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# Teachers' and Student Teachers' Attitudes Towards Nature and the Environment—A Comparative Study Between Sweden and France

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## ABSTRACT

Throughout the world, the educational system is expected to deal with issues regarding sustainability and to promote pro-environmental behaviours and attitudes. This study investigates attitudes towards nature and the environment among 1,109 teachers and student teachers in Sweden and France, using the 2 factor Model of Environmental Values (2-MEV). The results imply that in both Sweden and France, teachers and student teachers hold a prevailing ecocentric attitude, as opposed to an anthropocentric attitude, which possibly indicates a predominantly positive approach towards the environment and environmental education. Comparisons between the countries show, however, that the Swedish teachers and student teachers hold a more anthropocentric attitude than the teachers and student teachers in the French sample.

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## Introduction

### *Humans and Nature*

The human relationship to nature is crucial for environmental awareness, according to a number of scholars, including Bonnett (1999, 2007), who argues for the development of an “ethical response” towards our living environment (Bonnett, 2012, p. 294). Accordingly, there is increased interest, in Swedish as well as in international educational research, in the ethical dimensions of both environmental education and education for sustainable development (Kronlid & Öhman, 2013). This ethical responsibility concerns future generations as well as nature in its own right (Öhman, 2006; Östman, 2015). That the ethical dimension concerns nature as well as humans is not new. A historical overview of environmental education and associated research (Hart, 2007) emphasizes that ethics has long been acknowledged in environmental education. The report “World conservation strategy” from 1980 (IUCN, 1980) states that

A new ethic, embracing plants and animals as well as people, is required for human societies to live in harmony with the natural world on which they depend for survival and wellbeing. The long-term task of environmental education is to foster or reinforce attitudes and behaviour compatible with this new ethic. (IUCN, 1980, section 13)

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This is supported by Jan Oakley, who states that: “One of the deep roots of environmental crisis, it has been suggested, lies in anthropocentric Western characterizations of humanity as separate from other species and the natural world” (Oakley, 2011, p. 8).

Indeed, it thus seems as if there is a lack of knowledge regarding the fact that humans are part of the Earth’s biosphere and that humans as well as all other living organisms are part of and dependent on the worldwide ecosystem of the Earth—which is the point of departure for an ecocentric or biocentric position. Valérie Chansigaud, a researcher in the history of environmental sciences, claims that the sciences of both natural history and ecology have failed in giving an account of the complexity of the relations between the human being and her environment, both in France and elsewhere (Chansigaud, 2017, p. 67), no matter how much valuable knowledge the biological sciences have produced regarding human beings’ impact on ecosystems or our dependence on natural resources. Regarding science education, Cobern, Gibson, and Underwood (1999), in their interview study of ninth graders’ conceptualization of nature, found that the link between the students’ experience of school science and their experience of the natural world outside school was very weak. Instead their narratives revealed a “disjunction between the students’ experience of the world and the world as constructed in the classroom” (Cobern et al., 1999, p. 557). The need to connect the learning in school with children’s everyday experience has previously been highlighted by other researchers, such as Dewey (e.g., 1938/97).

In fact, there are indications that students believe that humans are independent of all other living organisms in the biosphere (Andersson, Kärrqvist, Löfstedt, Oscarsson, & Wallin, 1999; Nyberg, 2004), and thus that many students hold an anthropocentric view. In line with this, there are scholars, such as Kopnina (2014, 2015), who argue that at present an anthropocentric ethic governs “much of the EE/ESD educational practice” (Kopnina, 2015, p. 370) and that environmental ethics must explicitly include non-human animals as well as plants and thereby include all living organisms. She argues that “the failure of ecological justice// ... //is not sufficiently addressed in education” (Kopnina, 2014, p. 227). Likewise, Hodson (2003) argues for a biocentric ethic in science education, implying respect for all living beings—both human and non-human—and “challenging and rejecting all forms of discrimination” (Hodson, 2003, p. 663).

Environmental attitudes are often categorized as being either *ecocentric*—having a concern for all living beings—or *anthropocentric*—having a concern for humans and society (Munoz, Bogner, Clément, & Carvalho, 2009). However, Bonnett (2002), discusses whether it is possible to describe our relationship with the environment as either anthropocentric or ecocentric, due to the complexity of this relationship. This is in accordance with arguments put forward by e.g., Kronlid and Öhman (2013), who question this simplistic way of describing environmental ethical positions. They offer a more nuanced “conceptual framework that captures a wide variety of environmental ethical positions” (p. 31), instead of seeing anthropocentrism and bio/ecocentrism “as opposite ends of a continuum” (Kronlid & Öhman, 2013, p. 23). They argue, for example, that an anthropocentric, i.e., a human centred worldview can also include an appreciation of nature, since nature is the foundation of human well-being. They also raise concerns about making the assumption that a non-anthropocentric or bio/ecocentric position can be equated with an environmentally friendly position and that an anthropocentric position can be equated with a non-environmentally friendly position (Kronlid and Öhman, 2013, p. 23).

