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**MEASURING ENVIRONMENTAL AWARENESS IN
THE WORLD**

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<p>Tiivistelmä</p> <p>Tämän tutkimuksen tarkoituksena oli mitata ympäristötietoisuutta maailmassa. Tieto ympäristötietoisuuden tasosta eri maissa on tärkeää, koska aikaisempi kirjallisuus ja tutkimus ovat osoittaneet, että kansalaisten tuki ympäristönsuojelulle riippuu yhteisön ympäristötietoisuuden tasosta. Parantaakseen ympäristötietoisuutta on tärkeää ensin tuntea ympäristötietoisuuden taso eri maissa tällä hetkellä. Itse ympäristötietoisuuden lisäksi olemme tutkineet sitä mitkä tekijät liittyvät ympäristötietoisuuteen kansallisella tasolla. Vielä lisäksi mittasimme ympäristön nykytilaa eri maissa ja sitä katsottiin ympäristön tilan olevan heikentymässä vai paranemassa.</p> <p>Työn päätavoitteena oli selvittää millainen ympäristötietoisuuden profiili eri maissa on. Tarkoituksena oli siis luoda yleiskuva kolmen eri ympäristötietoisuuden ulottuvuuden (motivaatio, tiedot ja taidot) tasosta eri maissa. Selvitimme myös kuinka meidän mittaamamme ympäristötietoisuusindeksi korreloi muiden kansallisten, sosiaalista ja taloudellista kehitystä kuvaavien, indikaattoreiden kanssa.</p> <p>Käyttämämme teoria, menetelmät ja työkalut ovat peräisin kahdesta aikaisemmin toteutetusta hankkeesta, joissa mitattiin ympäristötietoisuutta Itämeren alueen maissa ja Intian osavaltioissa. Tähän selvitykseen tutkimusalue on laajennettu kattamaan koko Maa. Tutkimuksen data saatiin online-kyselyn kautta. Kyselyssä vastaajia pyydettiin arvioimaan kahdeksaa ympäristötietoisuuteen liittyvää osa-alueita: ympäristön nykytilaa, ympäristön tilan trendiä, maan koulutuksen tasoa, kansalaisten tietoa ympäristöstä, heidän motivaatiota toimia ympäristömyönteisesti, heidän taitoja toimia ympäristömyönteisesti, heidän mahdollisuuksia toimia ympäristömyönteisesti, ja ympäristöä koskevan tiedon saatavuutta. Yhteensä vastauksia saatiin 1861 ja 543 näistä läpäisi alustavan seulonnan. Vastaajat ovat alan asiantuntijoita, jotka arvioivat naapurimaiden tilannetta. Kysely tuotti riittävän määrän maakohtaista dataa 57 maan arvioimiseen.</p> <p>Tulostemme mukaan eri maat suoriutuvat huomattavan vaihtelevasti arvioimillamme kahdeksalla osa-alueella. Yleisesti maailmassa kansalaisten motivaatio ja taidot, ja ympäristöön liittyvän tiedon saatavuus arvioitiin olevan paremmalla tasolla kuin ympäristön tilan, trendin tai kansalaisten ympäristötuntemuksen. Huomattavaa on, että kuudessa osa-alueessa yhdeksästä vastausten mediaani jäi alle 50:n eli "ei niin hyvä" -alueelle. Toisaalta ne kolme osa-alueita, joissa mediaani oli yli 50, koskevat mahdollisuuksia muuttaa tilannetta. Näin ollen, vaikka maailmanlaajuisesti ympäristön tilan nähdään olevan huonompi kuin se voisi tai pitäisi olla, vastaajat ovat sitä mieltä, että on olemassa keinoja sen parantamiseksi.</p> <p>Visualisoidaksemme tuloksia esitimme ne myös karttoina. Kartat osoittivat, että ympäristötietoisuus on yleisesti suurempi Euroopassa kuin muualla maailmassa joitakin poikkeuksia lukuun ottamatta. Näyttää myös siltä, että maat lähellä päiväntasaajaa suoriutuvat keskimääräistä huonommin niin ympäristötietoisuudessa kuin nykyisessä ympäristön tilassa ja ympäristön trendissä. Korrelaatiot muiden kansallisen tason indikaattoreiden kanssa osoittivat, että ympäristötietoisuus korreloi positiivisesti kansallisen varallisuuden ja koulutuksen tason kanssa. Lisäksi tulokset tukivat mm. oletusta siitä, että ympäristötietoisuus on korkeampi postmaterialistisissa yhteisöissä kuin materialistisissa.</p> <p>Kaiken kaikkiaan tiedosta eri maiden suoriutumisesta ympäristötietoisuuden eri osa-alueilla on oletettavasti hyötyä yrityksissä parantaa ympäristötietoisuuden tasoa maailmassa. Mielestämme tässä työssä esittämämme menetelmä tarjoaa käyttövalmiin kyselyn ympäristötietoisuuden mittaamiseen kansainvälisesti. Toistamalla kysely sopivin väliajoin saataisiin tietoa ympäristötietoisuuden kehittymisestä maailmassa.</p>			
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ABSTRACT

FOR THESIS

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Abstract <p>The aim of this study was to measure environmental awareness in the world. The level of environmental awareness of the nations is important, because previous literature and research on environmentalism have demonstrated that the publics' support for the protection of the environment depends on the level of its environmental awareness. In order to improve environmental awareness it is essential to first understand the level of environmental awareness in the countries today. Furthermore, we studied what factors correlate with environmental awareness on national level. In addition to measuring environmental awareness in countries, we also measured the current state of the environment in those countries and if the environment was perceived to be deteriorating or improving.</p> <p>The main objective of this study was to form a profile of environmental awareness in the countries of the world. The purpose of this was to give a view on the level of the country in the three different elements of environmental awareness: motivation, knowledge and skills. We were also interested to know if our measurement of national environmental awareness correlated with other national level indicators of social and economic development.</p> <p>The theory, methodology and tools of our study originate from two earlier projects that measured environmental awareness in the Baltic Sea Region and in the states of India. For this study the research area is extended to cover the entire Earth. An online survey was used to acquire data about the three elements of environmental awareness: motivation to act pro-environmentally, level of education, and skills to act pro-environmentally. The questionnaire also asked five questions about other issues of interest: current state of the environment, trend of the environment, environmental knowledge, possibilities to act pro-environmentally, and availability of environmental information. A total of 1861 responses were received, and 543 of those passed the initial screening process. The respondents were experts in the field, and evaluated the situation in the neighbouring countries. In consequence, 57 countries obtained the sufficient number of answers.</p> <p>The survey proved to provide relevant and valid data. According to the results, the countries vary significantly in their performances in the eight indicators. Overall, the countries score better in motivation, skills, and availability of information than in state of environment, trend of environment, or environmental knowledge. It is worth noting that the median of six of the nine measures fell below 50, i.e. on the 'not so good' area. On the other hand, the three measures that had a median over 50 are measures of empowerment. Therefore, even if the environmental situation globally is seen as worse than it could or should be, the respondents overall feel that there are ways to improve it.</p> <p>In order to visualize the results, maps of them were created. They showed that environmental awareness is generally higher in Europe than elsewhere, although with some exceptions. It also seems that the countries near the Equator perform worse in environmental awareness, current state of the environment and trend of the environment. As for the tested correlations with other national level indicators, we found that environmental awareness is positively correlated with national wealth and the level of education. Furthermore, populations that hold postmaterialistic values were more likely to have higher environmental awareness than materialistic publics.</p> <p>All in all, the information about the country's performance in the different elements of environmental awareness is expected to be helpful in national attempts to improve environmental awareness. In our view, the method we have presented in this work provides a ready-to-use survey for others to use to measure environmental awareness cross-nationally. Further runs of the survey would provide information on the development of environmental awareness in the world.</p>			
Additional Information			

FOREWORD

The purpose of this study was to measure the level of environmental awareness in the countries of the world. I wish to thank Pekka Harju-Autti, MSc(Tech.), for commissioning this Master's Thesis study and for his continuous support and advice throughout the process. I am also grateful to my Thesis Supervisor Erkki Alasaarela, PhD, for his guidance in data acquisition, and to Mika Ruusunen, MSc(Tech.) for his invaluable recommendations on how to describe data. I received a grant from Maa- ja vesitekniikan tuki ry for the study.

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Eevi Kokkinen

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1 INTRODUCTION

Why are we studying environmental awareness and particularly why cross-nationally? Because, for one, there are many cross-national environmental agreements that call for radical changes in energy production and consumption in industrialized as well as in developing nations, and ascertaining public support is essential for any such new policies to succeed. (Franzen & Meyer 2009). On the other hand, the public's support for the protection of the environment depends on its level of environmental awareness. Furthermore, to understand better the world we live in, we wish to understand cross-national differences in environmental awareness.

This research responds to these challenges by implementing a global study of the state of environment and level of environmental awareness in the countries of the world. The importance of measuring environmental awareness in countries can be derived from the well-known engineering wisdom: you can accurately influence only that which you can reliably measure. Therefore, in order to improve environmental awareness it is essential to first understand the level of environmental awareness in the countries today, and to study what factors influence it. Essentially, the main problem for researching environmental awareness in the world today is the lack of a universally applicable method. Fundamentally, because environmental awareness is a very abstract concept it is not feasible to measure it in absolute terms. However, comparative assessments can be performed. For instance, a Swedish man can estimate the level of environmental awareness in his country as compared to the situation in Finland, Norway and Germany. Therefore, our survey method is based on such comparisons between countries.

The study builds upon the previous analysis in the project 'Strategic guidelines for improving public awareness and environmental education in the Baltic Marine Environment Protection Commission (Partanen-Hertell et al. 1999). In that project a methodology for comparing countries' levels of environmental awareness was tested. The methodology was slightly refined and a completely new IT tool for data gathering and processing was used in a recent project 'Measuring Environmental awareness in 19 states in India' (Harju-Autti 2013a), where Environmental awareness in 19 states of India was compared. The theory, methodology and tools of our study originate from these two projects, but the research area is extended to cover the entire Earth.

Our main objective is to form a profile of environmental awareness in every country. The purpose of this is to give an outlook of the level of the country in the three different dimensions of environmental awareness: motivation, knowledge and skills. In the core of the work is to emphasize the constructive resources every country has. In previous literature, proenvironmental behaviour and environmental attitudes have been studied both on individual level and in groups, organizations and societies. Furthermore, factors that contribute to environmental behaviour and attitudes have been identified. National differences in environmental concern have been attributed to differences e.g. in wealth and values. We, too, explore the macro-level factors that are expected to correlate with environmental awareness.

In this paper, we firstly offer theoretical background for our study, starting from defining environmental awareness and describing how it affects behaviour. Then we give an overview of previous research and literature about the issue including theory and case studies. In chapter four we state our research questions and hypotheses. Chapter five describes the survey method and how the survey was implemented. The next chapter offers an analysis of the survey data, and then the discussion and conclusions are presented in chapter seven. Finally, chapter 8 summarises the study.

2 THEORETICAL BACKGROUND

In this chapter we explore the concept of environmental awareness and its determinants. Furthermore, we explore how environmental awareness is connected with environmentally beneficial behaviour.

2.1 The concept of environmental awareness

According to Collins English Dictionary, environment means the ‘external conditions or surroundings, esp. those in which people live or work’ or ‘external surroundings in which a plant or animal lives, which tend to influence its development and behaviour’ (environment 2009). On the other hand, awareness means ‘the state or condition of being aware; having knowledge; consciousness’ (awareness 2013). Consequently, environmental awareness could be defined as a state of being aware, having knowledge about, and being conscious of the external surroundings in which people live and work, and which tend to influence people’s development and behaviour.

In this study we describe environmental awareness as a combination of motivation, knowledge and skills (see figure 1). This model was developed in the project ‘Strategic guidelines for improving public awareness and environmental education in the Baltic Sea area’. (Partanen-Hertell et al. 1999)



Figure 1. The three elements of environmental awareness. (Partanen-Hertell et al. 1999).

Each element of environmental awareness comprises several aspects:

- **Motivation**, values and attitudes:
 - concern about environmental problems,
 - understanding of one's own empowerment,
 - understanding of responsibility and
 - willingness to act.
- Environmental **knowledge**:
 - information about environmental problems,
 - knowledge of the cause-effect relationships of environmental problems and
 - information about structural possibilities of environmental friendly activities.
- **Skills** and ability to act:
 - different levels: waste, transport, housing, education, political activities, participation, organizational activities;
 - different spheres of life: home, work, leisure, hobbies; and
 - habits vs. deliberate action.

The motivation to try to improve the environment is based on values and attitudes. Values are the moral principles and beliefs or accepted standards of a person or social group (value 2009). Dietz et al. (2005) discuss and analyse the relationship between values and environmentally significant behaviour from many angles. They conclude that values influence individual decisions and that individual decisions are consequential in shaping individual, and ultimately group, behaviour with regard to the environment.

Attitude is the way a person views something or tends to behave towards it (attitude 2009), or in other words a relatively stable and enduring predisposition to behave or react in a characteristic way (attitude 2002). Environmental values and attitudes do not necessarily lead to environmental friendly behaviour, although they enhance it (Harju-Autti 2011).

Above we have listed concern about environmental problems as an attribute to motivation. According to Dietz (2005) the word 'concern' reflects both a sense that something is important and a belief that it may be at risk. Dunlap and Jones (2002, see Alibeli & White 2011, 1) define environmental concern as 'the degree to which people are aware of problems regarding the environment and support efforts to solve them and or indicate the willingness to contribute personally to their solution.' In any case, environmental concern appears to be relevant

because, for example, Franzen and Meyer (2009) found that the level of environmental concern of a society influences its environmental behaviour.

Knowledge could be defined simply as acquaintance with facts, truths, or principles. The knowledge a person has about his/her environment is central to the development of his/her environmental awareness. Understanding of the cause-effect relationships within our environment is especially important. However, knowledge about environmental problems is not sufficient to make people behave environmental friendly. In fact, underlying any change in an individual's behaviour is a decision based on a personal assessment. Environmental issues are only one of many factors affecting any decision. Therefore, knowledge only prepares for action. (Harju-Autti 2011.)

The third main element of environmental awareness is skills. Even if someone was very motivated to improve the environment and was knowledgeable about environmental issues, s/he might not be able to behave environmental friendly. Skills and abilities to act in ways that improve the environment are also needed. Learning suitable practical skills, like recycling, takes time and effort, both from individuals and societies. In view of raising environmental awareness, it would be advisable to make environmental friendly choices easy to make, since it is known that old habits die hard. (Harju-Autti 2011.)

Thus, in our view the concept of environmental awareness is composed of three elements. Similarly to us, Sánchez and Lafuente (2010) in their paper establish a multidimensional definition of environmental consciousness. In their model, they integrate the most widespread theories of environmental concern from both sociological perspective, as well as theories of environmental behaviour found in environmental psychology. In result, their operationalization of environmental consciousness covers four dimensions: affective, cognitive, dispositional and active:

- Affective dimension includes:
 - endorsement of a general pro-environmental worldview,
 - support for pro-environmental solutions to specific problems, and
 - perception that the environment is under serious threat.
- Cognitive dimension includes:
 - individuals' level of information (and knowledge) about environmental problems.
- Dispositional dimension includes:

- personal norms,
- feelings of self-efficacy,
- perception of individual responsibility, and
- willingness to assume the costs of different environmental policy measures.
- Active dimension includes:
 - environmental activism (belonging to an environmental group, environmental protests, collaborating as environmental volunteers, etc.)
 - low-cost individual behaviours (such as recycling), and
 - high costs individual behaviours (“green” consumerism, reducing car use, etc.).

Figure 2 shows, that the relationships between these different dimensions are bidirectional. Even though Sánchez and Lafuente’s dimensions do not perfectly match our elements, they both distinguish some common components of environmental awareness/consciousness e.g. understanding of the threat to environment, perception of responsibility, willingness to take action, and different types of action.

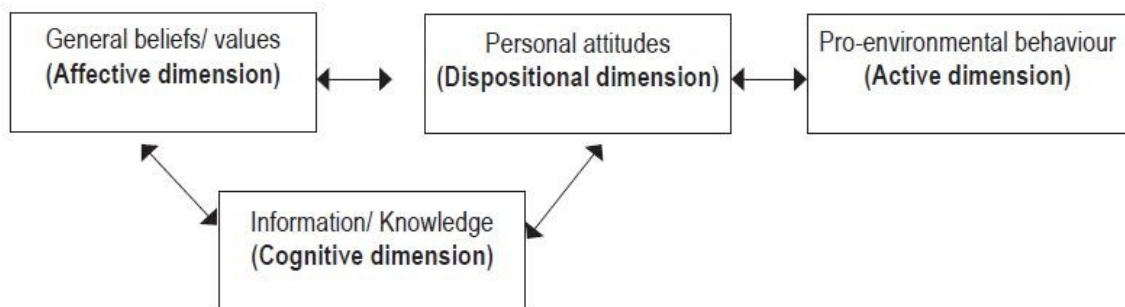


Figure 2. Dimensions of environmental consciousness (Sánchez & Lafuente 2010).

It is important to note that our definition of environmental awareness does not include environmental friendly actions or behaviour dimension per se in the dimensions. Conversely, when considering what they see as the behavioural dimension of environmental consciousness, Sánchez and Lafuente (2010) state that ‘environmental consciousness is characterized by the extent to which a person engages in pro-environmental behaviours of diverse kinds, particularly those which are more costly.’ However, figure 2 shows that the active dimension does not enjoy an equal status among the four dimensions, but is set apart as something that depends on the other three dimensions. This would lead to the conclusion that the active dimension is a sort of out-put product of environmental consciousness, though it has a feedback function as well. Accordingly, in Finnish literature about environmental awareness, it has been common to include action within the concept of environmental

awareness (see e.g. Heikkinen 2009). However, we see this method as a gross oversimplification: in our view action is not, and should not be treated, as an element of awareness. We must emphasize that in our view, awareness and behaviour (action) are two fundamentally different things. These two surely are related to each other, but it is in our view erroneous to say one is part of another.

How are awareness and behaviour (action) related to each other, then? Figure 3 illustrates how environmental awareness and values affect practical activities. When an environmentally aware individual encounters an external physical or practical stimulus, s/he may realise that there is potential for environmental friendly actions. If his/hers world view and values support environmental friendly actions, s/he be motivated to make environmental friendly choices. Based on the individual's knowledge and skills, and according to the existing opportunities to act, this motivation may manifest in environmental friendly actions or choices in the individual's private or professional life, or show through environmental political choices. This, in turn, will lead to improved state of the environment. (Partanen-Hertell et al. 1999.)

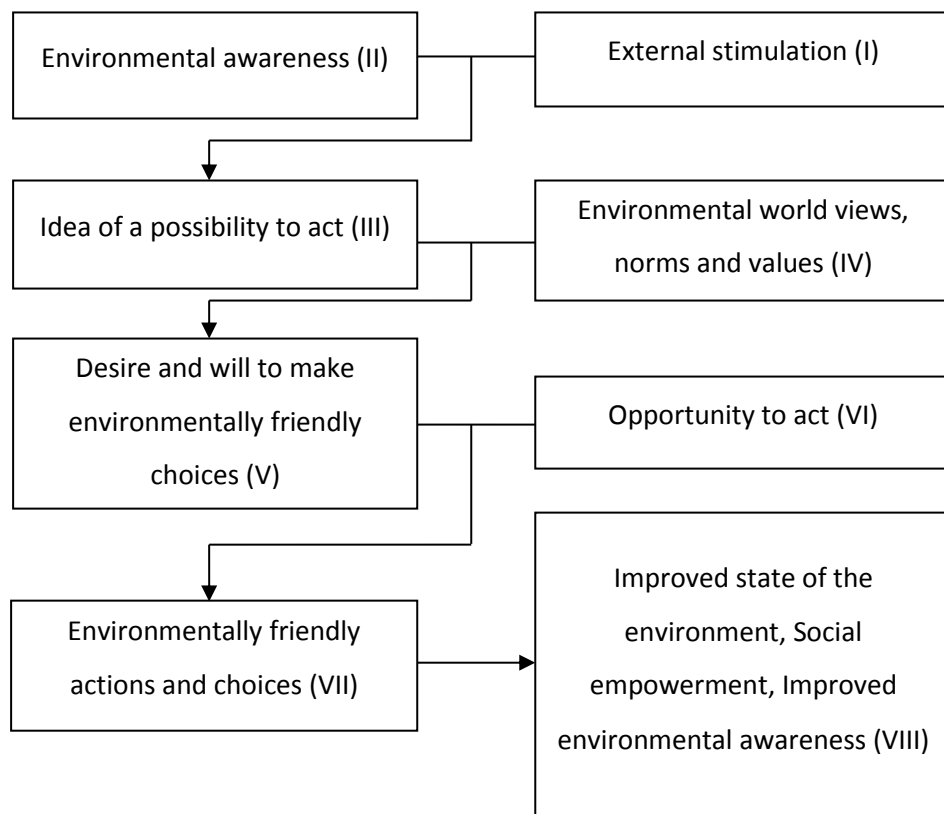


Figure 3. Environmental awareness in practice. Stages I-VIII as in the example above. (Modified from Harju-Autti 2011).

