwan	7,1
Denmark	6,9
Germany	6,2
United States	4,8
Mexico	4,7
Canada	4,6
Turkey	4,3
Finland	3,8
Austria	3,7
Japan	3,5
New Zealand	3,4
Belgium	3,3
Spain	3,3
South Africa	3,2
Norway	2,9
Sweden	2,5
United Kingdom	2,4
Czech Republic	2,3
Philippines	2,0
Slovenia	1,8
Argentina	1,3
Croatia	1,3
Chile	,7
Israel	,7
Slovakia	,7
Russia	,4
Bulgaria	,3
Latvia	,3

rural areas) (tabs. 15 and 16). These variables are ordered in a decreasing importance. The least important variables include gender (women feel more concerned) and employment status (people working at home, and the unemployed are more concerned about threats, while those unable to work and pensioners are the least concerned) (tab. 18).

Residents of Chile (83,8%) and Turkey (78,3%), as well as those of Argentina (73,3%), Croatia (67%), Russia (71%), and Mexico (70,8%) are most frequently highly concerned about threats to the environment. On the other hand, such concern is lower in countries such as: the UK (51,9%), Norway (48,8%), Belgium (45,3%), Denmark (45,3%), and New Zealand (37,9%) (tab. 17). The top five countries with a high awareness of environmental threat include non-European countries, or Eurasian countries (Turkey and Russia), and the top five countries with a low level of this indicator include mostly European countries (except for New Zealand, but Sweden and Finland are only slightly behind it).

Correlations between environmental concerns, pro-environmental behaviour, and declarations of pro-environmental behaviour were also studied (tab. 19). The analysis shows that such correlations exist. It has also been observed that correlations between concerns about environmental threats and pro-environmental behaviour are stronger than correlations between environmental concerns and declarations of pro-environmental behaviour. It should be borne in mind that the indicator of pro-environmental behaviour is slightly more associated with actions aimed at saving natural resources

Table 15. CATREG optimal scaling: summary of the model. Source: own analysis based on ISSP Environment 2010.

Model - Summary				ANOVA	
Multiple R	R-squared	Adjusted R-squared	Prediction error	F	Significance
,253	,064	,063	,936	57,914	,000

Table 16. CATREG optimal scaling : regression coefficients. Source: own analysis based on ISSP Environment 2010.

	Coefficients				
	Beta	Estimation of the standard error	df	F	Significance
Gender	,088	,007	1	155,293	,000
Age	-,117	,010	1	144,172	,000
Years of education	-,111	,008	9	197,745	,000
Employment status	,053	,007	6	51,400	,000
Political orientation	-,116	,007	1	250,657	,000
Size of place of residence	,114	,007	4	278,229	,000

Dependent Variable: concerns about environmental threats

Table 17. Concerns about environmental threats by country. Source: own analysis based on ISSP Environment 2010.

Country		Concerns about environmental threats			Total
		Low level	Moderate level	High level	
Argentina	N	104	193	833	1130
	%	9,2%	17,1%	73,7%	100,0%
Austria	N	155	286	578	1019
	%	15,2%	28,1%	56,7%	100,0%
Belgium	N	511	346	270	1127
	%	<b>45,3%</b>	30,7%	24,0%	100,0%
Bulgaria	N	153	251	598	1002
	%	15,3%	25,0%	59,7%	100,0%
Canada	N	261	274	435	970
	%	<b>26,9%</b>	28,2%	44,8%	100,0%
Chile	N	86	146	1197	1429
	%	6,0%	10,2%	<b>83,8%</b>	100,0%
Taiwan	N	308	629	1272	2209
	%	13,9%	28,5%	57,6%	100,0%
Croatia	N	182	216	809	1207
	%	15,1%	17,9%	67,0%	100,0%
Czech Republic	N	391	464	573	1428
	%	<b>27,4%</b>	32,5%	40,1%	100,0%
Denmark	N	510	348	400	1258
	%	<b>40,5%</b>	27,7%	31,8%	100,0%
Finland	N	440	376	359	1175
	%	<b>37,4%</b>	32,0%	30,6%	100,0%
Germany	N	203	374	767	1344
	%	15,1%	27,8%	57,1%	100,0%
Israel	N	133	282	510	925
	%	14,4%	30,5%	55,1%	100,0%
Japan	N	347	399	536	1282
	%	<b>27,1%</b>	31,1%	41,8%	100,0%
South Korea	N	407	392	777	1576
	%	<b>25,8%</b>	24,9%	49,3%	100,0%
Latvia	N	315	311	374	1000
	%	<b>31,5%</b>	31,1%	37,4%	100,0%
Mexico	N	185	249	1051	1485
	%	12,5%	16,8%	70,8%	100,0%
New Zealand	N	430	313	391	1134
	%	<b>37,9%</b>	27,6%	34,5%	100,0%
Norway	N	650	393	289	1332
	%	<b>48,8%</b>	29,5%	21,7%	100,0%
Philippines	N	163	300	736	1199
	%	13,6%	25,0%	61,4%	100,0%
Russia	N	184	285	1150	1619
	%	11,4%	17,6%	71,0%	100,0%
Slovakia	N	200	291	649	1140
	%	17,5%	25,5%	56,9%	100,0%
Slovenia	N	171	296	615	1082
	%	15,8%	27,4%	56,8%	100,0%
South Africa	N	626	896	1525	3047
	%	20,5%	29,4%	50,0%	100,0%
Spain	N	320	553	1653	2526
	%	12,7%	21,9%	65,4%	100,0%
Sweden	N	436	333	395	1164
	%	<b>37,5%</b>	28,6%	33,9%	100,0%
Switzerland	N	311	403	481	1195
	%	<b>26,0%</b>	33,7%	40,3%	100,0%
Turkey	N	164	198	1303	1665
	%	9,8%	11,9%	<b>78,3%</b>	100,0%
United Kingdom	N	474	236	203	913
	%	<b>51,9%</b>	25,8%	22,2%	100,0%
United States	N	505	408	508	1421
	%	<b>35,5%</b>	28,7%	35,7%	100,0%
Total	N	9325	10441	21237	41003
	%	22,7%	25,5%	51,8%	100,0%