### **The Swedish Outdoor Tradition**

Sweden has a relatively long tradition of environmental education and of caring for nature. Breiting and Wickenberg (2010) identify a number of socio-cultural and political trends of relevance for the development of this tradition, for example, they put forward the fact that Sweden has depended on natural resources for its industrial development as well as the democratic and participative traditions at both local and national level which have developed during the twentieth century. The tradition of environmental education in Sweden, can, according to Breiting and Wickenberg (2010), be traced back to as early as 1919, when it was stated in the National School Plan that there should be education in “nature conservation and animal protection” (Breiting & Wickenberg, 2010, p. 12). They further

state that the contemporary “environmental discourse” (p. 12) started in 1962 with the publication of *Silent Spring*, by Rachel Carson (Breiting & Wickenberg, 2010). In the same year, the Swedish state school system with a nine-year compulsory school for all children was established, and in the Swedish National Curriculum from 1969 (Lgr 69), there were sections relating to what was later called environmental education (Breiting & Wickenberg, 2010). During the same period, the Swedish Environmental Protection Agency (*Naturvårdsverket*) was established (1967) and the Swedish National Agency for Education initiated an investigation concerning “the School’s Fostering of Environmental Protection (1968–1971)” (Breiting & Wickenberg, 2010, p. 13). The UN Conference on the Human Environment in Stockholm 1972 and the Conference on Environmental Education in Tbilisi 1977 had, according to Breiting and Wickenberg (2010), further influence on the development of environmental education in Sweden. In the present Swedish National Curriculum for the compulsory school (Lgr11), there is now a clear focus on Education for Sustainable Development (Swedish National Agency for education, 2011).

In the history of outdoor life in Sweden, the right of public access has played an important role for leisure activities in rural areas (Sandell & Öhman, 2010), as have the links to the Norwegian deep ecology movement (Sandell & Öhman, 2010). The right of public access allows anyone to pass through forests, pick berries, swim in lakes, camp (for less than 24 h), light a small fire etc., without permission from the owner of the land. However, this “right” is connected to an obligation not to destroy or disturb (Swedish Environmental Protection Agency, 2017).

The tradition described above could lead to the assumption that there are more pro-environmental attitudes in Sweden than in many other countries. Results from a survey of 1280 Swedish citizens—randomly selected—on values and beliefs supporting environmental responsibility, could also be interpreted as suggesting a well-developed ecocentric view among the individuals who took part in the survey. The authors conclude: “a large majority of the respondents recognizes the rights also of other species and rejects any notion of human beings as being at the top of a nature’s hierarchy” (Jagers & Matti, 2010, p. 1076). However, Torbjörnsson (2014) reports that with regard to environmental attitudes among young people in Sweden, studies indicate a lower interest in environmental matters during the first decade of the twenty-first century than during the last decades of the twentieth century. According to Torbjörnsson, the OECD-PISA study from 2009 shows a lower sense of responsibility for environmental issues among young people in Sweden compared to the OECD mean. At the same time, Swedish young people are more optimistic regarding possibilities of solving environmental problems (Torbjörnsson, 2014).

### **Relation to Nature and Environment in France**

Using a historical approach, Chansigaud (2017) concludes: “The French are less interested in nature than their German-speaking or English-speaking neighbors” (p. 12, translation by authors). As evidence for this, she puts forward the number of journals or associations dedicated to wild animals and plants, as well as the nationality of scientists who defined the main concepts of ecology. For example, the first French association for the protection of birds was not established until 1912, with a few dozen members, while at the same time there were several similar organizations in Germany, with more than 70,000 people, and even more in the U.K. and in the USA (Chansigaud, 2017, p. 60). She notices also the success of nature dioramas at the end of the nineteenth century in Scandinavian countries, as well as in German and Anglo-Saxon ones, but not in France. The explanation of these differences is complex, and cannot be reduced to an opposition between Catholic and Protestant traditions. The Cartesian philosophical French tradition is probably more pertinent, where humankind is considered as “master and owner of nature”, which is a handicap regarding becoming “masters and protectors of nature” (Roger & Guéry, 1991).

This philosophy of nature structures our Western civilization, where knowledge of nature is not revealed by god (while there is a harmony between nature, men and gods in some other civilizations: Dogons, Pawnees, Taoists), but stolen by man, ripped from the gods in narratives such as: Adam and Eve, Prometheus, Pandora (Clément, 2004). This tradition was then shared by Christianity,

Cartesianism, Kantianism, Hegelianism, existentialism, and even Marxism, as well as the structuralism of the 1960s (Quillot, 2000).