For example, let's say a man is shopping and passes through the fruit section. Seeing bananas there, he decides he would like some (I in figure 3). Due to his environmental awareness (II), it occurs to him to consider the environmental aspects of the production of bananas. He knows about product labels like Fair Trade (III). If the notion of buying environmental friendly products is compatible with his world view and values (IV), he might decide to look for Fair Trade bananas in the shop (V). If there are Fair Trade bananas in the shop (VI), his willingness to act environmental friendly may lead him to buy those instead of non-labelled bananas (VII). This in turn will contribute to the state of the environment, strengthen his environmental awareness, and give him a satisfying feeling of empowerment (VIII). (Harju-Autti 2013b.)

Stage IV in figure 2 emphasizes the importance of the individual's world view and values in the process that determines his/her behaviour. Above we already gave a definition for values but the concept of world view is more complex. A dictionary definition for world view states that it 'is a comprehensive conception or image of the universe and of humanity's relation to it' (weltanschauung 2013). Hence, to get the simplest definition for environmental world view we only have to replace the word universe with the word environment. Clapp and Dauvergne (2011) introduce four main types of environmental world views: market liberals, institutionalists, bioenvironmentalists, and social greens.

Each of these views presents a different take on the global environmental change –problems and solutions alike– and its relationship to the global political economy. For example, a CEO of an international company probably has a high understanding of market forces and sees green business as having great future potential for a better world. An eco-village leader, on the other hand, probably believes more on grass root activities and focuses on the connection with the nature. Each view has its own logic, and therefore environmental friendly actions can take multiple forms depending on the environmental world view of the individual. We cannot objectively say that one way of thinking is more environmentally friendly than other. (Harju-Autti 2011.)

Figure 3 above describes the relationships between environmental awareness and environmentally friendly behaviour. This pattern on how environmental awareness affects individuals' actions shares several aspects with some theories of planned human behaviour, like the values-beliefs-norms (VBN) theory (Stern et al. 1999 & Stern 2000). According to Hansla et al. (2008) in the VBN theory, 'the determinants of intentions to perform proenvironmental behaviors include awareness of consequences – understood as individuals'

beliefs about the adverse consequences of environmental problems.’ Kenter et al. (2011) describe the VBN theory as a process where values shape an ecological world view (figure 4).

The models in figures 3 and 4 contain mutual components. However, the relationships between the components are set differently. All in all, the values, beliefs and norms steps of VBN theory could be seen simply as a sub model for the stage IV in figure 3. On the other hand, beliefs, for example, manifest themselves as perceived ability to reduce threat (figure 4) which corresponds partly with the idea of a possibility to act (stage III in figure 3). Moreover, the sense of obligation to take proenvironmental actions that norms inspire in figure 4 is a similar state of mind as described in stage V in figure 3: desire and will to make environmental friendly choices.

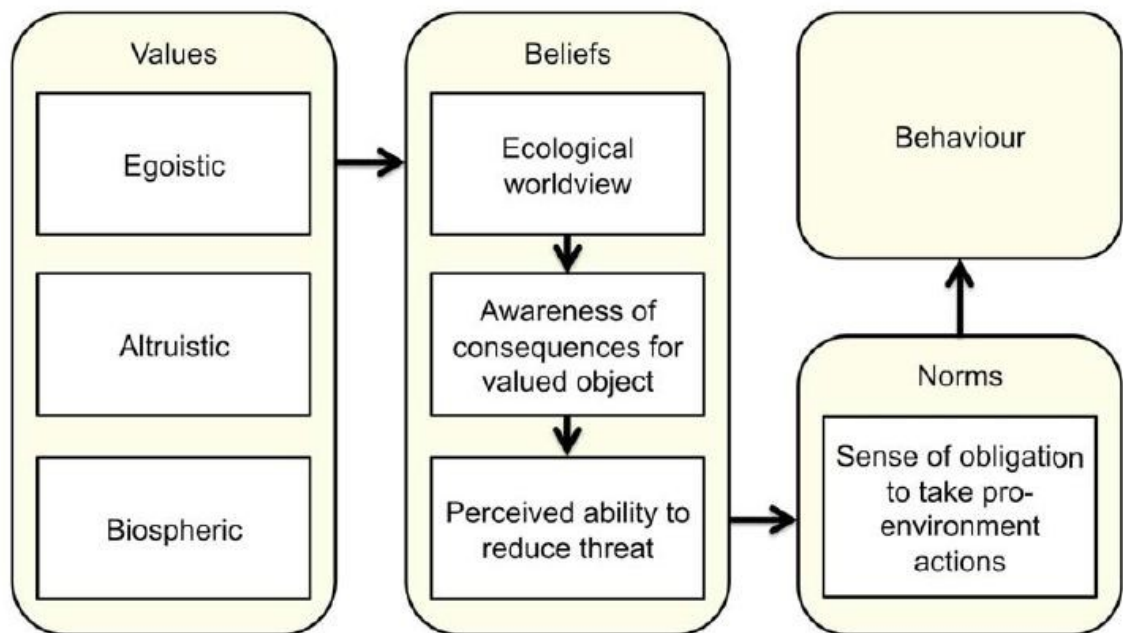


Figure 4. Representation of the values-beliefs-norms theory of environmental behaviour (Kenter et al. 2011, adapted from Dietz et al. 2005; Stern 2000).

2.2 The development of environmental awareness

Nowadays the topic of environmental awareness is often approached solely from educational point of view. Environmental awareness is considered a matter of education, and enhanced awareness is expected to result from further environmental education. This might work in cases where environmental knowledge is the limiting factor for raising environmental awareness. However, in many cases it would be more advisable to begin from environmental motivation, because motivation plays a crucial role in the development of environmental

awareness. For example, in their study Biel and Thøgersen (2007) demonstrate the crucial role social and personal norms play for pro-environmental behaviours. Corresponding to what we showed in figure 3, in practice, environmental awareness enhances itself by means of generating pro-environmental actions that in turn lead to improved awareness. This process is similar both among individuals and collectively. Therefore, even the environmental awareness of a nation develops in a similar fashion.

An example of the successful development of collective environmental awareness and its effects can be found in Finland, in matters concerning its abundant freshwaters. In the 1960's and 1970's significant part of Finnish fresh waters were thought to be irrevocably contaminated. This caused great concern and discontent among the people who lived or spent holidays near the waters. At some point the discontent reached a level where it manifested in actions: active citizens took the matter of polluted waters to the politicians and consequently new laws were passed to protect the environment; engineers developed better processes for the industry, and municipal officials commissioned adequate waste water treatment plants; scientists and environmentalists gathered and disseminated information on the state of the waters; values shifted and actions that spoiled the waters became socially unacceptable. (Neuvonen 2011.)

Gradually, during the last 30 years, innovations, amendments, newspaper articles and petitions have led to a change in the state of the freshwaters and also in the environmental awareness of Finns. This change is a product of many deeds and actors, and could not have been achieved by any action or individual contributor alone. The necessary chain of events was enabled by the knowledge the people had on the state of their environment, by the skills and abilities they had to take effective action, and by the motivation they had to better the situation. (Neuvonen 2011.)

However, the restoration of Finnish fresh waters was only one step on the way to improved state of the environment and higher level of national environmental awareness. New environmental problems are emerging. It should also be pointed out that environmental problems cannot be solved for good, but they require constant effort to remain under control. For example, despite the successful recuperation of Finnish waters since the 1970s, it could be argued that we are on the brink of a similar challenge with today's mining industry in Finland. Once again there are reports of citizens becoming concerned about the effect local mines have on the environment they live in (Hämäläinen & Tuominen 2013).

The success story of the restoration of the Finnish freshwaters might lead us to believe that all other environmental problems could be controlled by a similar process. Unfortunately, not all environmental problems are the same. Problems like the pollution of freshwaters, air pollution in cities and environmental toxins are all local level problems and relatively easy to detect. Furthermore, they can be mitigated by comparatively simple measures: e.g. by putting a stop to major source of pollution, reigning in major polluters or by agreeing on national policies. However, many 21st century problems, like climate change, acidification of oceans and loss of biodiversity, are global. Their effects are not so easy to detect, and nor are their causes. Consequently, responsibility for the situation cannot be placed on any single polluter, and there is no one solution and national policies have only a limited effect. (Neuvonen 2011.)

2.2.1 The model for the development of environmental awareness

In their project, Partanen-Hertell et al. (1999) created a model that illustrates the development of environmental awareness of individuals in four stages. The model focuses on individual level, but it can be extended to illustrate the development of the environmental awareness of a group, society or nation (Partanen-Hertell et al. 1999).

Extending the models to a societal level requires a few assumptions:

- 1) In order to enable individual development of awareness in its citizens, a society should allow them to take responsibility for common matters, to have possibilities to change things, and also to have opportunities for personal development.
- 2) Alongside that, a general long term positive trend of development, as long as it corresponds with overall improvement of the standard of living in the society, is assumed. However, it should be stated that if the model is applied on individual level, development of environmental awareness is not necessarily restricted by personal prosperity or opportunities.

The above mentioned two main assumptions are feasible for the following reasons, respectively. Firstly, as we described in chapter 2.1, the perception and understanding of personal responsibility of the state of the environment, as well as the feeling of self-efficacy are essential components of an individual's environmental awareness. If a society constantly denies its citizens the opportunities to take responsibility, it will hinder the development of the population's environmental awareness. In this case citizens' opportunities to act would be

deliberately weakened (see box VI in figure 3), thus hampering the development of people's environmental awareness.

Secondly, as for assuming long term development, previous research presents two theoretical perspectives that link economic development, or affluence, with concern for the natural environment: the theory of postmaterialism by Inglehart, and the affluence hypothesis by Diekmann, Franzen and Meyer (Knight & Messer 2012). According to postmaterialism theory, environmental concern increases alongside with increases in affluence and a generational shift in cultural values (Inglehart 1995, see e.g. Franzen & Meyer 2010). In other words, as societies grow more prosperous, the population's values undergo a Maslowian shift from predominantly materialist values (values concerning survival and physical security) to predominantly postmaterialist values (values concerning identity, rights, and quality of life, e.g. environmental quality) (Knight & Messer 2012).

Moreover, affluence hypothesis assumes a more direct link between affluence and concern, and claims that increases in affluence have the most impact in the development of environmental concern. If regarded from the perspective of affluence hypothesis, the protection of the environment is not only a public good, but also a normal good, whose demand increases with income. (Diekmann & Franzen 1999, Kimmelmeier et al. 2002, Franzen 2003, Franzen & Meyer 2010; see e.g. Knight & Messer 2012.) In his theory, Franzen (2003, see Knight & Messer 2012) also includes the notion of a Maslowian value shift according to which people in wealthier nations 'have less pressing economic problems and are therefore more willing and able to reduce their standard of living in order to devote more resources to global environmental protection'.

However, the above mentioned theories that connect economic development and environmental concern have not gone unchallenged, and other theories for the development of environmental awareness have been suggested. For example, in the 80's and 90's some poor nations showed unexpectedly high levels of environmental concern e.g. in the Health of the Planet (HOP) survey. The results from the questions of HOP show clear differences on how people from poor and rich nations perceive environmental problems, but that does not imply that the citizens of poorer nations would be inherently less concerned about the environment (as the postmaterialism hypothesis would assume). (Dunlap & York 2008.)

Furthermore, world society theory has been used to explain the spreading and development of environmental concern (Knight & Messer 2012). According to world society theory, international organizations embody, reinforce, and diffuse world cultural norms to regional, national, and local levels regardless of their level of economic development (Knight & Messer 2012). The role world society has in the promotion and diffusion of pro-environmental values, norms and ideas has been of particular interest for the study of environmental concern (Longhofer & Schofer 2010, see Knight & Messer 2012).

All in all, it is clear that there is no single reason or cause that would exhaustively explain the development of a nation's environmental awareness. All nations must develop in their own pace according to their individual cultural, economic and geographic history. That is not to say that there would not be any common features in the process of the development of the environmental awareness of countries in general. Next chapter explains the four stages that could be distinguished in the development of environmental awareness in a typical country.

2.2.2 The stages of the development of environmental awareness

Environmental awareness begins to develop when people start to notice unfavourable, threatening changes in their surroundings. In the first stage, the motivation for increasing the level of knowledge and skills is usually based on a growing concern over threats to health. People's knowledge about environmental issues is limited. Environmental matters are perceived as separate from other spheres of life, and taking care of environment is left e.g. to scientist, non-governmental organizations or international organizations. (Partanen-Hertell et al. 1999.)

In the second stage people realize that they can influence the state of the environment. Their understanding of the causal relations in our environment improves. This adds to the sense of responsibility and motivation. On the other hand, 'outsourcing' environmental matters is still quite usual. Environmental issues are, however, more a part of everyday life and work. Development will be faster, if environmental friendly behaviour is seen as a 'social obligation'. (Partanen-Hertell et al. 1999.)

In the third stage people understand that the development of a welfare society depends on the state of the environment. Because environmental problems are perceived globally, supporting other countries in environmental activities is considered essential. Environmental

friendly actions are seen as normal part of everyday life, both in private and in work. The focus of action moves from curative to preventive measures. (Harju-Autti 2011.)

In the fourth, final stage, environmental awareness becomes an integral part of professional skills and everyday life choices. Environment is no longer considered a resource that belongs to mankind, but to have intrinsic value. Our values are no more based on growing consumption, but they are aimed at general welfare and happiness. (Harju-Autti 2011.)

3 LITERATURE REVIEW

The questions, why people become engaged in environmental issues and perform pro-environmental behaviour, have been studied since the beginning of the environmental movement over 40 years ago. In the beginning, this research was mainly based on traditional attitude theory and on social psychological theories of pro-social behaviour. Then, in the 1990s the direction of the research shifted from investigating the general attitudes about environmental issues to attempting to identify the values behind the environmental attitudes, too. (Schultz & Zelezny 1999.) In the 21st century research, it has become common to combine many theories and assess several determinants behind environmentalism in one study (see examples in e.g. Gelissen 2007; Dunlap & York 2008; Franzen & Meyer 2010; Givens & Jorgenson 2011; Knight & Messer 2012).

As we have defined above, environmental awareness is a combination of several elements, and as such a complicated variable to measure. There are also many different definitions of environmental awareness which makes comparisons between studies confusing. Furthermore, even the elements that make up environmental awareness are challenging to operationalize. In most cases, the previous studies about environmental awareness and related subjects have concentrated on some aspects of the subject e.g. on environmental concern, consciousness, attitudes, behaviour or values, and comparisons have been made between individuals, groups, populations, or nations. Moreover, as the theoretical basis of environmentalism is still under development, many studies examine or seek to explain the relationships between e.g. environmental values, attitudes, knowledge and behaviour. Therefore, there is a wide variety of research about what we call environmental awareness.

3.1 Determinants behind environmentally significant behaviour

Contemporary research on the determinants behind environmentally significant behaviour embraces the complexity of the issue. A wide variety of theories and methods have been derived from previous research from many fields of study. Stern (2000) lists three distinct approaches behind the theories that explain environmentalism. The first of them uses altruistic behaviour to explain environmentalism, the second treats environmentalism as a worldview, and the third bases environmentalism on values.

According to Dietz et al. (2005) the idea that altruism is a basis for environmentalism was the starting point for empirical work linking environmentalism and values. The most prominent

examples of this approach are the developments based on Schwartz's moral norm-activation theory of altruism. For instance, Stern and colleagues (Stern & Dietz 1994), in their value-basis theory of environmental concern, generalize Schwartz's theory and suggest that there are at least three value bases for environmental concern: egoistic, social-altruistic, and biospheric. The value-belief-norm (VBN) theory that we mentioned earlier also builds on the same theory (Stern 2000).

For example, Hansla et al. (2008) studied the relationships between environmental concern and egoistic, social-altruistic and biospheric value orientations. Based on a survey of 494 Swedish residents, their study 'provides empirical support for that egoistic, social-altruistic, and biospheric environmental concerns are related to corresponding awareness-of-consequences beliefs, and that both the beliefs and environmental concerns are related to the three value types power, benevolence, and universalism'.

One example of the second approach, worldviews, is the New Environmental (or Ecological) Paradigm (NEP) scale. It is a measure of endorsement of a 'pro-ecological' world view and it is widely used to measure the environmental concern of groups of people. It was developed by Dunlap and colleagues in the 1970's to measure the hypothesized change from the then prevailing world view of the population, called the dominant social paradigm (DSP), to a worldview that reflected greater environmental concern. The revised NEP scale uses fifteen statements and respondents are asked to indicate their strength of agreement with each statement. (Anderson 2012.)

The third approach to environmentalism studies values as predictors of environmental attitudes. There are two major lines of research within this approach. One line of research suggests that environmentalism emerges when basic material needs are met, and that individuals and societies that are postmaterialist in their values are more likely to exhibit pro-environmental behaviours. The other one focuses on four general value clusters: self-interest, altruism, traditionalism, and openness to change. (Stern 2000.)

As for the first line of research, since the presentation of Inglehart's postmaterialism theory, there has been an on-going debate on the relationship between postmaterialist values, (national) wealth and environmental concern. One side of the discussion is the study on whether postmaterialist theory is able to explain the development of environmental concern cross-nationally and/or on individual level. Alongside that, others study whether affluence

(national wealth or individual prosperity) is more adept at explaining differences in environmental concern. It is beyond the scope of this study to examine the debate in detail, but we'll give an overview of the discussion as far as it relates to our study. In the following we first shortly introduce the two prevalent theories that are connected to environmental concern and then present some examples of previous research in chronological order.

Drawing upon Maslow's theory of a hierarchy of human needs and Mannheim's theory of generations, Inglehart (1995) theorizes a widespread shift in values in the industrial world as a result of increasing affluence and security. In this shift, previous materialist values such as economic well-being and personal and national security give way to postmaterialist values such as freedom of speech, citizen participation and quality of life. Inglehart sees emerging environmental concern to be one result of increasing postmaterialist values.

Affluence hypothesis, on the other hand, is based on rational choice theory and behavioural economics. It proposes that environmental quality is a public good for which demand rises with income. (Diekmann & Franzen 1999; Kemmelmeier et al. 2002; Franzen & Meyer 2010.) Hence, in postmaterialism environmental concern is expected to increase concomitantly with increases in affluence and a generational shift in cultural values, while according to affluence hypothesis the increases in affluence have the most impact. Sometimes, in earlier studies especially, wealth of a nation is used to indicate the level of its postmaterialism, which makes it difficult to keep the two hypotheses separate (Dunlap & Mertig 1997).