Kruskal-Wallis H = 5012.985, df = 29, p < 0.0005. Values over 25% (low level) and over 75% (high level) are in bold.

Table 18. Mean values of environmental concern by employment status and size of place of residence. Source: own analysis based on ISSP Environment 2010.

Employment status			Size of place of residence		
Employed	,6189	22013	Big city	,6579	12440
Unemployed	,6339	2943	Suburbs or outskirts of big city	,5885	5519
Learning or studying	,6101	2492	Mid-sized or small town	,6112	10332
Trainee	,5907	126	Village	,6039	10504
Unable to work	,5630	847	Farm	,5271	2020
Retired or pensioner	,5768	7285			
Home-maker	,6940	3698			
Total	,6175	39404	Total	,6163	40815

Table 19. Correlations between environmental concerns, declarations of pro-environmental behaviour, and pro-environmental behaviour. Source: own analysis based on ISSP Environment 2010.

Spearman's rho				
		Levels of declared pro-environmental behaviour	Levels of pro-environmental behaviour	Levels of concern about environmental threats
Levels of declared pro-environmental behaviour	Correlation coefficient	1,000	,315**	,119**
	Significance	.	,000	,000
	N	39486	19234	38795
Levels of pro-environmental behaviour	Correlation coefficient	,315**	1,000	,202**
	Significance	,000	.	,000
	N	19234	20226	19700
Levels of concern about environmental threats	Correlation coefficient	,119**	,202**	1,000
	Significance	,000	,000	.
	N	38795	19700	41003

\*\* . Correlation is (mutually) significant at 0.01.

and one's financial resources than the indicator of declarations of environmentally friendly behaviour, which is associated with the necessity to incur costs. Therefore, it can be concluded that concerns about environmental threats stimulate our actions and behaviour, or prevent us from certain behaviour slightly more than the readiness to bear costs in order to protect natural environment. This, of course, does not mean that there is no correlation between our awareness of threats and declarations of pro-environmental behaviour (mainly of a financial nature). Such a correlation exists. It is weaker, though, than the one described earlier.

## Conclusions

The first of the hypotheses proposed in the research was largely confirmed: declared pro-environmental behaviour, displayed pro-environmental behaviour, and ecological concerns are dependent on social and demographic factors, such as age, education, employment status, political orientation, and size of place of residence. Gender proved to have no influence on the declarations of pro-environmental behaviour, but it influences the other two indicators. The second hypothesis was fully confirmed: declarations of pro-environmental behaviour, displayed pro-ecological behaviour, and environmental concerns differ from country to country. Countries with the highest indicators of both declarations and pro-environmental behavior include: Switzerland,

South Korea, Taiwan, Denmark, and Germany. On the other hand, Latvia, Bulgaria, Russia, Slovakia, and Israel rank at the bottom of this classification. Residents of Chile, Turkey, Argentina, Croatia and Russia display high concerns about environmental threats.

Furthermore, concerns about environmental threats influence pro-environmental behaviour and declarations of pro-environmental behaviour. This influence is slightly stronger for pro-environmental behaviour.

## References

1. BORYS T., 2011, Sustainable Development – How to Recognize Integrated Order, in: *Problemy Ekorożwoju/Problems of Sustainable Development* vol. 6, no 2, p. 75-81.
2. FIUT I.S., Sustainable Development: The Upcoming Revolution of Civilization?, in: *Problemy Ekorożwoju/Problems of Sustainable Development*, vol. 7, no 2, p. 43-50.
3. FRANKFORD-NACHMIAS CH., D. NACHMIAS, Metody badawcze w naukach społecznych, Zysk i S-ka Wydawnictwo, Poznań 2001, pp. 470-477
4. KRAS E., 2011, The Deep Roots of Sustainability, in: *Problemy Ekorożwoju/Problems of Sustainable Development*, vol. 6, no 1, p. 11-30.

5. NOWAK S., *Teorie postaw*, PWN, Warszawa 1973, pp. 25-26.
6. NOWAK S., *Metodologia badań społecznych*, PWN, Warszawa 1985, pp. 169-183.
7. PAPUZIŃSKI A., 2011, Realizacja zrównoważonego rozwoju, in: *Problemy Ekorozwoju/ Problems of Sustainable Development*, vol. 6 no 1, p. 107-116.
8. PAWŁOWSKI A., *Sustainable Development as a Civilizational Revolution. Multidisciplinary Approach to the Challenges of the 21st Century*, CRS/Balkema, London 2011.
9. RYDZEWSKI P., 2010, Metodologia i problematyka programu badawczego ISSP Environment z perspektywy idei zrównoważonego rozwoju, in: *Problemy Ekorozwoju/ Problems of Sustainable Development*, vol. 5, no 2, p. 51-60.
10. WCED, *Our Common Future*, Oxford University Press, New York 1987.