The French sociologist of science, Latour (1999), defined different social representations of nature, depending on the degree of rupture between the social and non-social dimensions of nature, as well as different “politics of nature”. Some of these differences can be correlated with the socio-cultural context of each country. For Cans (1997), a specialist in environmental issues for the respected French daily newspaper “Le Monde”, the relationship with nature is not the same across Europe. Instead he identifies three “sisters of ecology”<sup>1</sup>:

- In Latin Europe (e.g., France), “Nature is mastered, neat, combed. We no longer distinguish between what is man’s fact and what is the fact of nature, since the whole must give the impression of the same work directed by man.”// “As a result, the Latins retain their built patrimonies better than others. The towns and villages of southern Europe are, as a general rule, better preserved than in the north”. // “Cities in Sweden, which have never been fueled by war, have been disfigured by the developers” (Cans, 1997, pp. 209–210).
- Germanic ecology is based on the worship of virgin and wild nature, reputed to be pure, hygienic and a source of strength. “In Scandinavia and the German-speaking countries, one swears by deep forests, pure lakes and impetuous rivers. It is the culture of naturism, sauna, outdoor sports” (Cans, 1997, p. 210). However, this does not necessarily imply a willingness to act pro-environmentally.
- Anglo-Saxon ecology is marked by pragmatism. “One does not strike one’s chest crying the death of the Baltic, as in Hamburg or Stockholm, one acts” (Cans, 1997, p. 210). He argues that this willingness to act among the English, Americans and the Australians rests on a “highly developed civic sense” (p. 211) that does not exist among the Latins or the Germans, and that “[t]hey know the art of boycott, to start campaigns and to raise funds, which makes it possible to address well targeted ‘shots’ and to see very quickly the result” (Cans, 1997, p. 211).

From this review, it seems likely that attitudes towards nature and the environment differ between Sweden and France, and thus that it might be relevant to formulate the hypothesis that more ecocentric attitudes, and less anthropocentric attitudes, can be expected in Sweden than in France. However, some studies have shown that the implementation of environmental education in France is dominated by ecocentric values (Cottureau, 2014; Giolitto & Clary, 1994; Girault & Sauvé, 2008) and that a great majority of teachers of different disciplines are very motivated to implement environmental education for sustainable development (EESD) (Clément, 2011; Lange, 2008). Similar studies have to our knowledge not been carried out in Sweden, although Clément and Caravita (2011) in their analysis of the state of implementation of EESD in 13 countries, including France (pp. 19–22) and Sweden (pp. 17–18), did find some differences regarding teaching approaches between the two countries. Their analysis shows that in the Swedish school system there is more institutional help, more direct links with research and more active pedagogy, while among French teachers there is more diversity of attitudes, and more questioning, particularly about a paradoxical injunction: to teach good choices, and to teach how to choose (Bonhoure, 2008; Urgelli, 2011). In contrast to the present study, however, Clément and Caravita’s research did not concern teachers’ environmental attitudes.

### ***A Psychometric Model to Investigate Environmental Attitudes***

Worldwide, the educational system is expected to deal with issues regarding sustainability and to promote pro-environmental behaviours and attitudes, i.e., to promote a sense of care and responsibility for nature. In an attempt to investigate these matters among teachers and student teachers within Sweden and France, a two-dimensional model, the 2 factor Model of Environmental Values (2-MEV) (Bogner & Wiseman, 2006; Wiseman & Bogner, 2003) was used. Fourteen items of the

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<sup>1</sup>All translations from French by the authors.

instrument are based on a theoretical framework assuming that environmental attitudes can be represented by a two-dimensional model (2-MEV), comprising the two value-based factors Utilization (U) and Preservation (P). The Utilization dimension reflects here an anthropocentric concern and the Preservation dimension reflects an ecocentric concern. In a study by Munoz et al. (2009), this two-dimensional structure was robust within their sample of 6,379 teachers in 16 countries, meaning that the two dimensions reflecting environmental attitudes are independent of country. Previous studies based on the 2-MEV model used different questionnaires (from 14 to 20 items used depending on the study) have demonstrated the validity and reliability of the tool in many different situations (e.g., Castéra, Clément, Munoz, & Bogner, 2018; Liefländer & Bogner, 2014; Munoz et al., 2009; Quinn, Castéra, & Clément, 2016; Schneller, Johnson, & Bogner, 2015; Wiseman, Wilson, & Bogner, 2012).