The results from the 1990/91 World Values Survey reveal that people in the world practically universally approve of the ecology movement. However, as Inglehart (1995) pointed out in his study, there is a difference between approving the ecological cause and being willing to make sacrifices for it. Furthermore, according to him, the way a question is formulated in a survey affects how it is answered; a fact that is essential to keep in mind when interpreting such survey data. He also demonstrates how a question about willingness to give part of one's income to prevent pollution ranks countries into different order than a question that asks whether the government should reduce pollution as long as it does not cost the respondent any money. This clearly displays that support for environmental protection is not one-dimensional phenomenon. Therefore, Inglehart formulated a summary measure comprising of four distinct questions from the World Values survey of 1990/91 to measure the level of environmental concern i.e. the extent of support for environmental protection. He also examined and analysed data about the seriousness of environmental pollution in countries and

how that related to the level of support for pro-environmental behaviour. The two key findings of Inglehart's study are: 1) Mass support for environmental protections tends to be greatest in countries that have relatively severe objective (environmental) problems. 2) Countries that have relatively postmaterialist publics rank relatively high in their readiness to make financial sacrifices for the sake of environmental protection. They also form the basis of Inglehart's Objective Problems Subjective Values (OPSV) theory of environmentalism.

Dunlap and Mertig (1997) go through some issues that have arisen from the use of Inglehart's postmaterialism hypothesis and objective problems subjective values theory, and offer further insights into its criticism. Firstly, they agree with Brechin and Kempton (1994, see Dunlap & Mertig 1997) in thinking that postmaterialist value change is inadequate for explaining global environmental concern. Furthermore, they defend the ability of national wealth to serve as a measure of a country's postmaterialism, since their connection has been strongly supported in research. They also point out limitations in the data that has been available for research.

Diekman and Franzen (1999) further focus on the relation between a nation's wealth and its public's degree of environmental concern. Using the International Social Survey Programme (ISSP) data (1993 21 countries) they provide an explanation for why HOP and ISSP give contradictory results with regard to the affluence hypothesis. According to them, the survey questionnaires of ISSP and HOP contain different kinds of questions: rating question and ranking questions, which leads to two dimensions in the answers: environmental concern referring to an awareness of environmental problems mainly in one's community that are rated as more or less serious; and willingness and ability of people to give up something for the priority of environmental goals. Although the tendency to give priority to environmental goals is much stronger in wealthy countries than in poorer countries, this does not hold for environmental concern.

Also Kemmelmeier et al. (2002) examine the relationship between economic factors, values, and environmental attitudes both at the societal level and the individual level. Using data provided by the 1993 ISSP, they tested Inglehart's postmaterialist hypothesis that connects economic development via postmaterialist values to support for the environment. According to their results 'economic factors predicted proenvironmental attitudes at the societal level and less so at the individual level, but at neither level was the influence of economic factors mediated through postmaterialist values'.

Gelissen (2007) investigated the differences in public support for environmental protection among individuals from 50 nations. Support was determined by the willingness of individuals to make financial sacrifices to protect the environment. The findings of their analysis are congruent with the affluence hypothesis and Inglehart's subjective values hypothesis: variables like GDP, GDP growth, and average postmaterialist value-orientation of publics related directly to levels of support for environmental protection among nations and explained a significant part of the cross-national level variance.

Dunlap and York (2008) perform a comprehensive analysis on the globalization of environmental concern and the limits of the postmaterialist values explanation. According to them, conventional wisdom –supporting the postmaterialism theory– has long held that widespread citizen concern for environmental quality is limited to wealthy nations. Their goal was to determine the degree to which existing data support this assumption. To achieve that, they present evidence from four multinational surveys: three waves of the World Values Survey (WVS) and the Health of the Planet (HOP) survey that found highly inconsistent and often negative correlations between national affluence and environmental concern. The overall results of their study suggest that citizen concern for the environment is not dependent on national affluence or on affluence-based postmaterialist values. Additionally, Dunlap and York also reflect on the implications and consequences that the general acceptance of the postmaterialist theory has e.g. on policy development.

Contrary to Dunlap and York's (2008) findings, Franzen and Meyer (2010) conclude from the results of their own study that environmental concern is closely associated with national wealth. In their article they discuss Inglehart's theory of post-materialism, Dunlap and Mertig's (2010) globalization explanation, and the prosperity hypothesis, and test these hypotheses by applying multilevel analysis to the International Social Survey Programme (ISSP) data from the years 1993 and 2000. The multilevel analysis allows separate evaluations of individual and national level determinants of environmental concern. Their analyses show that cross-national differences in environmental concern are clearly related to wealth (the single-wealth indicator explains 63 per cent of the observed between-country differences), which lends strong support to the affluence hypothesis. Furthermore, individuals with higher relative income within countries display higher levels of environmental concern than their compatriots, and additionally, more concern is reported in wealthier countries than in poorer nations. Postmaterialist values are closely associated with individuals' environmental concern, but their influence is significantly less pronounced on cross-national level.

However, Givens and Jorgenson (2011) are in accordance with Dunlap and York (2010). They employ several theories (postmaterialist values hypothesis and the objective problems subjective values hypothesis among others) to assess the effects of affluence, economic development and environmental degradation have on environmental concern in 38 nations. The results of their multilevel analyses indicate that a higher level of national affluence lessens the likelihood of individual-level environmental concern. Conversely, they found that economic development and growth in environmental degradation both increase the likelihood of expressions of environmental concern in national level.

Moreover, Knight and Messer (2012) come to similar conclusions in their study that assesses three macro-level explanations of national-level environmental concern: national affluence, environmental degradation, and world society integration. For their analysis, they use data from five waves of the World Values Survey (WVS). Their results suggest that 'environmental degradation is positively associated with environmental concern expressed as willingness to pay higher taxes, affluence is either negatively or not associated, and international nongovernmental organizations are not significantly associated.' Likewise, Mostafa (2012) in his analysis of 25 countries, concludes that 'concern for the environment is a global phenomenon and not unique to the wealthy and more globalised nations.'

The second line of research on values behind environmentalism focuses on certain value orientations. Perhaps the most commonly used method to measure values is the Rokeach/Schwartz approach (Dietz et al. 2005). The Schwartz analysis reveals 10 value types that form four value clusters that further form two dimensions: self-enhancement versus self-transcendence and openness to change versus conservation (traditionalism). Dietz et al. (2005) report that during the last 40 years, researchers have found relatively consistent theoretical and empirical support for the relationship that some general value orientations have with environmentalism. For example, Schultz and Zelezny (1998) studied values and pro-environmental behaviour in five countries. They collected data from college students in Mexico, Nicaragua, Peru, Spain, and the United States. Analyses revealed a positive relationship between items within Schwartz's self-transcendence value cluster and pro-environmental behaviour in Mexico, Nicaragua, Spain, and the United States. Their analyses also provided partial support for the extension of Schwartz's model of norm-activation to pro-environmental behaviour.

Only a year later, Schultz and Zelezny (1999) conducted another multinational study on the relationship between values and attitudes. They used the revised New Environmental Paradigm (NEP) and Thompson and Barton's ecocentrism-anthropocentrism scales to measure environmental attitudes and Schwartz's universal values scale to measure general values. Survey data were obtained from college students in 14 countries. The results give support to the hypothesis that pro-environmental attitudes are positively linked to universalism and benevolence, and negatively linked to power, tradition and security. Overall, their findings support the value-basis theory of environmental attitudes.

Lately, some researchers have combined several theories and methods to tackle the complexity of environmentally significant behaviour. For instance, Oreg & Katz-Gerro (2006) used Ajzen's theory of planned behaviour and Stern et al.'s value-belief-norm theory to propose and test a model that predicts proenvironmental behaviour cross-nationally. They also incorporate Inglehart's postmaterialist and Schwartz's harmony value dimensions as contextual antecedents at the national level. Analysing data from 27 countries, they came to the conclusion that postmaterialistic values, but not harmony, affect environmental concern. Furthermore, environmental concern, perceived threat and behavioural control, in turn, affect willingness to sacrifice, which then affects a variety of proenvironmental behaviours.

Additionally, there are some attempts to elucidate and summarise the research on environmental awareness for the purposes of policy-making. For example, Iizuka (2000) wrote a report that attempts to clarify how environmental awareness can be utilised as a tool for environmental policy making and management. In her paper she reviews major works on environmental awareness. She divides them into four groups: those that study major trends on environmental public opinions; those that study the associations between environmental concern and socio-demographic factors; those that study values and world view; and those studies that link awareness and behaviour.

3.2 Case Studies

In addition to general research on environmental awareness and related issues, there have been many specific case studies that seek to measure or analyse the level of environmental awareness or concern in certain populations. Usually, they apply a suitable method and a survey that has been developed specifically for the purposes of the study in question. Next we introduce a few examples of such case studies.

In view of our study, the most important case study is the Raising environmental awareness in the Baltic Sea area that we mentioned in chapter 2.1. In the 1990s the Baltic Sea catchment area countries underwent many changes on the political, economic, social and cultural levels. These developments created a new framework for international, regional and subregional co-operation, and in the field of environmental awareness. Improving environmental awareness in the Baltic Sea catchment area countries was seen as a way to prevent further deterioration of the Baltic Sea. A conceptual framework for the contents and the development of environmental awareness was created for the project. (Partanen-Hertell et al. 1999.)

Another part of the project was a questionnaire sent to 850 key persons presenting various professional groups in 14 countries in the Baltic Sea catchment area. The results of the questionnaire divided the 14 countries into three subregions that shared many common characteristics:

- 1) Russia, Belarus and Ukraine;
- 2) Estonia, Latvia, Lithuania, Poland, the Czech Republic and Slovakia;
- 3) Denmark, Finland, Germany, Norway and Sweden.

The key finding of the study was that the countries of subregion 1 mainly showed characteristics of the first stage of environmental awareness, and accordingly, the countries of subregion 2 of the second stage, and countries of subregion 3 of the third stage.

Furthermore, one part of the questionnaire concentrated on the state of the environment and on the level of environmental awareness. Nine countries received sufficient number of answers to those questions: Denmark, Finland, Germany, Sweden, Belarus, Latvia, Lithuania, Poland and Russia (Pemberton et al. 1999). With regard to that, other findings of the study reveal that:

- Firstly, only in Russia and Belarus the state of the environment is seen as getting worse. In all other 7 countries the environment is believed to be improving.
- Secondly, the questions about factors affecting the opportunities to act pro-environmentally and about the level of environmental awareness divided the countries into two distinct groups: the EU countries (Denmark, Finland, Germany and Sweden), and (then) non-EU countries (Belarus, Latvia, Lithuania, Poland and Russia). The first group scored clearly higher both in perceived opportunities to act pro-environmentally and in the level of environmental awareness, though in awareness the difference between the groups was not as remarkable as in the opportunities. (Partanen-Hertell et al. 1999.)

As for other relevant studies, Onder (2006) performed a survey of awareness and behaviour in regard to environmental issues among Selcuk University Students in Konya, Turkey. The purpose of the study was to determine students' awareness of environmental issues and problems and their behaviour towards the environment. A survey of 18 items was designed for the study, and 375 students from 12 faculties of the university answered it. The survey asked for opinions about the most important environmental problems globally and locally, the best ways to solve them, and most effective means to improve environmental awareness.

Kalantari et al. (2007) investigated factors individual and social factors affecting environmental behaviour of urban residents in Tehran City in Iran. To achieve this objective, they developed a conceptual framework to examine relationships between personal variables, attitudes towards environment and environmental behaviour. 1200 individuals of Tehran residents were randomly chosen and interviewed about their environmental behaviours, opinions, knowledge and sources of information about the environment. Results of the study showed that environmental behaviour of urban residents is connected with variables like age, gender, income, education, problem-based knowledge, environmental legislation, environmental attitudes, feeling of stress and preparedness to act.

Abdul-Wahab (2008) conducted a preliminary investigation into the environmental awareness of the Omani public and their willingness to protect the environment. The focus of the study was to investigate the Omani public's level of knowledge about general basic and current local and international environmental issues and to find out their environmental attitudes and behaviours towards their environment. This information was gathered through a questionnaire that was developed for the purposes of this study. The questionnaire was administered to 425 respondents. The results of the survey showed that the Omani public had knowledge about local and global environmental problems, but that they lacked general knowledge about environmental issues. The study also revealed that the public achieved a higher score in their environmental attitudes than in their environmental behaviours.

Lin et al. (2011) compared governmental activities and the environmental awareness of citizens' in four cities in China and Japan. A questionnaire was designed to measure the citizens' environmental awareness and the relevant behaviours. It was distributed to citizens in both urban and rural cities in China and Japan. The results demonstrate that there are more differences between the two countries than between urban and rural cities within a country.

According to the results, Chinese people pay more attention to local severe problems, and require more garbage classification while Japanese people are relatively satisfied with the current environmental situations.

Cities have been the focus of much wider studies as well. The Economist Intelligence Unit (EIU) conducted the Green City Index research series. The series includes six studies each of which focuses on one of the six regions: Europe, Latin America, Germany, US & Canada, Asia, and Africa. Overall, the studies measure the environmental performance of over 120 cities. The Green City Index covers CO₂ emissions, energy, buildings, land use, transport, water and sanitation, waste management, air quality and environmental governance. The results of the studies reveal great variety in performance among the cities, both globally and within the regions. Based on the results, the summary report also presents a seven step framework to greener cities. The fourth step, civic engagement bears the strongest connection with our study and emphasises awareness raising, motivational and inclusive campaigns and projects that involve citizens in environmental decision-making. (Siemens 2012.)

GlobeScan (2013) has provided an annual multi-country poll about environmental issues since 1992. For it, citizens from 12 countries have been asked how serious they consider each of six environmental problems to be: air pollution, water pollution, species loss, automobile emissions, fresh water shortages, and climate change. The latest poll reveals that environmental concerns among citizens around the world have reached twenty-year lows. It is noteworthy that the GlobeScan poll asks very specific questions about issues that change in time and are not equally relevant globally. Compared to the GlobeScan poll our method has the advantage of being less susceptible to seasonal and local variations.

TERI (2013) carried out a survey of perceptions related to the environment in major metropolitan areas of India. Accordingly, the 2013 TERI Environmental Survey was conducted in the six most populous cities in India. The study sought to assess people's perceptions, behaviour, awareness, and opinions towards the environment. The questions of the survey were divided into six themes: overall environment, air quality, water quality, forest/ green cover, climate change, and waste and waste management. The results show some similarities between the cities (e.g. in perceptions that many aspects of the environment have deteriorated over the last five years). However, there were also many marked differences among the cities in all of the six themes (e.g. in views on the relationship between protection of the environment and economic development).

Also Harju-Autti (2013) studied environmental awareness in India. However, instead of cities he compared environmental awareness in 19 states of India. It was found out that comparisons of the level of environmental awareness are possible within one single country, if there are strong cultural differences within the country. Among the 19 states studied rather remarkable differences were found in both environmental awareness and in the perceptions of the state of the environment.

4 RESEARCH QUESTIONS AND HYPOTHESES

The primary purpose of this study was to determine the level of environmental awareness globally. Hence, the research questions were:

- What is the level of environmental awareness in the countries included in the study?
 - How the elements of environmental awareness (motivation, knowledge, skills) vary among these countries?
 - How national wealth, level of education, societal equality, and national values correlate with the environmental awareness in a country?
- What is the (perceived) state of the environment in the same countries?
- What is the (perceived) trend of the state of the environment in the countries?

Based on the literature on environmental awareness and its relation with other measurable indicators, we formulated a set of hypotheses. They were developed keeping in mind the three basic elements of environmental awareness: motivation, knowledge and skills.

Franzen and Meyer (2009) connect environmental concern with the respondent's subjective perception of the condition of the local environment. In their view, worse quality of environment leads to higher environmental concern. Furthermore, Inglehart (see Dietz et al. 2005) found that mass support for environmental protection tends to be the greatest in countries that have relatively severe environmental problems like air and water pollution. Moreover, Knight and Messer (2012) came to the conclusion that 'environmental degradation is positively associated with environmental concern expressed as willingness to pay higher taxes.' Even though environmental concern and environmental awareness are, by their definitions, inter-correlated, the concept of environmental awareness entails much more than just environmental concern. Therefore, it is not logical to expect a similar (positive) relationship between worse quality of (local) environment and higher environmental awareness. As we see it, the relationship between the (perceived) state of the environment and (national) environmental awareness is very complex. However, the process description in figure 3 demonstrates how improved environmental awareness should, all other circumstances being favourable, lead to improvements in the state of the environment. Therefore, we hypothesize that:

- HP1 If environmental awareness is related to the quality of the environment, then there should be a positive correlation between good state of environment and environmental awareness.

Our second hypothesis has to do with the wealth of a country. Consequently, it relates with all three elements of environmental awareness, but the associations are complicated. The relationship between a nation's wealth or an individual's prosperity and its citizens' or the individual's environmental awareness has been studied by many researchers. However, it is still unresolved exactly how a nation's wealth is related to its environmental awareness (Franzen & Meyer 2009). According to Franzen and Meyer (2009), some studies find positive associations and some not. For example, Dunlap and Mertig (1995, see Dunlap & Mertig 1997) found that national wealth is more likely to be negatively than positively related to citizens' environmental awareness. Also Knight and Messer (2012) concluded that affluence is either negatively or not associated with environmental concern. Contrary to that, Kimmelmeier and colleagues (2002, see Dietz et al. 2005) found that a society's affluence predicted greater environmentalism. All things considered, we chose to hypothesize that:

HP2 If a country's environmental awareness is related to its wealth, then there should be a positive correlation between them.

Our third hypothesis stems from cultural considerations, and has mostly to do with the third element of environmental awareness: motivation, specifically values. Some value orientations have been found to be positively related to pro-environmental attitudes and behaviour. Several researchers have studied the relationship between a nation's (and an individual's) postmaterialist values and the level of its (his/her) environmental concern (Dunlap & Mertig 1997). For example, Inglehart (1995, see Dietz et al. 2005) found that countries that hold postmaterialist values tend to give greater support for environmental protection. Therefore, we hypothesize that:

HP3 If a country's environmental awareness is related to its postmaterialist values, then there should be a positive correlation between them.

Lastly, our two final hypotheses are also about motivation and values. Some value orientations have been found to be positively or negatively related to pro-environmental attitudes and self-reported environmental behaviours (e.g. Hansla et al. 2008; Dietz et al. 2005). Especially interesting are altruistic and egocentric values (Stern et al. 1999). For example, Schultz and Zelezny (1998, see Dietz et al. 2005) found a negative relationship between Schwartz's self-enhancement values and pro-environmental behaviour. On the other hand, values from Schwartz's self-transcendent value cluster have been shown to be positively related to pro-environmental attitudes and behaviour (Hansla et al. 2008; Dietz et al. 2005). Accordingly, we hypothesize that:

- HP4 If altruistic values are related to environmental awareness, then there should be a positive correlation between self-transcendent values and environmental awareness in a country.
- HP5 If egocentricity is related to environmental awareness, then there should be a negative correlation between self-enhancement values and environmental awareness in a country.

5 RESEARCH METHOD AND IMPLEMENTATION

Despite the variety of previous research, no one has yet measured national environmental awareness globally. All previous studies have been geographically limited to certain populations or a predetermined number of countries. Particularly, the availability of data limits international research. Many researchers make use of international survey data, but, as Dunlap and York (2008) point out in their study, that data is also lacking.

As was mentioned previously, the primary purpose of the study is to determine the level of environmental awareness globally. In practice, we chose to include all 193 Member States of the United Nations, plus the one observer state, Vatican City (Wikipedia 2012). Furthermore, as has been stated before, the intent of the study was not to measure the environmental awareness of individuals, not even as samples of each country, but to ask for well-informed evaluations for the general level of environmental awareness in each country. Therefore, for the purposes of the study, we chose to aim the questionnaire to experts: individuals who, by their profession or some other activity, were expected to have relatively high environmental awareness and understanding of environmental matters in their own country and worldwide. Moreover, we mean to measure environmental awareness of countries in relation to other countries, and not absolutely. This method gives us the relative level of environmental awareness in countries on a numerical scale by means of which countries can be compared with each other, i.e. by definition, an index of environmental awareness (index 2009).

As we have defined above, environmental awareness is a combination of several elements, and as such a complicated variable to measure. Furthermore, even the elements that make up environmental awareness are challenging to operationalize in ways that would allow meaningful comparisons between studies. Conventionally studies have been made in comparisons between some aspects of environmental awareness between individuals, nations, groups. Traditionally, there are two main approaches to the measuring: One is based on investigating some particular aspects of the three elements of environmental awareness by interviews, questionnaires and tests among individuals, organizations' staff or the public. Questions like 'Do you usually recycle newspapers?' and 'Would you be willing to sign a petition in favour of stricter environmental protection?' are often used (Dietz et al. 2005). The other concentrates on measuring concrete environmental friendly choices, actions and practices of individuals, groups, organizations or the society as a whole.

Dietz et al. (2005) have pointed out some drawbacks in both approaches: In the first case, self-reporting questionnaires and interviews might be misleading, because, what people say they do or think is rarely the same thing they actually do or think. To make things more complicated, they might not even do as they think they do. Therefore, the link between self-reported behaviour or behavioural intentions and actual behaviour is far from perfect. In the second case, measuring concrete choices, it is many times difficult and expensive to measure individual behaviour. Another important factor to consider is the fact that people may act differently, even inconsistently, in the different spheres of their life: home, work, leisure and hobbies (Partanen-Hertell et al. 1999).

5.1 Content of the questionnaire

For our study we used a previously prepared online survey questionnaire (Harju-Autti 2012). The questions of the survey were developed from the relevant questions of the previous survey about environmental awareness in the Baltic Sea Region. In their book Hofstede et al. (2010) caution researches against the pitfalls of applying a national survey or questionnaire to intercultural research. They state that such questionnaires ‘cover only issues considered relevant in the society in which they were developed, and they exclude questions unrecognized by the designer’. For example, in their study Sánchez and Lafuente (2010) use a specific indicator like the ‘Level of agreement with the pro-environmental proposal to “pay more for *water*”’ as an operationalization for their dispositional dimension (emphasis ours). However, their aim was to study environmental consciousness solely among Andalusians and not to make cross-national comparisons.

We have tried to avoid the intercultural problem mentioned by Hofstede et al. (2010) by keeping the questionnaire as general as possible. Another advantage of keeping the questionnaire general is that it allows comparisons with possible later reproductions of the survey. We cannot know the future of environmental problems, but we can assume that our concept of environmental awareness (motivation, knowledge and skills) will continue to be suitable for use in the future. This way it is possible to eventually follow the development of environmental awareness in the world.

The survey was available only in English mainly for two reasons:

- Firstly, it eliminated the impact that different translations would have on how people would interpret the questions.

- Secondly, English language acted as a screen to limit the respondents to those with sufficient understanding of English and therefore, probably, higher level of enlightenment, and knowledge on environmental matters.

The survey itself began with a short introduction message: “You will find here statements relating to your home country and four other countries. What is your opinion - how do these statements reflect to the situation in real life? Naturally, you know best the situation in your own country. However, people are using different scales, so to allow good international comparisons it is important that you will answer also how you think the situation is in ALL the other countries given.” (Harju-Autti 2012.)

The questions of the survey were as follows (Harju-Autti 2012):

1. Background question: Your country (YC)
2. To your mind, how good is the state of the environment in [each assigned country, separately]?
 - A. Current State of the environment (STE)
 - B. Trend of the environment (TRE)
3. How good is the level of general education and environmental knowledge in [each assigned country, separately]?
 - A. General education (GEE)
 - B. Environmental knowledge (EKN)
4. Motivation to try to improve the environment by their own behaviour and personal skills to do it (i.e. recycling, energy decisions etc.) in [each assigned country, separately]?
 - A. Motivation to act (MOA)
 - B. Personal skills (PES)
5. Possibilities to act environmentally friendly and availability of environmental information in [each assigned country, separately]?
 - A. Possibilities to act (POA)
 - B. Availability of environmental information (AVI)

The first question was answered by selecting appropriate country from the list. The questions from 2 to 5 were answered by indicating a point on a fourfold table (see Figure 3). Part A of the question was answered on the x-axis and part B on the y-axis. The scale for both axes went

from 0 to 100, where 0 indicated 'Poor', 'Not at all' or 'Hard to find', and 100 indicated 'Good', 'Very much' or 'Easy to get' depending on the question.

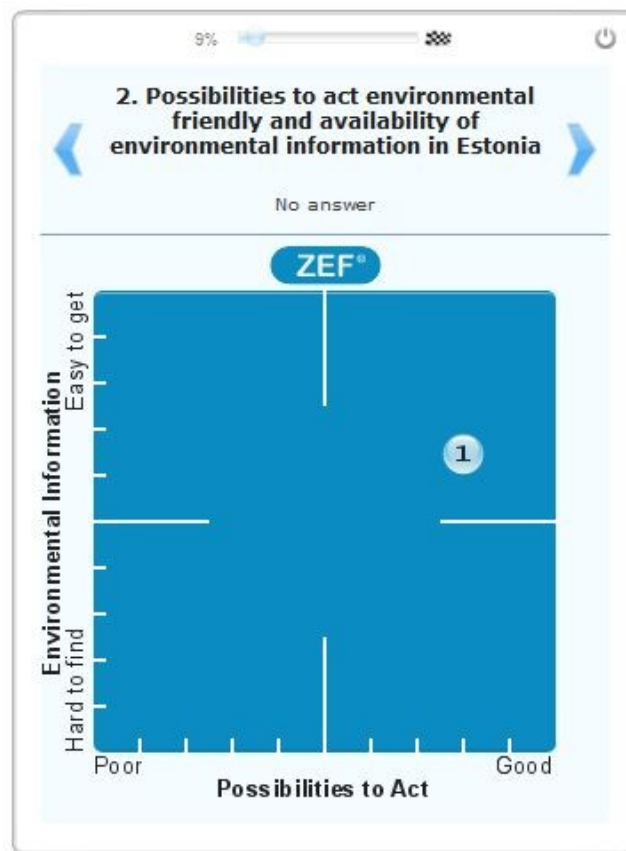


Figure 5. An example of an answer for question 5 in the questionnaire.

The aim of the study was to measure relative environmental awareness between countries. This was achieved by asking every respondent to evaluate the situation in his/her own country plus in two neighbouring countries and two control countries, namely Germany and India. Hence, for the questionnaire, we formed a web of countries so that the respondent of each country assessed his/her own country and four other countries. For example, a respondent from Switzerland would evaluate first the situation in Switzerland, and then in France and Italy, and finally in Germany and India (figure 6). The connections between countries were not necessarily two-way. Annex I lists the countries included in the survey and their connected countries.

Background Information

State of the Environment
Please note that you do not need to have an exact knowledge of the situation in other countries. But you surely have some sort of ideas in their mind about them - thus please complete the survey based on these ideas. Why do we do it in this way? In this way we will be better able to compare the answers given since people are using surprisingly different scales.

Education and Knowledge

- ✓ 1. How good is the level of general education and environmental knowledge in Switzerland
- ✓ 2. Level of general education and environmental knowledge in France
- ✓ 3. Level of general education and environmental knowledge in Italy
- ✓ 4. Level of general education and environmental knowledge in Germany
- ✓ 5. Level of general education and environmental knowledge in India

Motivation and Personal Skills

Possibilities to Act and Environmental Information

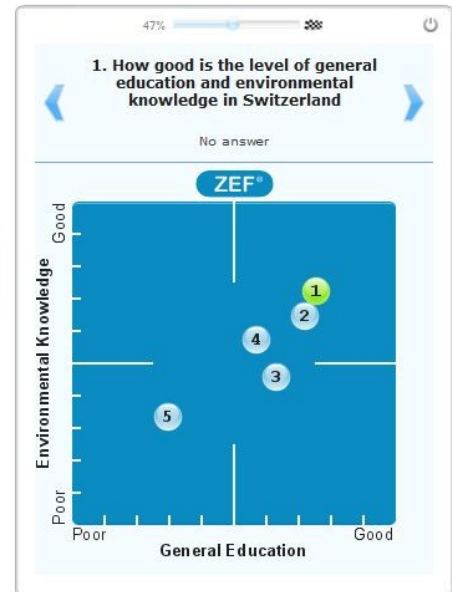


Figure 6. An example of an answer from Switzerland to the question about the education and knowledge. Each point on the fourfold table represents the answer concerning the correspondingly numbered country.

5.2 Implementation of the Survey

The online survey service provider ZEF Evaluation Engine® hosted the online survey. The data collection period started in August 2012 and continued to October 10th 2013. Respondents were searched via wide variety of different ways. For example:

- Selected experts from a diverse range of organizations and
- the leaders and contact persons from the Life+ Programme's projects from the last 7 years were invited to take the survey directly via e-mail.
- Suitable citizens were recruited through targeted Facebook (FB) invitations.
- Many contacted organizations organized internally the recruitment of respondents.

Examples of other organizations that participated are:

- International Club of Rome ,
- Baltic21,
- Birdlife International,
- Greenpeace International, and
- HELCOM.

The experts were selected from the fields of academics, business, industries, administration and NGOs. FB recruits were searched from FB communities and groups. Invitation message was posted either on the 'wall' of the found group or community or send to them as a FB

message. In both cases the message contained a brief description of the survey, a link to the project's FB page and a direct link to the survey. Those who expressed special interest in the survey by e.g. commenting on the invitation message were encouraged to forward the invitation to their friends and acquaintances.

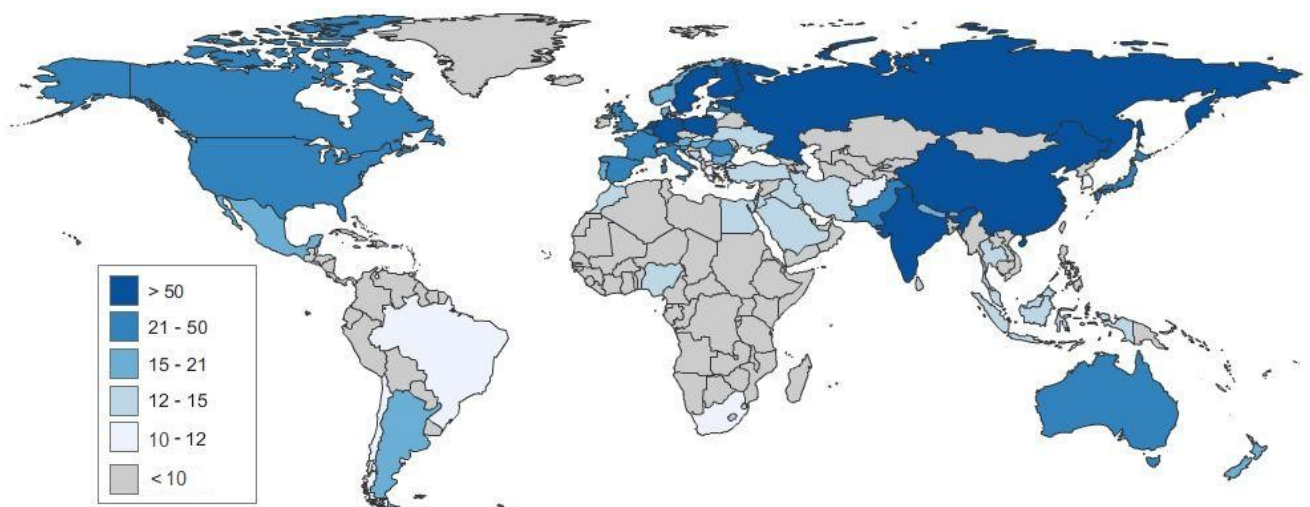
6 ANALYSIS OF RESULTS

The ZEF Evaluation Engine® reported a total of 1861 responses during the survey time. The ZEF Evaluation Engine® also performed the data collection and preliminary data modification. Microsoft Excel was used for further analysis of the data.

6.1 Overview of the data

Of the 1861 responses, 543 passed the initial screening process that eliminated e.g. empty responses and those responses that clearly showed that the respondent had not grasped the idea of the fourfold table. Because each individual response held data concerning five countries, the raw response data was segregated and allocated to correct countries using the country connections listed in annex 1. The resulting number of answers of countries varied from zero (e.g. Andorra and Niger) to 425 and 474 (Germany and India, respectively). For statistical relevancy, we decided to leave out from further analysis those countries that had less than 10 answers. In consequence, 57 of the initial 194 countries obtained the sufficient number of answers.

The final 57 countries come from seven geographical areas: 29 from Europe, 10 from Asia, six from Middle East, four from Africa, three from North and South America each, and two from Oceania. In the 57 countries, the median number of answers per country is 20, and eleven countries have fifty or more answers. The total sum of answers pertaining to the countries included in the final report is 2286. Map 1 shows the number of answers for the countries.



Map 1. Geographical distribution of answers in the 57 countries that acquired 10 or more answers.

As initial data analysis, the ZEF Evaluation Engine® creates report tables of the survey data that are shown in figure 8. The report tables provide information to support the feasibility of our survey method. In order to evaluate the report tables, we must keep in mind that the point labelled with number 1 indicates answers about the respondent's home country, and correspondingly, numbers 2 and 3 refer to neighbouring countries, number 4 usually to Germany and number 5 to India. The ellipse around each point indicates the deviation of the answers.

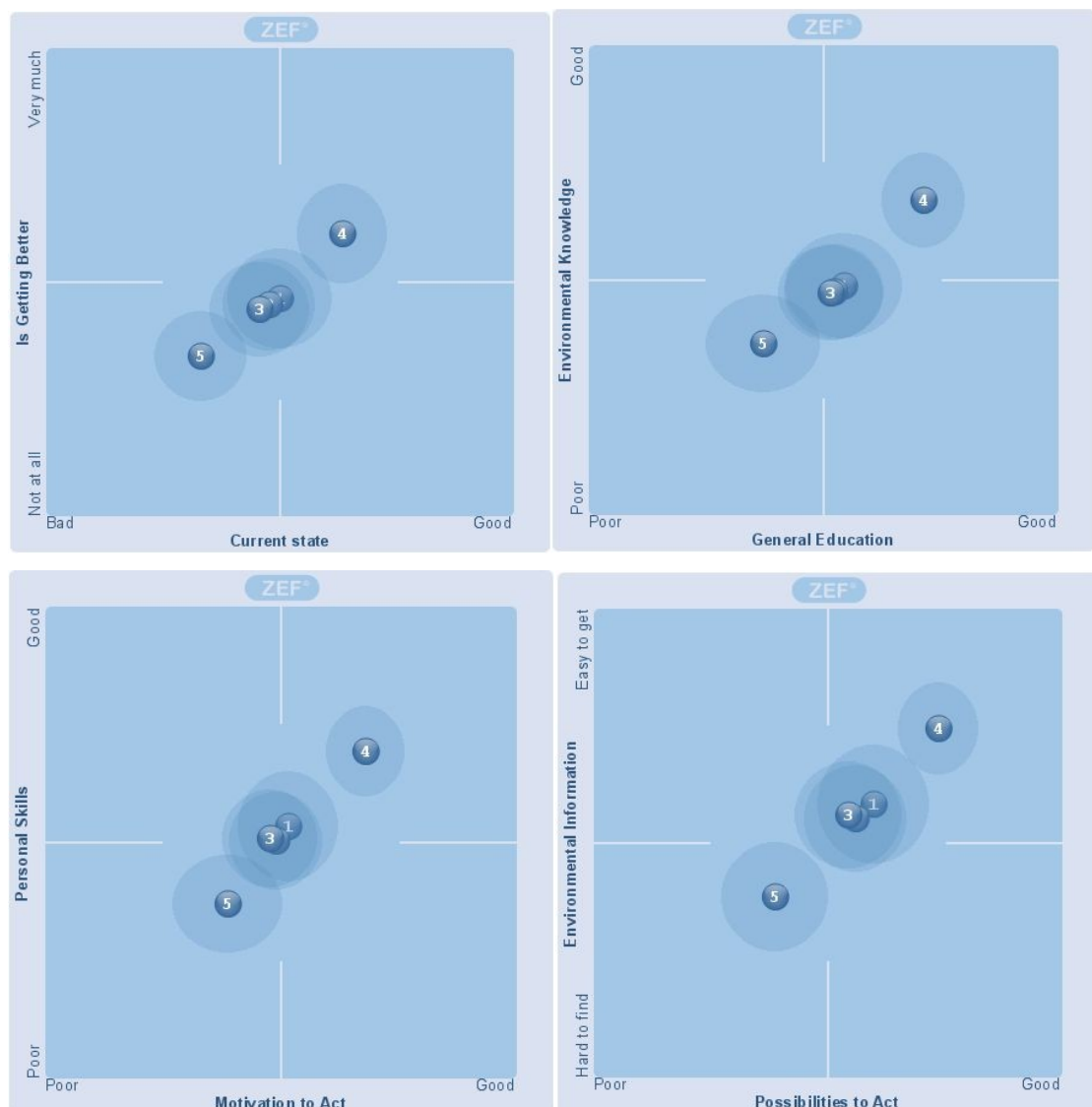


Figure 7. ZEF Engine's report tables of the answers to the questions in the survey. Each question group is presented in separate table.

The relatively small ellipses around points 4 and 5 show that respondents from all round the world have judged the situation of Germany and India similarly. This in turn leads us to believe that they have also assessed other countries equitably. Another conclusion we can draw from

the report table is that there is an evident lack of excessive patriotism in the responses. Since the points 2 and 3 are consistently very close to point 1, the respondents have not favoured their own country inequitably, nor have they been unduly modest in their answers.

Each answer of the data contains separate responses to each of the questions of the survey. Thus, a country that has 33 answers also has 33 (or sometimes less due to the deficiencies of the responses) evaluations of

- the state of its environment (STATE),
- the trend of state of its environment (TREND),
- the level of its general education (GEE),
- the level of its citizens' environmental knowledge (EKN),
- the motivation of its citizens' to improve the environment (MOA),
- the skills its citizens have to improve the environment (PES),
- the possibilities they have to act pro-environmentally (POA), and
- the availability of environmental information in that country.

Therefore, we calculated the arithmetic means of the country level data to form a country specific average measure for each of those individual components of the questions. As a result, we have the final values for the eight indicators: the perceived state of the environment in each country (STATE), the current trend of the state of the environment in each country (TREND), and average measures of the other questions (GEE, EKN, MOA, PES, POA, and AVI) for every country. The values are presented in annex 2 with the environmental awareness index.

In order to calculate the environmental awareness index (EAI), we took the arithmetic mean of the three measures that correspond to the three components of environmental awareness:

- Knowledge: General Education (GEE),
- Motivation: Motivation to Act (MOA), and
- Skills: Personal Skills (PES).

Thus,

$$EAI = \frac{GEE+MOA+PES}{3}. \quad (1)$$

The scale for every indicator (and consequently for EAI) ranges from 0 to 100, and the averaged results for the countries settle between 20 and 80 with some variation between questions. Figure 9 shows the maximum, minimum and median values of the country means for every variable. We can see from the results in figure 9 that sensitivity and relevance of each

question was satisfactory since all the questions provided answers with a wide range of values. It is worth noting that the median of six of the nine measures falls below 50, i.e. on the 'not so good' area. On the other hand, the three last measures (PES, POA and AVI), that have a median over 50, are measures of empowerment. Therefore, even if the environmental situation globally is seen as worse than it could or should be, the respondents overall feel that there are ways to improve it.

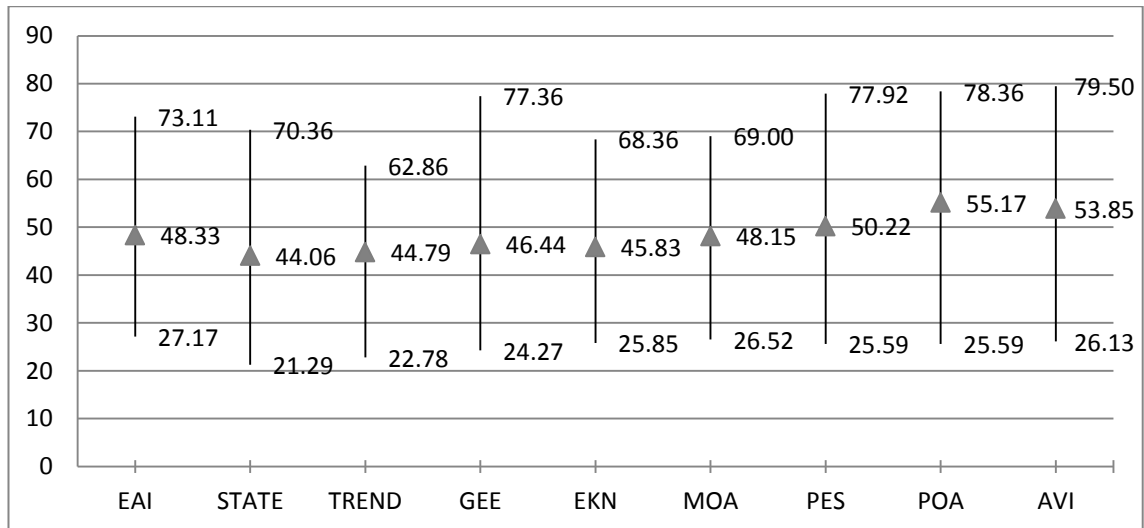


Figure 8. Shows the maximum, minimum and median values of country means for each survey question, plus Environmental Awareness Index (EAI).

In order to further explore the differences and similarities between our indexes –and to test our hypothesis number 1– we made a cross-correlation table of them (Table 1). The correlations of environmental awareness index (EAI) with general knowledge (GEE), motivation to and (MOA) and personal skills (PES) are calculated only for reference, as they should be high due to the fact that EAI, by its definition, directly depends on the three indicators. It is noteworthy that all of the correlation coefficients are very high, none below 0.74. In effect, Cronbach's alpha between the eight indicators (excluding EAI) is as high as 0.98. Therefore, a country that scores high in any of the indicators is likely to score high in all of the other indicators as well.

Table 1. Correlation coefficients between our variables and environmental awareness index. Coefficients over 0.85 are marked with dark green background, between 0.8 and 0.85 with light green background, and those below 0.8 with yellow background.

	STATE	TREND	GEE	EKN	MOA	PES	POA	AVI	EAI
STATE	-								
TREND	0.79	-							
GEE	0.91	0.80	-						
EKN	0.84	0.83	0.93	-					
MOA	0.75	0.79	0.80	0.85	-				
PES	0.78	0.75	0.88	0.87	0.82	-			
POA	0.86	0.80	0.90	0.83	0.84	0.84	-		
AVI	0.85	0.74	0.93	0.90	0.76	0.85	0.90	-	
EAI	0.87	0.83	0.95	0.94	0.92	0.96	0.91	0.90	-

As said, the correlations coefficients overall are very high. However, there is some variance in the correlations. Firstly, there is variance within the correlations of each indicator with the others. For example, the availability of environmental information (AVI) correlates well with the state of the environment (STATE), general education (GEE), environmental knowledge (EKN), personal skills (PES), possibilities to act (POA) and EAI, but noticeably worse with the trend of the environment (TREND) and motivation to act (MOA). Likewise, PES clearly correlates better with some indicators and not so well with others. Secondly, some indicators have consistently higher (or lower) correlation coefficients overall. For example, motivation to act (MOA) and state of the environment (STATE) both have relatively low correlation coefficients with all of the other indicators, and conversely, environmental knowledge (EKN) and possibilities to act (POA) both have relatively high correlation coefficients with all of the other indicators. The highest correlation coefficient (0.94) is between environmental awareness (EAI) and environmental knowledge (EKN), and the lowest (0.74) between availability of information (AVI) and trend of the environment (TREND).

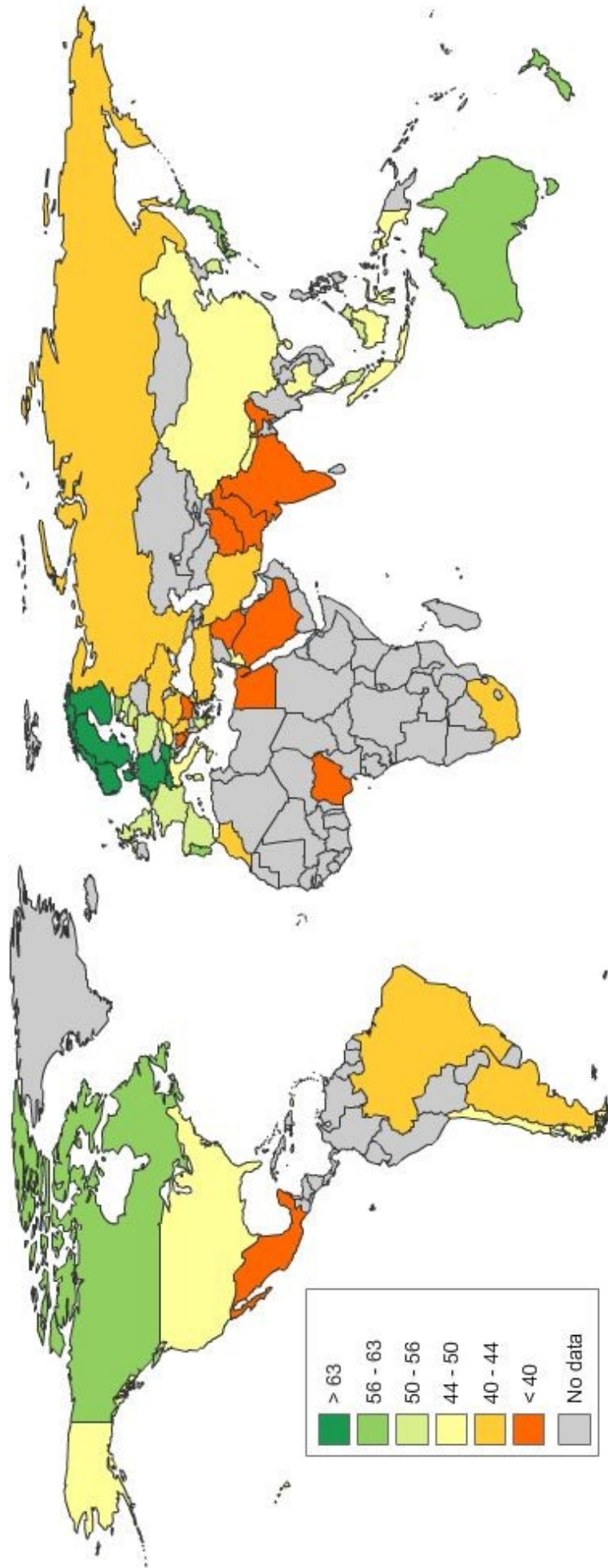
6.2 Maps of the results

In order to display our results about the environmental awareness index (EAI), state of the environment (STATE) and current trend of the environment (TREND) in a simple visual form, we decided to make use of choropleth maps. We had in our use the interactive data visualization and mapping tool StatPlanet. For the colour grading we used a six-colour scale: dark green, lighter green, pale green, yellow, light orange and dark orange. The ranges for the categories were adjusted individually for each indicator according to the range of values they have. For example, the values of the TREND indicator centre quite low on the scale (median 44.79) and they have a relatively narrow range (from 22.78 to 62.86), so the thresholds of the

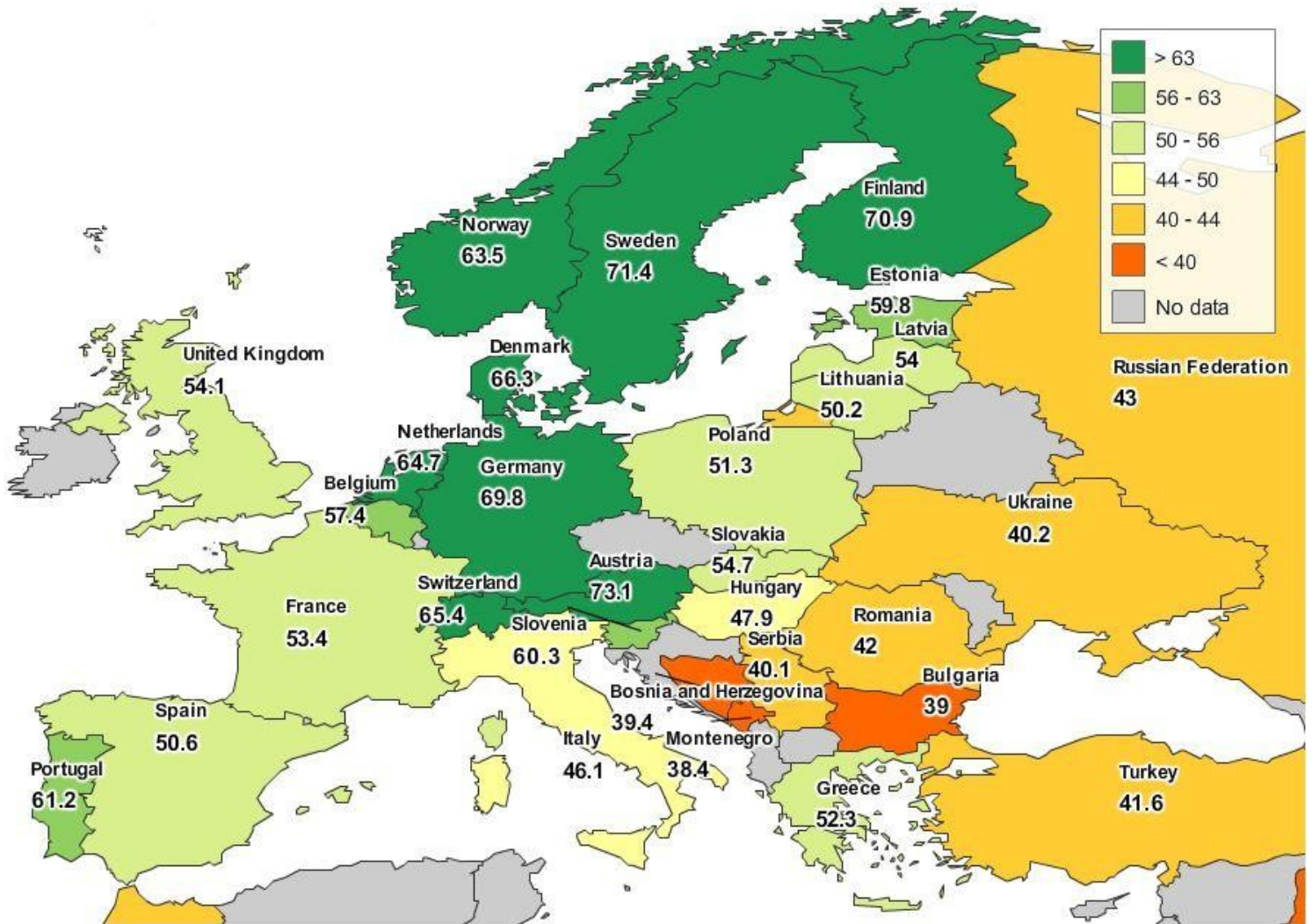
categories were adjusted accordingly. However, we kept the lower limit of the light green category fixed at 50, so that green colour would always indicate values on the 'good' half of the scale and yellow and orange colour values on the 'bad' half of the scale. After that, the aim was to divide the 'greens' (above 50 countries) into three categories of equal number of countries, and the 'oranges' likewise.

6.2.1 Environmental awareness in the world

Map 2 shows the values of the environmental awareness index (EAI) globally. By looking at the map 2, it seems that the countries close to the Equator appear to have lower environmental awareness than countries closer to the poles. Especially Nordic countries, Canada, Australia and New Zealand do well in this index. Overall, European and North American countries score high on environmental awareness. Additionally, we made a separate map of the environmental awareness in Europe (map 3). It shows that the level of environmental awareness is generally better in Northern and Western Europe and not so high in Southern and Eastern Europe.



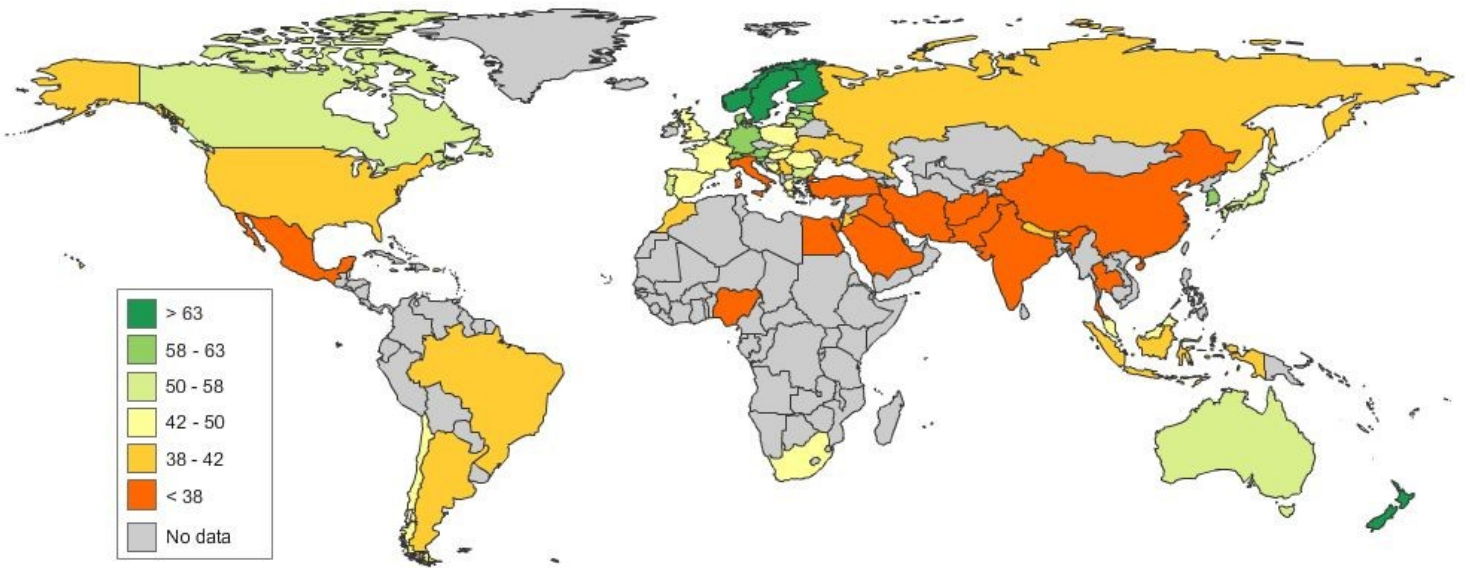
Map 2. Environmental awareness index (EAI) in the world.



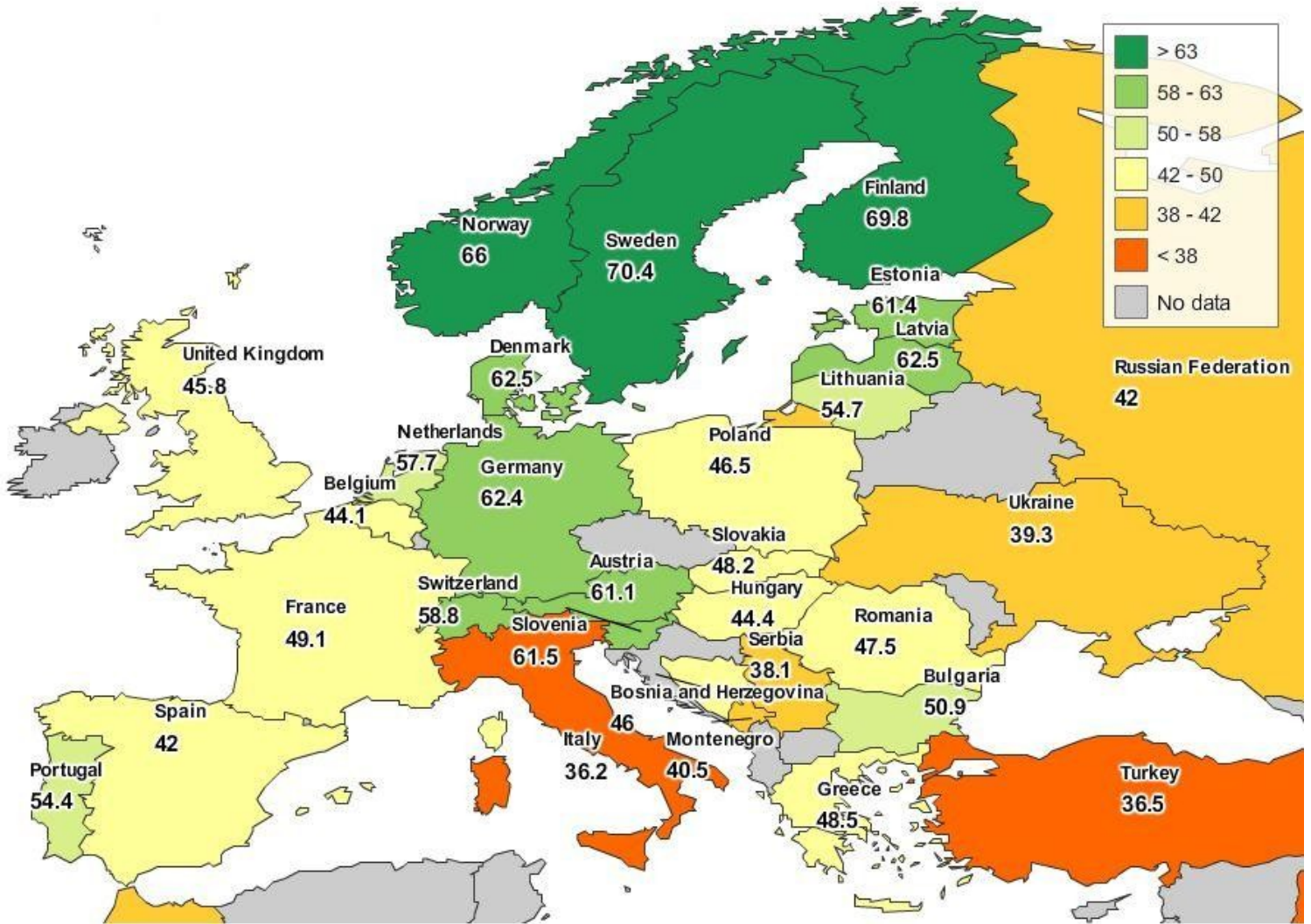
Map 3. Environmental awareness in Europe.

6.2.2 State of the environment in the world

Next we made a map of the current state of the environment in the countries (map 4). It looks very much like the map of the environmental awareness index in the world (map 2), though keeping in mind the high correlation coefficient between them (table 1) that is not surprising. We also mapped the STATE in Europe (map 5). The most obvious difference between maps 2 and 4 is the switch between the colours of the USA and China versus Russia. The USA and China score higher than Russia on the environmental awareness index, but the state of the environment is perceived to be better in Russia than in the USA or China. Overall, the map of state of the environment is yellower than the map of environmental awareness, i.e. fewer countries score over 50 on STATE than on EAI. Especially, many European countries shift from green to yellow between maps 3 and 5, though a few shift to greener colours as well.



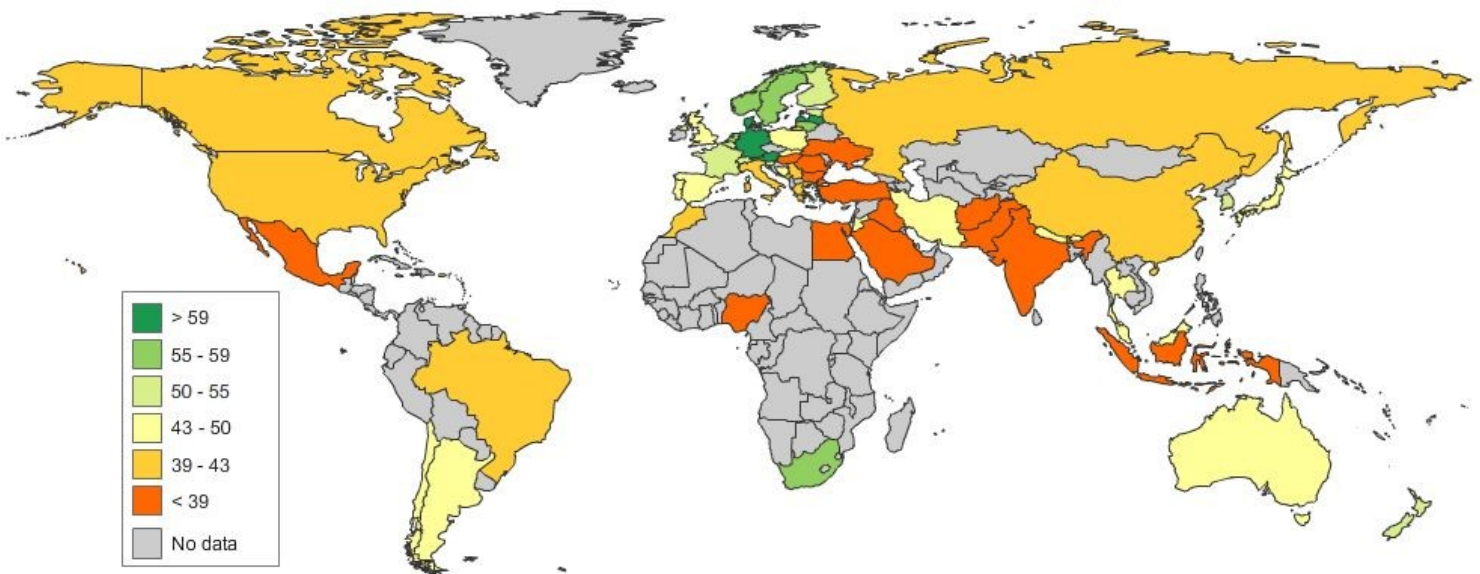
Map 4. The perceived state of the environment (STATE) in the world.



Map 5. The perceived state of the environment (STATE) in Europe.

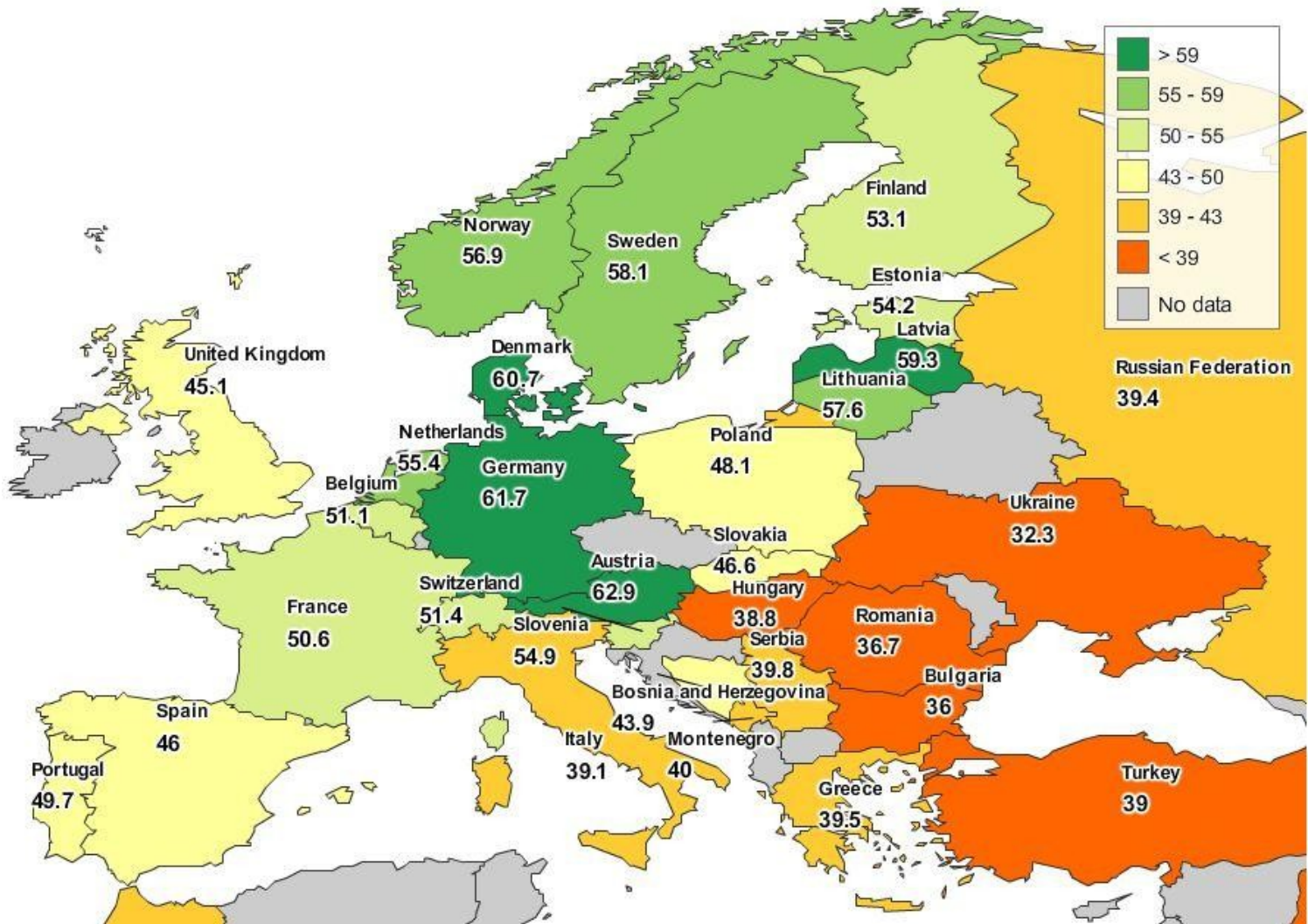
6.2.3 Trend of the environment in the world

After mapping the current state of the environment, we put also the trend of the environment on a map (map 6). When viewing map 6, it is imperative to note that some of the thresholds of the categories are clearly lower in this map than they were in the two previous maps. This is because the countries in general scored lower on the TREND indicator than they did on the EAI and STATE. Anyway, in an overview of the map 6, it seems evident that the current trend of the environment is regarded to be 'good' only in some parts of Europe, and in South Africa, New Zealand and South Korea. In other parts of the world the state of the environment is perceived to be deteriorating. Especially, in many parts of Asia and Middle East the TREND value is below 38. The situation in the Americas is slightly better than in Asia, but not as good as in Europe.



Map 6. Current trend of the state of the environment (TREND) in the world.

As in the previous two indicators, we made a map of the TREND in Europe (map 7). Map 7 shows that the perceived trend of the environment varies greatly in Europe: from 62.9 in Austria to 32.3 in Ukraine. The trend seems to be worse in Eastern and Southern Europe and better in Northern and Central Europe.



Map 7. Trend of the environment (TREND) in Europe.

6.3 Country rankings

The country rankings were performed separately in all of our indicators (EAI, STATE, TREND, GEE, EKN, MOA, PES, POA, and AVI). Table 2 contains the results of the rankings. No country ranked the first in all of the indicators, and there is considerable variance within each country's rankings. For example, Finland's median rank is 3, but it ranked first in general education (GEE) and only 17th in trend of the environment (TREND). Similarly, Bhutan has a median rank of 27, but it ranked as high as 6th in motivation to act (MOA) and as low as 45th in general education (GEE). Consequently, each country has its strengths and weaknesses, though some countries like Sweden and Iraq ranked more consistently in all variables.

Table 2. Country rankings, first for Environmental Awareness Index (EAI), and then individually for all measured variables: state of the environment (STATE), trend of the environment (TREND), general education (GEE), environmental knowledge (EKN), motivation to act (MOA), personal skills (PES), possibilities to act (POA) and availability of information (AVI). Countries are listed in the order of their median rank, and secondly according to their EAI rank. Green colour indicates rankings above the country's median rank (dark green the highest rank(s)), and orange colour indicates rankings below the country's median rank (dark orange the lowest rank(s)).

Country	Median rank	EAI rank	STATE rank	TREND rank	GEE rank	MOA rank	PES rank	EKN rank	POA rank	AVI rank
Sweden	2	2	1	5	2	3	2	1	1	1
Austria	3	1	10	1	4	1	1	4	3	7
Finland	3	3	2	14	1	5	4	3	4	3
Germany	4	4	7	2	6	2	3	2	5	4
Denmark	5	5	5	3	3	9	6	5	7	2
Switzerland	7	6	12	15	7	7	7	8	2	6
Norway	7	8	4	7	5	14	10	7	6	5
Netherlands	8	7	13	9	8	8	5	6	8	8
New Zealand	10	12	3	12	10	10	17	12	9	9
Slovenia	12	11	8	11	16	12	8	16	23	25
Estonia	13	13	9	13	12	15	12	10	14	14
Canada	14	14	14	34	13	16	11	17	13	11
Japan	15	10	15	30	9	11	15	11	20	16
Portugal	16	9	17	19	18	4	13	9	16	22
Belgium	16	15	29	16	17	20	9	15	15	19
Australia	17	16	18	25	15	17	18	13	17	13
Latvia	18	20	6	4	14	28	24	14	18	18
South Korea	19	19	11	10	22	19	26	18	24	15
Lithuania	19	26	16	6	19	37	30	20	19	17
United Kingdom	20	18	27	28	20	21	20	24	12	12
France	21	21	20	17	23	25	16	21	21	21
Slovakia	22	17	23	24	11	22	31	26	11	20
Malaysia	22	22	21	23	24	18	22	23	10	10
Poland	24	24	25	21	21	32	29	25	22	24
Greece	27	23	22	41	27	24	14	31	29	42
Spain	27	25	32	27	28	23	19	29	27	26
Thailand	27	27	45	29	26	27	32	22	39	27
Bhutan	28	28	35	20	45	6	43	19	25	40
Jordan	30	29	34	18	30	29	28	36	30	31
Chile	31	31	31	22	43	31	21	37	49	49
Hungary	34	30	28	45	25	34	34	43	35	38
Nepal	34	32	40	33	47	13	35	34	32	36
United States of America	34	33	43	39	34	40	23	41	26	23
China	34	34	49	37	29	42	27	27	34	30
Italy	36	35	48	43	44	36	25	42	31	28
Indonesia	36	36	37	46	37	33	40	28	33	29

Argentina	37	37	36	26	31	38	37	32	42	44
Russia	38	38	33	42	33	48	33	35	44	41
Romania	40	40	24	47	32	44	44	46	36	32
South Africa	40	42	30	8	40	26	54	51	28	52
Serbia	40	45	44	40	50	41	38	40	38	35
Bosnia and Herzegovina	40	48	26	32	35	52	49	38	40	46
Iran	41	39	46	31	41	30	47	39	45	48
Turkey	41	41	47	44	36	50	36	30	52	37
Brazil	41	43	41	35	38	51	41	33	53	53
Ukraine	44	44	42	54	39	53	39	47	51	34
Morocco	44	46	39	36	51	35	45	44	48	43
Montenegro	45	50	38	38	48	46	46	45	37	33
Egypt	47	47	53	51	46	43	48	48	47	45
Bulgaria	49	49	19	49	42	49	50	53	41	39
India	50	51	52	52	49	45	51	50	50	50
Mexico	51	53	51	48	53	54	52	49	46	51
Saudi Arabia	52	52	54	50	52	47	42	52	55	47
Afghanistan	55	54	55	56	54	39	57	56	56	55
Iraq	55	55	56	57	55	56	53	54	57	54
Nigeria	55	56	50	53	57	55	55	57	43	56
Pakistan	56	57	57	55	56	57	56	55	54	57

With regard to the geographical differences in rankings, Europe outperforms other geographical areas. In fact, European countries dominate the top 10 to the degree that New Zealand, with its median ranking of 10, is the highest scoring non-European country. Actually, there are 15 European countries in the top 20 of median rankings. However, it is important to remember that 29 of the total 57 countries included in the analysis are European, and therefore it is clear that they will be over-represented in the rankings. Nevertheless, it stands for something that 69% of the European countries rank in the top half and only 31% in the bottom half, whereas the same percentages e.g. for Asia (that has the second largest representation with 10 countries) are 50-50%. Furthermore, all countries from South America, Africa and Middle East rank in the lower half.

One interesting result of the rankings is that many of the world's most populous countries rank poorly, and conversely in the top ten all except Germany are quite small countries. However, further analysis fails to reveal a strong linear correlation between the countries' population and median ranking: the Pearson correlation coefficient between them is only 0.24. However, the Pearson correlation between the logarithm of population and median ranking gives a Pearson coefficient as high as 0.41.

For the purposes of finding ways to improve the environmental awareness in a country, it is revealing to compare how well the country does in the three indicators that proxy for the three elements of environmental awareness: MOA for motivation, GEE for knowledge and PES for skills (separated by bold lines in table 2). For example, France has higher ranking in skills (16.) and lower ranking in motivation (25.). Conversely, Afghanistan ranks relatively high in motivation (39.), but the last (57.) in skills.

6.4 Comparison with other indexes

One of the aims of our study is to research how our environmental awareness index compares with other national level indices. Especially interesting are those indices that in previous research have been connected with some or several dimensions of environmental awareness. For example, in their study about environmental concern, Dunlap and Mertig (1997) computed correlations between the environmental attitude items from the WVS, the national scores on the 12-item postmaterialism index, and GNP per capita. Our intention was to employ a collection of similar indices for our comparisons. A table listing of the included variables and their sources can be found in annex 3. The selected indicators form three groups that we examine separately in the following analysis.

6.4.1 Correlations with general national indices

The first group consist of general indices about the level of the countries' development, education and economy. Table 3 shows correlation coefficients between twelve general indicators and five of our indicators: perceived state of the environment (STATE), trend of the environment (TREND), level of general education (GEE), motivation to act (MOA), personal skills (PES), plus the environmental awareness index (EAI).

A quick view on the table 3 reveals that there are some very high absolute values of correlation coefficients in our analysis. For instance, Gender Inequality Index (GII) and Global Peace Index (GPI) stand out with their correlation coefficients below -0.8. Our test to scatter plot these two indices against environmental awareness index provides further support for the negative linear correlation between them. Conversely, environmental performance trend (EPI Trend) and population living below \$1.25 PPP per day have relatively low correlations with our indicators. Moreover, as was to be expected, all indicators of education correlate positively with environmental awareness and general education. Also, wealth of nation has a high positive correlation coefficient which supports our hypothesis number 2. In order to further explore the correlation between national wealth and environmental awareness, we produced a scatter plot diagram of them (figure 10).

Table 3. Contains indices about the level of human development. Includes measures for the level of education and the national wealth that both have been linked with environmental concern. Coefficients are Pearson correlation coefficients. Levels of significance: correlation of 0.53 significant at 0.0001 level, 0.45 significant at 0.001 level, and 0.36 at 0.01 level.

	>0.70	0.53–0.70	0.36–0.53	0.36–-0.36	-0.36–-0.53	-0.53–-0.70	<-0.70
Index	EAI	STATE	TREND	GEE	MOA	PES	
Human Development Index (HDI)	0.73	0.70	0.61	0.75	0.50	0.79	
Gender Inequality Index (GII)	-0.83	-0.80	-0.67	-0.83	-0.63	-0.85	
Global Peace Index	-0.81	-0.78	-0.73	-0.77	-0.74	-0.77	
EPI	0.77	0.68	0.64	0.75	0.69	0.77	
EPI trend	0.13	0.12	0.05	0.13	0.14	0.10	
PISA: average 2009	0.73	0.64	0.49	0.73	0.66	0.72	
Combined gross enrolment in education	0.68	0.67	0.61	0.69	0.50	0.72	
HDI: Education index	0.66	0.70	0.59	0.71	0.42	0.70	
Public expenditure on education	0.53	0.60	0.63	0.55	0.41	0.50	
Expected Years of Schooling (of children)	0.69	0.71	0.63	0.71	0.53	0.71	
HDI: Income index	0.74	0.68	0.64	0.75	0.54	0.79	
Population living below \$1.25 PPP per day	-0.42	-0.36	-0.31	-0.49	-0.17	-0.43	
GNI per capita in PPP terms	0.79	0.67	0.60	0.77	0.63	0.82	

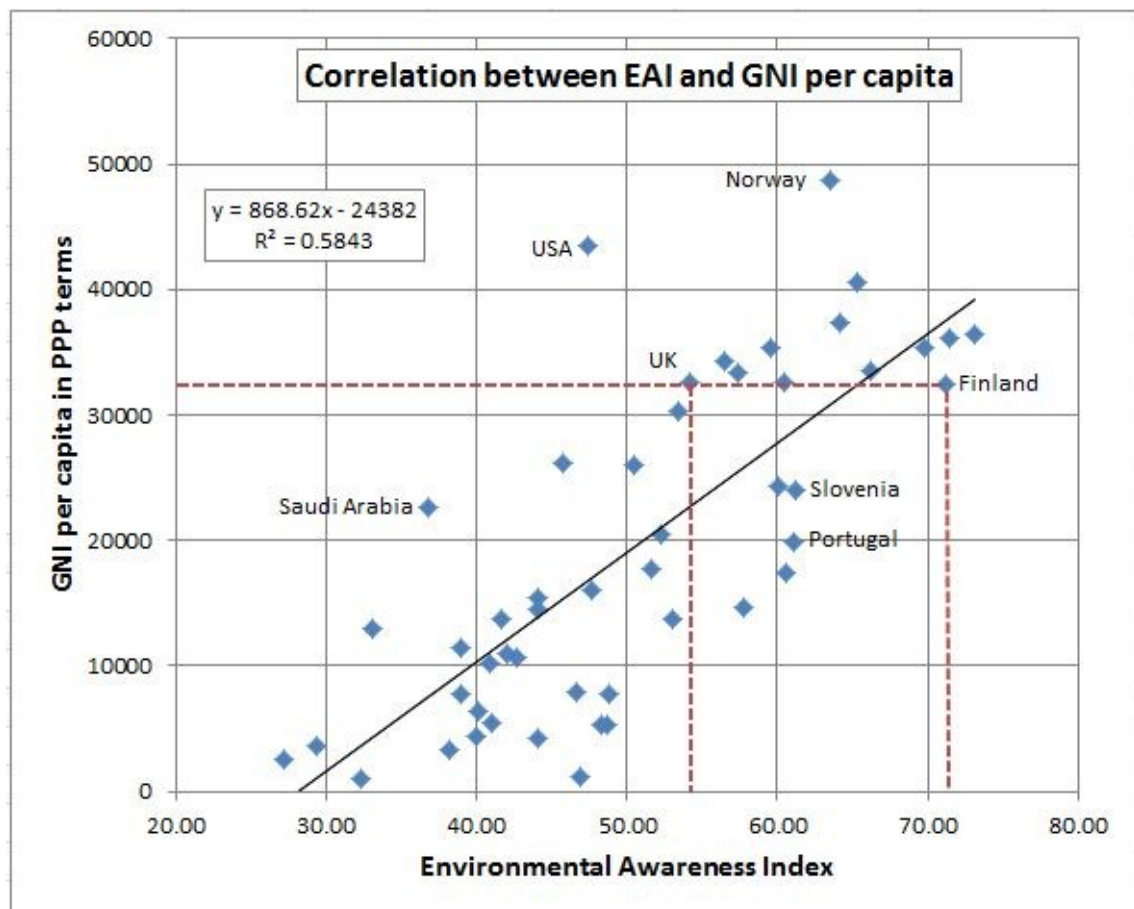


Figure 9. Correlation between EAI and GNI per capita.

As the figure 10 shows, there is an evident positive linear correlation between environmental awareness index and the country's wealth. However, a nation's level of environmental awareness is by no means determined by its GNI. The case of Finland and the United Kingdom clearly shows that two countries of the same level of wealth can have a significantly different level of environmental awareness, as is indicated with the red lines in the figure 10. Saudi Arabia, with Slovenia and Portugal, displays another example of disconnection between the level of wealth and environmental awareness.

It is interesting to note that most of our indicators (EAI, STATE, GEE, MOA and PES) behave similarly with all of the twelve general indices. Then again, this is not surprising considering their high internal consistency. However, there are some differences in the correlations. For instance, EAI, GEE and PES usually correlate better with the indices than do STATE, TREND and MOA. Overall, motivation to act (MOA) correlates the least with the general global indices. This is interesting, because great part of previous research has focused on studying motivation or in practice environmental concern.

6.4.2 Perceived environmental problems and environmental awareness

As we explained in chapter 3, Inglehart's postmaterialism theory suggests that environmental concern is inherently higher in wealthier countries. When this assumption was questioned by the results of several surveys, Inglehart (1995) proposed an explanation in the form of objective problems subjective values (OPSV) theory. OPSV theory attributes the unexpectedly high environmental concern of poor countries to objective environmental problems in local level. Contrary to that, higher environmental concern in wealthier countries was theorized to be due to economic development and consecutive dissemination of postmaterialist values. Brechin argued that the 'OPSV implies that residents of poor nations should rate local environmental problems as more serious than do their counterparts in rich nations (since the former presumably experience higher levels of community pollution), but the latter should rate global problems—the perception of which is dependent upon information presumably more accessible in wealthy nations—as more serious' (Brechin 1999, see Dunlap & York 2008, 537). Brechin tested this assumption with Health of Planet data, and found out that citizens of poor nations do rate local problems as more serious than citizens in wealthy nations. However, he found no significant difference between their ratings of the seriousness of global problems.

Accordingly, the second group of our correlation indices concern perceptions of environmental problems. Along the lines of Brechin's study, we were interested to compare the level of environmental awareness with perceived seriousness of local and global environmental problems. Thus, table 4 contains correlation coefficients between six of our indicators and some statements of perceived seriousness of environmental problems.

Table 4. Lists correlation coefficients between our variables and four measures about the perception of the state of the environment locally and globally.

	>0.70	0.53 – 0.70	0.36 – 0.53	0.36 – -0.36	-0.36 – -0.53	-0.53 – -0.70	< -0.70		
Index				EAI	STATE	TREND	GEE	MOA	PES
Environmental problems in your community: Poor water quality									
Very serious				-0.72	-0.67	-0.54	-0.67	-0.64	-0.75
Somewhat serious				-0.33	-0.26	-0.26	-0.32	-0.31	-0.30
Not very serious				0.44	0.37	0.30	0.39	0.40	0.47
Not serious at all				0.75	0.70	0.58	0.72	0.66	0.76
Environmental problems in your community: Poor air quality									
Very serious				-0.70	-0.66	-0.55	-0.67	-0.62	-0.71
Somewhat serious				-0.10	-0.03	-0.01	-0.13	-0.04	-0.09
Not very serious				0.62	0.54	0.42	0.59	0.56	0.62
Not serious at all				0.66	0.63	0.53	0.65	0.56	0.67
Environmental problems in the world: Pollution of rivers, lakes and oceans.									
Very serious				-0.24	-0.16	-0.28	-0.24	-0.27	-0.18
Somewhat serious				0.39	0.35	0.36	0.40	0.39	0.34
Not very serious				0.00	-0.14	0.13	-0.03	0.08	-0.04
Not serious at all				-0.36	-0.35	-0.13	-0.34	-0.28	-0.41
Environmental problems in the world: Global warming or the greenhouse effect.									
Very serious				-0.18	-0.13	-0.18	-0.20	-0.19	-0.13
Somewhat serious				0.37	0.33	0.30	0.40	0.32	0.31
Not very serious				-0.08	-0.17	-0.01	-0.10	-0.01	-0.11
Not serious at all				-0.39	-0.34	-0.21	-0.39	-0.30	-0.42

Already at first sight, it is obvious that perceptions on community level environmental problems in general correlate better with all our indices than do views on global level problems. That is consistent with Brechin's findings. Furthermore, we discover that the tendency to consider community level environmental problems to be (very) serious is negatively correlated with environmental awareness index, and in fact with all six of our indicators. Conversely, the prevalence to think that community level environmental problems are not serious (at all) is positively correlated with our indicators. Thus, environmental awareness tends to be lower in countries where people encounter serious environmental problems in their community. However, concern about global environmental problems is not

tied to the level of environmental awareness nor, it seems, to the state or trend of the environment of one's own country or the level of general education in it.

6.4.3 Values and attitudes and environmental awareness

Like we mentioned in chapter 3, one line of research on environmentally significant behaviour studies the influence of general value orientations. Especially, Schwartz's self-transcendence values (universalism and benevolence) have been connected positively to altruistic behaviour and support for environmentalism, while their counterparts, self-enhancement values (achievement and power), have a negative impact on expressions of environmental concern (e.g. Dietz et al. 2005; Schultz & Zelezny 1998; Schultz & Zelezny 1999). Therefore, we chose to calculate correlation coefficients between our indicators and four values statements that measure Schwartz's value orientations (table 5).

Table 5. Contains correlation coefficients between our indicators and measures of support for values that have been connected with environmentally significant behaviour.

	> 0.70	0.53 – 0.70	0.36 – 0.53	0.36 – -0.36	-0.36 – -0.53	-0.53 – -0.70	< -0.70
Index	EAI	STATE	TREND	GEE	MOA	PES	
Universalism: It is important to this person looking after the environment							
Very much like me	-0.21	-0.25	-0.13	-0.27	-0.14	-0.18	
Like me	-0.01	-0.06	0.02	0.07	-0.09	-0.02	
Somewhat like me	0.12	0.20	0.04	0.13	0.11	0.10	
A little like me	0.25	0.25	0.13	0.26	0.26	0.20	
Not like me	0.00	0.06	0.11	-0.03	0.01	0.04	
Not at all like me	-0.43	-0.35	-0.30	-0.46	-0.46	-0.31	
Benevolence: It is important to this person to help the people nearby							
Very much like me	-0.25	-0.29	-0.14	-0.29	-0.26	-0.17	
Like me	0.02	-0.01	0.06	0.06	-0.06	0.03	
Somewhat like me	0.11	0.16	0.02	0.12	0.14	0.07	
A little like me	0.21	0.20	0.08	0.21	0.26	0.13	
Not like me	0.14	0.20	0.17	0.13	0.16	0.11	
Not at all like me	-0.39	-0.23	-0.30	-0.38	-0.36	-0.38	
Achievement: It is important to this person being very successful							
Very much like me	-0.47	-0.47	-0.23	-0.51	-0.36	-0.46	
Like me	-0.45	-0.46	-0.07	-0.45	-0.38	-0.45	
Somewhat like me	0.13	0.14	0.07	0.09	0.14	0.15	
A little like me	0.31	0.29	0.05	0.35	0.28	0.26	
Not like me	0.51	0.50	0.22	0.55	0.40	0.51	
Not at all like me	0.21	0.29	0.05	0.23	0.10	0.27	
Power: It is important to this person to be rich							
Very much like me	-0.49	-0.44	-0.23	-0.54	-0.30	-0.56	
Like me	-0.47	-0.47	-0.18	-0.48	-0.33	-0.52	
Somewhat like me	-0.38	-0.39	-0.24	-0.44	-0.29	-0.36	

A little like me	0.11	0.07	0.04	0.13	0.09	0.08
Not like me	0.52	0.49	0.27	0.57	0.38	0.54
Not at all like me	0.17	0.21	0.07	0.17	0.09	0.22

Overall, the correlations are not very high. However, we can say that at least the correlations coefficients of the achievement and power values orientations show support for the negative correlation between those values and environmental awareness (and the other five indicators). The implications of the correlations of the self-transcendence values are less obvious. Nevertheless, according to the coefficients, it would seem that higher levels of environmental awareness are found in nations that are less likely to reject universalistic and benevolent values. Not adhering to self-transcendence values is weakly negatively correlated with environmental awareness. Furthermore, being a little universalistic has the highest positive correlation coefficient (0.25) with environmental awareness. On the whole, environmental awareness seems to be positively correlated with self-transcendent value orientation, but the correlation is quite weak. Comparisons with more extensive measures of Schwartz's value orientations could provide further information on the connection between self-transcendence values and environmental awareness.

Besides Schwartz's value dimensions, also Inglehart's postmaterialism scale has been commonly used in research on environmentalism (see chapter 3). Therefore, it seemed important to examine the relationship between postmaterialist value orientations and environmental awareness index (hypothesis number 3). Furthermore, willingness to sacrifice for the environment is another aspect of environmentally significant behaviour that has been used e.g. by Stern et al. (1999) in their study. As it happens, World Values Survey contains a suitable item: willingness to give part of one's income for the environment. The correlations of postmaterialism index and willingness to sacrifice are displayed in table 6.

An examination of the table reveals that support for postmaterialist values is evidently correlated with environmental awareness. Actually, postmaterialism seems to be positively correlated also with all other five of our indicators. The high correlation coefficients (0.65, 0.65 and 0.69) between the statements from the end of the postmaterialist scale and EAI indicate that higher environmental awareness coincides with postmaterialistic populations. Likewise, the negative correlation coefficients on the materialistic end of the same scale give further evidence to the same end. Explicitly, high levels of environmental awareness are more likely to be found in societies that stand by postmaterialist values. That supports our third hypothesis.

Table 6. Correlations with different levels of postmaterialism, and expression of willingness to act that has been used to measure pro-environmental attitude.

	> 0.70	0.53 – 0.70	0.36 – 0.53	0.36 – -0.36	-0.36 – -0.53	-0.53 – -0.70	< -0.70
Index							
Inglehart's postmaterialism							
Materialist				-0.67	-0.55	-0.63	-0.63
"1"				-0.67	-0.53	-0.57	-0.60
"2"				-0.08	-0.02	0.13	-0.02
"3"				0.69	0.56	0.58	0.61
"4"				0.65	0.49	0.51	0.57
Postmaterialist				0.65	0.51	0.46	0.60
Would give part of my income for the environment.							
Strongly agree				-0.29	-0.23	-0.21	-0.26
Agree				0.07	-0.03	-0.05	0.04
Disagree				0.10	0.20	0.14	0.12
Strongly disagree				0.03	0.01	0.08	0.01

On the other hand, the correlation coefficients between the statements of willingness to give part of one's income for environment and our indicators are all insignificant at the 0.01 level. Therefore, the willingness to sacrifice for environment seems not to be strongly correlated with environmental awareness. If anything, there appears to be a negative correlation between them.

7 DISCUSSION

While we started our survey with the objective to include as many countries as possible, our primary aim was to include at least all the nations associated with the Club of Rome. In the end, we managed to get enough answers from 28 of the 33 associated nations, which we consider a good result. In total, we received answers from 57 countries. Naturally, it was expected that there would be little data from small countries. Therefore, as we were expecting, the geographical coverage of our study ended up somewhat distorted. Especially, Africa, South America and Oceania are left relatively under-represented. Besides being geographically inclined to be located in the northern hemisphere and particularly in Europe, our countries tend to be economically developed. Further evidence of the somewhat unequal distribution of the data provides the fact that 33% (19/57) of the countries received 75% of the 2213 answers. However, this follows the distribution of people (percentage of people in the world).

Furthermore, our survey method is such that more responses from all over the world would eventually lead to the inclusion of greater number of countries. On the other hand, because the country connections table (annex 1) mainly connects countries to other countries nearby, no amount of responses from other continents would greatly increase the number of countries e.g. from Africa to get the required number of answers. Thus, the limiting factor for this kind of study is data acquisition, and more effective data procurement approaches are recommended for any future research that uses a similar method of study. For example, the authority and internal and external contacts of an international organisation could make a significant difference in the number of responses received.

One noteworthy feature of the study is that the survey was available only in English. That must have proven difficult for many non-native English speakers. In some other research projects the questionnaires have been translated to more than one language (e.g. Schultz & Zelezny 1999). However, keeping to English was a deliberate choice on our part and aimed partly to screen respondents and partly to eliminate the effects of discrepancy in translations, especially because we did not have the resources to make appropriate translations of the questionnaire. In the end, it is very difficult to assess the effects of using a monolingual questionnaire.

A further aspect to consider is that the level of the environmental awareness index in one country is based on the evaluation of the experts from that country and from two of its neighbouring countries. This leaves room for the influence of inter-country competitiveness

and patriotism. Choosing experts, who can be expected to demonstrate a reasonable degree of professional ethics in their answers, reduced the manifestations of extreme cultural bias, but we cannot assume them to be immune to all feelings. However, the report tables from ZEF implicate that in the end neighbouring countries were reasonably fairly judged.

Overall, we were pleased to find our method to provide valid data. It seems that the set of eight questions is able to pinpoint differences in the national levels of environmental awareness. The concept of environmental awareness is divided just appropriately: a greater number of questions would be too labor intensive for the respondents, and less would not be enough to describe the differences. Moreover, the questions themselves appear sufficiently relevant, because the answers to each question have similar ranges from approximately 20 to 80.

So, our survey method appears to be working well. It produces results that are, for the most part, concurrent with previous research on environmental consciousness. Especially, the strong positive correlation between national wealth and environmental awareness index gives support to this conclusion. Furthermore, our results clearly connect endorsement of postmaterialist values with higher environmental awareness. However, it remains unclear how great part of that correlation is due to wealth. For example, Franzen and Meyer (2010) concluded that 63% of variance in national environmental concern can be explained by per capita PPP. Anyway, concern about local environmental problems is negatively correlated with environmental awareness index, while concern about global environmental problems is not significantly correlated with it. The effect of general value orientations and willingness to sacrifice were more ambiguous, but at least the lack of self-enhancement values was positively connected with environmental awareness.

In sum, with regard to our hypotheses, we find that the results of our survey support all of them. More particularly:

- HP1: In table 1, the correlation of 0.87 between EAI and STATE gives strong support to the hypothesis that environmental awareness is positively correlated with good state of environment.
- HP2: In table 2, the correlation coefficient of 0.78 between EAI and GNI per capita ascertainably supports the hypothesis that there is a positive correlation between the level of a nation's environmental awareness and its national wealth.

- HP3 In table 6, the high correlations between EAI and different levels of postmaterialism in a nation positively connect postmaterialist populations with high environmental awareness.
- HP4 In table 5, the coefficients reveal a positive correlation between self-transcendent values and environmental awareness in a country. However this correlation is rather weak.
- HP5 In table 5, the correlation coefficients negatively connect environmental awareness and endorsement of self-enhancement value orientations.

This study was conducted with the objective of providing information on the current state of environmental awareness in the world so that it might help policymakers and other interested parties in their attempts to improve the situation. Especially the country rankings provide country specific information about the country's standing in international comparison. Also the table in annex 2 provides detailed information on countries' performance on different elements of environmental awareness. For example, it reveals that countries most often score the lowest in TREND or STATE (21 and 16 countries of 57, respectively). In opposition, the highest national scores are most often in AVI or POA (24 and 12 countries, respectively). However, for six countries the national high score is in MOA; while eight have their lowest score in that indicator. Thus, the table in annex 2 helps in finding the national 'bottleneck'; whether it is environmental knowledge that is most lacking like in the case of Slovenia, or maybe the restricting element is the motivation to act like in Denmark, Latvia and Finland.

Looking from a global perspective, the results indicate that in general the state of the environment is getting worse, i.e. overall there are more <50 evaluations for the trend of the environment than there are >50. Hence, the situation is getting worse, or at least it is perceived to be. Taking a look at the maps, it is evident that especially larger countries have problems (scores below 50 both in STATE and TREND). However, large countries are likely to have more variance within the country, and a general national score does not take that into account. In any case, on the whole, there is silver lining in this cloud too. The relatively high scores that countries have in indicators PES, POA and AVI (medians over 50) tell us that globally, people have skills and possibilities to act, and are able to find information if they wish to.

8 SUMMARY

Our world is currently facing many challenges e.g. environmental problems and climate change that demand national and international attention. Many measures to tackle these problems rest heavily on new policies, and new policies require public support to be effective. Consequently, understanding environmental awareness as a precondition behind any such environmentally significant behaviour underlines the importance of it. This study was conducted in order to contribute to the study of environmental awareness in the world. Especially, we have provided and tested a survey method to measure environmental awareness globally.

The determinants that seek to explain environmentalism have been studied for decades. The problematic issue in the previous research in the field is that the concept of environmentalism has not been exhaustively defined. Therefore, the research on environmentally significant behaviour covers a wide ground from behavioural theories to attitude surveys and exploration of national value orientations. For example, expressions of environmental concern have been connected with altruistic values, postmaterialist values, wealth, affluence and prosperity, and evident deterioration of local environment. Furthermore, there is a wide variety of case studies that research one or more aspects of environmentalism in specified populations like in cities or among university students. Those provide practical information especially for local and national policy-making, but do not allow global comparisons.

For the purposes of our study, we have used the definition for environmental awareness from an earlier similar study that divides the concept to be comprised of three elements: motivation, knowledge and skills. We also described the process how environmental awareness affects behaviour on individual level. Furthermore, we outlined the framework for the development of environmental awareness in national level. It includes four stages, each of which are characterized e.g. by certain perceptions on the responsibility of environmental problems, and the progress in the introduction of environmental policies.

In our research questions we focused firstly on finding out the level of environmental awareness in the countries of the world, and secondly on the perceptions of the current state of the environment in those countries and its trend. We also resolved to compare our results to other national level indicators. Based on literature we wrote five hypotheses that proposed that environmental awareness is related to: the state of the environment, national wealth, postmaterialist values, self-transcendence values, and self-enhancement values, respectively.

The data for our study was acquired from an online survey that was conducted between August 2012 and October 2013. The survey asked the respondents to evaluate eight features (current state of the environment, trend of the environment, level of general education, environmental knowledge, motivation to act pro-environmentally, personal skills to act, possibilities to act, and availability of environmental information) in their own country, in two neighbouring countries, and in two control countries. A total of 1861 responses were received, and 543 of those passed the initial screening. After the responses were divided and distributed to their appropriate countries, we had sufficient number of answers for 57 countries.

According to the results, the countries vary significantly in their performances in the eight indicators. Overall, the countries score better in motivation, skills, and availability of information than in state of environment, trend of environment, or knowledge. In order to calculate the index for environmental awareness, we took the arithmetic average of the three indicators corresponding to the three element of environmental awareness: general education, motivation to act, and personal skills. With the purpose of visualising the results, we made maps of them. They showed that e.g. environmental awareness is generally higher in Europe, than elsewhere with some exceptions. It also seems that the countries near the Equator score worse in environmental awareness, in current state of the environment and in trend of the environment.

Moreover, we ranked the countries in all of the eight indicators and in environmental awareness index. European countries overwhelm the top 10 and 20 of the rankings, but there are also many high risers in every indicator. As no country ranks the same in every indicator, they all have their strengths and weaknesses. In order to raise environmental awareness, it is very useful to identify them.

With regard to the objective to compare our results with other national level indicators and in order to test our hypotheses, we calculated correlation coefficients between our indicators and e.g. measures of national wealth, level of education, endorsement of postmaterialist values, perceptions on environmental problems, and general value orientations. For the most part, the results were as expected. However, some correlations failed to provide sufficient support to either uphold or refute our suppositions. In sum, we conclude that environmental conditions influence the levels of environmental awareness around the world. Furthermore, it

should not be assumed that affluence is the determining factor in global environmental awareness.

All in all, in our view, the survey method we have presented in this work provides a ready-to-use survey for others to use to measure environmental awareness cross-nationally, and on smaller scale too. Yet, for future use of environmental awareness index, more emphasis should be placed on the arrangements of data acquisition. However, even with a modest amount of work we were able to get sufficient number of answers for 57 countries. With more extensive international cooperation and support a greater number of countries could be achieved. Moreover, further reproductions of the survey could make it possible to follow the development of environmental awareness and its components in the world.

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10 ANNEXES

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Annex 1: Table of country connections

Table 1. Lists the connections between countries, i.e. the countries that the respondent was asked to evaluate.

Home country	Country # 1	Country # 2	Country # 3	Country # 4
Afghanistan	Pakistan	Iran	Germany	India
Albania	Montenegro	Greece	Germany	India
Algeria	Morocco	Libya	Germany	India
Andorra	Spain	France	Germany	India
Angola	Congo, Democratic Republic of the	Namibia	Germany	India
Antigua and Barbuda	Venezuela	Dominican Republic	Germany	India
Argentina	Brazil	Chile	Germany	India
Armenia	Georgia	Azerbaijan	Germany	India
Australia	New Zealand	Japan	Germany	India
Austria	Slovenia	Hungary	Germany	India
Azerbaijan	Armenia	Russia	Germany	India
Bahamas	United States of America	Cuba	Germany	India
Bahrain	Saudi Arabia	Qatar	Germany	India
Bangladesh	Burma	China	Germany	India
Barbados	Venezuela	Dominican Republic	Germany	India
Belarus	Russia	Poland	Germany	India
Belgium	Netherlands	France	Germany	India
Belize	Guatemala	Mexico	Germany	India
Benin	Togo	Nigeria	Germany	India
Bhutan	Nepal	China	Germany	India
Bolivia	Chile	Brazil	Germany	India
Bosnia and Herzegovina	Croatia	Serbia	Germany	India
Botswana	South Africa	Zimbabwe	Germany	India
Brazil	Argentina	Colombia	Germany	India
Brunei	Malaysia	Indonesia	Germany	India
Bulgaria	Romania	Turkey	Germany	India
Burkina Faso	Mali	Niger	Germany	India
Burma	Thailand	China	Germany	India
Burundi	Rwanda	Tanzania	Germany	India
Cambodia	Thailand	Vietnam	Germany	India
Cameroon	Central African Republic	Nigeria	Germany	India
Canada	United States of America	United Kingdom	Germany	India
Cape Verde	Senegal	Portugal	Germany	India
Central African Republic	Chad	Cameroon	Germany	India
Chad	Central African Republic	Nigeria	Germany	India

Chile	Argentina	Bolivia	Germany	India
China	Japan	Korea, South	Germany	India
Colombia	Brazil	Panama	Germany	India
Comoros	Mozambique	Madagascar	Germany	India
Congo, Democratic Republic of the	Congo, Republic of the	Angola	Germany	India
Congo, Republic of the	Congo, Democratic Republic of the	Gabon	Germany	India
Costa Rica	Nicaragua	Panama	Germany	India
Côte d'Ivoire	Liberia	Ghana	Germany	India
Croatia	Slovenia	Bosnia and Herzegovina	Germany	India
Cuba	Haiti	United States of America	Germany	India
Cyprus	Greece	Turkey	Germany	India
Czech Republic	Slovakia	Poland	Germany	India
Denmark	Norway	Sweden	Germany	India
Djibouti	Ethiopia	Somalia	Germany	India
Dominica	Venezuela	Dominican Republic	Germany	India
Dominican Republic	Venezuela	Haiti	Germany	India
East Timor	Indonesia	Australia	Germany	India
Ecuador	Peru	Colombia	Germany	India
Egypt	Jordan	Nigeria	Germany	India
El Salvador	Guatemala	Honduras	Germany	India
Equatorial Guinea	Cameroon	Gabon	Germany	India
Eritrea	Ethiopia	Sudan	Germany	India
Estonia	Latvia	Russia	Finland	India
Ethiopia	Sudan	Somalia	Germany	India
Fiji	Vanuatu	Tonga	Germany	India
Finland	Estonia	Russia	Sweden	India
France	Spain	Belgium	Germany	India
Gabon	Cameroon	Congo, Republic of the	Germany	India
Gambia	Senegal	Mauritania	Germany	India
Georgia	Turkey	Russia	Germany	India
Germany	Poland	Netherlands	Sweden	India
Ghana	Côte d'Ivoire	Togo	Germany	India
Greece	Bulgaria	Turkey	Germany	India
Grenada	Venezuela	Dominican Republic	Germany	India
Guatemala	Mexico	El Salvador	Germany	India
Guinea	Guinea-Bissau	Sierra Leone	Germany	India
Guinea-Bissau	Guinea	Senegal	Germany	India
Guyana	Venezuela	Surinam	Germany	India
Haiti	Dominican	Cuba	Germany	India

	Republic			
Honduras	El Salvador	Nicaragua	Germany	India
Hungary	Romania	Slovakia	Austria	India
Iceland	Norway	Canada	Germany	India
India	China	Australia	Germany	Pakistan
Indonesia	Malaysia	Australia	Germany	India
Iran	Iraq	Afghanistan	Germany	India
Iraq	Iran	Saudi Arabia	Germany	India
Ireland	United Kingdom	United States of America	Germany	India
Israel	Jordan	Turkey	Germany	India
Italy	Spain	Slovenia	Germany	India
Jamaica	Cuba	Haiti	Germany	India
Japan	Russia	China	Germany	India
Jordan	Saudi Arabia	Egypt	Germany	India
Kazakhstan	Russia	Uzbekistan	Germany	India
Kenya	Tanzania	Somalia	Germany	India
Kiribati	Marshall Islands	Tuvalu	Germany	India
Korea, North	Japan	China	Germany	India
Korea, South	Japan	China	Germany	India
Kuwait	Iraq	Saudi Arabia	Germany	India
Kyrgyzstan	Tajikistan	Kazakhstan	Germany	India
Laos	Thailand	Vietnam	Germany	India
Latvia	Estonia	Lithuania	Germany	India
Lebanon	Syria	Israel	Germany	India
Lesotho	South Africa	Swaziland	Germany	India
Liberia	Sierra Leone	Côte d'Ivoire	Germany	India
Libya	Algeria	Egypt	Germany	India
Liechtenstein	Switzerland	Austria	Germany	India
Lithuania	Latvia	Poland	Germany	India
Luxembourg	Belgium	France	Germany	India
Macedonia	Serbia	Greece	Germany	India
Madagascar	Mozambique	South Africa	Germany	India
Malawi	Mozambique	Zambia	Germany	India
Malaysia	Indonesia	Thailand	Germany	India
Maldives	Sri Lanka	Somalia	Germany	India
Mali	Algeria	Mauritania	Germany	India
Malta	Italia	Tunisia	Germany	India
Marshall Islands	Micronesia	Kiribati	Germany	India
Mauritania	Morocco	Mali	Germany	India
Mauritius	Madagascar	Seychelles	Germany	India
Mexico	Columbia	United States of America	Germany	India
Micronesia	Palau	Papua New Guinea	Germany	India
Moldova	Romania	Ukraine	Germany	India
Monaco	France	Italia	Germany	India

Mongolia	China	Russia	Germany	India
Montenegro	Serbia	Albania	Germany	India
Morocco	Spain	Algeria	Germany	India
Mozambique	Tanzania	South Africa	Germany	India
Namibia	South Africa	Angola	Germany	India
Nauru	Kiribati	Solomon Islands	Germany	India
Nepal	Bhutan	China	Germany	India
Netherlands	United Kingdom	Belgium	Germany	India
New Zealand	Australia	Japan	Germany	India
Nicaragua	Honduras	Costa Rica	Germany	India
Niger	Nigeria	Mali	Germany	India
Nigeria	Egypt	South Africa	Germany	India
Norway	Denmark	Sweden	Germany	India
Oman	Yemen	United Arab Emirates	Germany	India
Pakistan	Afghanistan	Iran	Germany	India
Palau	Indonesia	Micronesia	Germany	India
Panama	Costa Rica	Colombia	Germany	India
Papua New Guinea	Indonesia	Micronesia	Germany	India
Paraguay	Brazil	Argentina	Germany	India
Peru	Brazil	Ecuador	Germany	India
Philippines	Indonesia	Japan	Germany	India
Poland	Russia	Lithuania	Germany	India
Portugal	Spain	Morocco	Germany	India
Qatar	Saudi Arabia	Bahrain	Germany	India
Romania	Ukraine	Bulgaria	Germany	India
Russia	Ukraine	Japan	Germany	India
Rwanda	Tanzania	Burkina Faso	Germany	India
Saint Kitts and Nevis	Venezuela	Dominican Republic	Germany	India
Saint Lucia	Venezuela	Dominican Republic	Germany	India
Saint Vincent and the Grenadines	Venezuela	Dominican Republic	Germany	India
Samoa	Fiji	Tonga	Germany	India
San Marino	Italia	France	Germany	India
Sao Tome and Principe	Gabon	Portugal	Germany	India
Saudi Arabia	Jordan	Iraq	Germany	India
Senegal	Gambia	Mauritania	Germany	India
Serbia	Bosnia and Herzegovina	Montenegro	Germany	India
Seychelles	Madagascar	Kenya	Germany	India
Sierra Leone	Guinea	Liberia	Germany	India
Singapore	Malaysia	Indonesia	Germany	India
Slovakia	Hungary	Czech Republic	Germany	India
Slovenia	Italia	Austria	Germany	India

Solomon Islands	Papua New Guinea	Vanuatu	Germany	India
Somalia	Ethiopia	Kenya	Germany	India
South Africa	Mozambique	Nigeria	Germany	India
South Sudan	Ethiopia	Sudan	Germany	India
Spain	France	Italy	Germany	India
Sri Lanka	Indonesia	Maldives	Germany	India
Sudan	Egypt	Ethiopia	Germany	India
Suriname	Guyana	Brazil	Germany	India
Swaziland	South Africa	Mozambique	Germany	India
Sweden	Finland	Poland	Germany	India
Switzerland	France	Italy	Germany	India
Syria	Lebanon	Turkey	Germany	India
Tajikistan	Kyrgyzstan	Afghanistan	Germany	India
Tanzania	Kenya	Mozambique	Germany	India
Thailand	Malaysia	Burma	Germany	India
Togo	Ghana	Benin	Germany	India
Tonga	Fiji	Samoa	Germany	India
Trinidad and Tobago	Venezuela	Dominican Republic	Germany	India
Tunisia	Algeria	Libya	Germany	India
Turkey	Bulgaria	Israel	Germany	India
Turkmenistan	Uzbekistan	Iran	Germany	India
Tuvalu	Solomon Islands	Kiribati	Germany	India
Uganda	Kenya	Tanzania	Germany	India
Ukraine	Russia	Romania	Germany	India
United Arab Emirates	Oman	Saudi Arabia	Germany	India
United Kingdom	Netherlands	Canada	Germany	India
United States of America	Mexico	Canada	Germany	India
Uruguay	Brazil	Argentina	Germany	India
Uzbekistan	Kazakhstan	Turkmenistan	Germany	India
Vanuatu	Solomon Islands	Fiji	Germany	India
Vatican City	Italia	France	Germany	India
Venezuela	Brazil	Mexico	Germany	India
Vietnam	Laos	China	Germany	India
Yemen	Saudi Arabia	Oman	Germany	India
Zambia	Congo, Democratic Republic of the	Zimbabwe	Germany	India
Zimbabwe	Mozambique	South Africa	Germany	India

Annex 2: Table of indicator values and EAI by country

Table 1. Provides the mean values of indicators for the 57 countries that received sufficient number of answers. **Green (red)** font indicates the best (worse) score a country has in each of the three indicator groups: EAI-STATE-TREND, GEE-EKN-MOA and PES-POA-AVI. The country's overall best and worse scores are in **bold**.

Country	EAI	STATE	TREND	GEE	EKN	MOA	PES	POA	AVI
Afghanistan	32,3	27,7	24,2	29,0	26,9	42,2	25,6	32,1	31,8
Argentina	44,0	41,5	46,0	46,4	44,8	42,2	43,3	43,5	43,5
Australia	56,5	51,5	46,3	59,7	55,4	55,6	54,2	62,9	66,9
Austria	73,1	61,1	62,9	72,4	65,7	69,0	77,9	75,1	72,9
Belgium	57,4	44,1	51,1	57,8	52,6	52,3	62,0	64,6	61,0
Bhutan	48,7	41,8	48,7	40,1	49,6	64,5	41,4	58,4	46,9
Bosnia and Herzegovina	39,4	46,0	43,9	43,8	40,4	35,9	38,4	43,7	41,7
Brazil	40,5	39,5	42,3	43,4	44,5	36,2	42,0	37,0	37,2
Bulgaria	39,0	50,9	36,0	41,4	35,2	37,0	38,4	43,5	47,1
Canada	59,5	57,3	43,0	62,2	52,0	55,9	60,5	65,1	67,2
Chile	47,3	42,3	46,9	41,4	41,2	46,9	53,5	38,8	39,9
China	46,1	36,2	40,2	46,4	47,3	40,5	51,4	50,3	53,7
Denmark	66,3	62,5	60,7	74,5	65,2	60,0	64,3	72,4	77,6
Egypt	39,6	32,2	35,4	39,9	37,2	40,3	38,7	40,2	42,0
Estonia	59,8	61,4	54,2	63,1	57,8	56,5	59,7	65,1	66,2
Finland	70,9	69,8	53,1	77,4	67,3	65,8	69,5	73,8	77,3
France	53,4	49,1	50,6	54,0	48,9	49,5	56,8	61,0	60,3
Germany	69,8	62,4	61,7	70,9	68,0	68,3	70,2	73,8	75,9
Greece	52,3	48,5	39,5	49,2	45,1	49,6	58,0	55,2	44,7
Hungary	47,9	44,4	38,8	50,8	39,0	46,1	46,7	49,8	47,4
India	38,0	33,3	34,8	38,1	37,1	38,4	37,4	38,5	38,8
Indonesia	44,1	41,1	38,5	43,6	46,4	46,2	42,4	50,8	53,8
Iran	42,7	37,9	44,6	42,2	40,4	47,3	38,8	41,2	40,5
Iraq	29,4	23,3	22,8	27,6	30,7	29,1	31,4	25,6	34,1
Italy	46,1	36,2	39,1	40,6	39,0	44,6	53,0	53,0	54,1
Japan	60,8	54,8	44,7	65,1	56,2	59,4	57,9	61,1	63,4
Jordan	48,3	41,9	49,9	46,4	42,8	48,2	50,5	55,0	52,5
Latvia	54,0	62,5	59,3	60,6	53,3	48,2	53,1	62,4	61,4
Lithuania	50,2	54,7	57,6	57,3	49,3	43,5	49,6	61,3	62,7
Malaysia	53,1	48,6	46,8	53,5	48,6	52,3	53,3	67,1	69,7
Mexico	33,7	33,9	36,6	29,2	37,2	35,1	36,9	41,0	38,4
Montenegro	38,4	40,5	40,0	38,5	38,6	37,9	38,9	48,4	49,8
Morocco	40,0	40,4	40,4	33,8	38,9	45,1	41,2	39,1	44,1
Nepal	46,9	39,9	43,8	39,0	44,3	57,1	44,7	52,0	48,0
Netherlands	64,7	57,7	55,4	66,5	61,2	61,8	65,8	71,3	70,8
New Zealand	60,1	67,9	54,4	64,1	55,7	59,5	56,6	68,3	69,9
Nigeria	29,2	34,3	33,7	24,3	25,8	34,0	29,4	42,1	28,4
Norway	63,5	66,0	56,9	72,1	60,3	56,8	61,7	73,5	73,8

Pakistan	27,2	21,3	26,3	25,6	27,4	26,5	29,4	33,7	26,1
Poland	51,3	46,5	48,1	57,0	47,5	46,7	50,2	59,9	58,5
Portugal	61,2	54,4	49,7	57,5	58,6	67,0	59,0	64,4	59,6
Romania	42,0	47,5	36,7	44,9	37,9	39,9	41,2	49,1	50,5
Russia	43,0	42,0	39,4	44,2	43,2	37,4	47,3	42,0	45,7
Saudi Arabia	36,8	28,2	35,9	31,0	36,6	37,9	41,5	33,2	41,0
Serbia	40,1	38,1	39,8	36,0	39,5	41,7	42,6	45,9	48,6
Slovakia	54,7	48,2	46,6	63,4	47,4	51,2	49,6	67,1	60,4
Slovenia	60,3	61,5	54,9	58,0	52,1	59,3	63,7	59,8	57,9
South Africa	40,7	43,6	56,2	42,3	36,9	49,1	30,7	55,4	38,3
South Korea	54,0	60,1	55,0	56,9	51,5	52,3	52,7	59,5	64,4
Spain	50,6	42,0	46,0	47,8	45,8	49,9	54,1	56,2	55,9
Sweden	71,4	70,4	58,1	76,3	68,4	67,7	70,2	78,4	79,5
Switzerland	65,4	58,8	51,4	69,1	59,8	62,7	64,3	75,4	73,6
Thailand	48,8	38,0	44,8	49,3	48,8	49,0	48,3	45,8	55,6
Turkey	41,6	36,5	39,0	43,7	45,4	36,6	44,5	38,0	47,6
Ukraine	40,2	39,3	32,3	42,9	37,4	35,1	42,4	38,2	49,7
United Kingdom	54,1	45,8	45,1	57,2	48,0	51,4	53,9	66,8	67,2
United States of America	46,5	38,6	40,0	44,2	39,1	42,2	53,3	58,3	59,1

Annex 3: Table of correlation indicators

Table 1. Offers the details about the indices and indicators for the variables that were tested for correlation with our indicators.

Variable	Indicator(s)	Source	Description/Notes
Human development	Human Development Index (HDI)	Human Development Report (HDR 2013a; HDR 2013b)	It measures the average achievements in a country in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living.
Gender inequality	Gender Inequality Index (GII)	Human Development Report (HDR 2013a; HDR 2013b)	Reflects gender-based disadvantages in three dimensions: reproductive health, empowerment and the labour market.
Peacefulness	Global Peace Index (GPI)	Vision of Humanity (Chalabi 2013)	The GPI measures the state of peace in 162 countries. It uses 22 indicators that can be classified under three broad themes: on-going domestic and international conflict, societal safety and security and militarisation.
Environmental Performance	Environmental Performance Index (2012 EPI)	Yale University (2012a)	The EPI ranks countries on 22 performance indicators spanning ten policy categories reflecting facets of both environmental public health and ecosystem vitality. Each indicator has an associated environmental public health or ecosystem sustainability target, and the index measures the achievement of those targets.
Environmental Performance	Pilot Trend Environmental Performance Index (Trend EPI)	Yale University (2012b)	The Pilot Trend Environmental Performance Index (Trend EPI) ranks countries on the change in their environmental performance.
Level of education	Education Index	Human Development Report (HDR 2013a; HDR 2013b)	One of the three indices on which the Human Development Index is

			built. It is based on mean years of schooling (of adults) and expected years of schooling (of children).
Level of education	Expected Years of Schooling (of children)	Human Development Report (HDR 2013a; HDR 2013b)	Number of years of schooling that a child of school entrance age can expect to receive if prevailing patterns of age-specific enrolment rates persist throughout the child's life.
Inclusiveness of education system	Combined gross enrolment in education	Human Development Report (HDR 2013a; HDR 2013b)	The number of students enrolled in primary, secondary and tertiary levels of education, regardless of age, as a percentage of the population of theoretical school age for the three levels.
Investment in education	Public expenditure on education (% of GDP)	Human Development Report (HDR 2013a; HDR 2013b)	Total public expenditure (current and capital) on education expressed as a percentage of GDP.
Level of education	PISA: average score in 2009	(OECD 2013)	Calculated as the averages of the mean scores in reading, mathematics and science in the 2009 study.
Wealth of nation	GNI per capita in PPP terms	Human Development Report (HDR 2013a; HDR 2013b)	Aggregate income of an economy generated by its production and its ownership of factors of production, less the incomes paid for the use of factors of production owned by the rest of the world, converted to international dollars using purchasing power parity (PPP) rates, divided by midyear population.
Poverty of nation	Population living below \$1.25 PPP per day	Human Development Report (HDR 2013a; HDR 2013b)	Percentage of the population living below the international poverty line \$1.25 (in purchasing power parity terms) a day.
General values	Schwartz's value orientations	World Values Survey (WVS 2011). WVS 2005-	Universalism: It is important to this

		2008 corresponding to the fifth wave of the World Values Survey Data.	person looking after the environment. Benevolence: It is important to this person to help the people nearby. Power: It is important to this person to be rich. Achievement: It is important to this person being very successful.
Perception of the seriousness of local environmental problems	Environmental problems in your community: Poor water quality. Environmental problems in your community: Poor air quality.	World Values Survey (WVS 2011).	WVS 2005-2008 and WVS 1999-2000, corresponding to the fifth and fourth wave of the World Values Survey Data.
Perception of the seriousness of global environmental problems	Environmental problems in the world: Global warming or the greenhouse effect. Environmental problems in the world: Pollution of rivers, lakes and oceans.	World Values Survey (WVS 2011).	WVS 2005-2008 and WVS 1999-2000, corresponding to the fifth and fourth wave of the World Values Survey Data.
Willingness to sacrifice for environment	Would give part of my income for the environment	World Values Survey (WVS 2011).	WVS 2005-2008 corresponding to the fifth wave of the World Values Survey Data.
Endorsement of postmaterialist values	Inglehart's indicators: 12-item postmaterialist index	World Values Survey (WVS 2011).	WVS 2005-2008 corresponding to the fifth wave of the World Values Survey Data.