As the relatively recent studies described above (Jagers & Matti, 2010; Torbjörnsson, 2014) to some extent report contradictory findings regarding environmental attitudes in Sweden, it is relevant and interesting to further explore the attitudes that Swedish teachers and student teachers hold and to compare these with other European countries, in this case France. Although, as previously mentioned, the connection between anthropocentric or bio/ecocentric attitudes and non-environmentally friendly or environmentally friendly positions might not be straightforward, environmental attitudes are defined in this study as reflecting an *ecocentric* attitude—a concern for all living beings—or an *anthropocentric* attitude—a concern for humans and society. These attitudes were explored in this study in relation to the 2 factor Model of Environmental Values (2-MEV) described above. The study thus makes it possible to investigate the assumption of a two-dimensional model regarding these attitudes, as well as to compare the environmental attitudes found among teachers and student teachers, between the two countries Sweden and France. Historically, French people's environmental attitudes seemed to be more anthropocentric than in Sweden, but possibly this is no longer the case today, which is indicated by the results from the studies mentioned above showing a dominance of ecocentric values within environmental education in France.

## Aim and Research Questions

The aim of this study was to compare teachers' and student teachers' attitudes to nature and the environment in Sweden and France and to explore these in relation to a two-dimensional model. Our research questions were:

- (1) How do the environmental attitudes defined as either reflecting an anthropocentric or an ecocentric attitude, relate to the 2 factor Model of Environmental Values (2-MEV)?
- (2) Can any differences between the samples in Sweden and France be found, regarding the nature of environmental attitudes?

## Methods

### Instrument

The 2-MEV instrument (Bogner & Wiseman, 2006; Wiseman & Bogner, 2003) previously described was applied in the study. Only the 14 items designed to measure environmental attitudes were used, comprising the two value-based factors Utilization (U) and Preservation (P). According to Liefländer and Bogner (2014), the 2-MEV model has been used and tested by various research groups, who have independently come to the conclusion that the psychometric properties of the model are sound. As is argued by Quinn et al. (2016), the advantage is also that the model has been extensively piloted, includes rigorous psychometric techniques and has been validated in many different populations. Liefländer and Bogner (2014) likewise assert that the model “has undergone various validation steps and its dichotomous structure has proven to be consistent, reliable, and highly valid in diverse settings” (Liefländer

**Table 1.** Questions selected measuring attitudes towards nature and the environment.

Item	Dimension
A1: We must set aside areas to protect endangered species.	P
A4: Nature is always able to restore itself.	U
A5: If an intensive chicken farm were to be created near where you live, you would be against this because it may pollute the groundwater.	P
A7: Humans will die out if we don't live in harmony with nature.	P
A11: Industrial smoke from chimneys makes me angry.	P
A16: Our planet has unlimited natural resources.	U
A17: Society will continue to solve even the biggest environmental problems.	U
A18: Human beings are more important than other living beings.	U
A22: I enjoy trips to the countryside.	P
A23: We need to clear forests to increase agricultural areas.	U
A32: Humans have the right to change nature as they see fit.	U
A40: It is interesting to know what kinds of animals live in ponds or rivers.	P
A50: All contemporary plant species should be preserved because they may help in the discovery of new medicines.	P
A54: Only plants and animals of economic importance need to be protected.	U

Note: Preservation/ecocentric (=P), Utilization/anthropocentric (=U). The items below in English are from the original questionnaire.

& Bogner, 2014, p. 106). The 14 variables (Table 1) were developed specifically with the aim of characterizing attitudes towards nature and the environment (Wiseman & Bogner, 2003).

*Preservation* in this model is used to describe “a biocentric dimension that reflects conservation and protection of the environment” (Wiseman & Bogner, 2003, p. 787), whereas the value *Utilization* represents “an anthropocentric dimension that reflects the utilization of natural resources” (Wiseman & Bogner, 2003, p. 787). These values could also be described as reflecting either an *ecocentric* attitude—a concern for all living beings—or an *anthropocentric* attitude—a concern for humans, as previously described.

A Likert type scale, was used with a choice of four options. In the questionnaire, there were four options ranging from “I agree” to “I don't agree”. Seven of the questions related to a preservation/ecocentric attitude and seven to a utilization/anthropocentric attitude, in accordance with the study by Munoz et al. (2009). The 14 items are listed in Table 1.

For this study, the Swedish version of the questionnaire was translated from English into Swedish by two independent research teams. These two versions were compared and adjusted to one version by the researchers, after which a translation was made back into English by a professional translator, in order to validate the translations. The French version of the questionnaire underwent an analogous procedure.

### Data Collection and Participants

Data collection in France was made within the context of the European project called *BIOHEAD-Citizen* (Carvalho, Clément, Bogner, & Caravita, 2008), and two years after in Sweden, using the same methodology. In the *BIOHEAD-Citizen* project an extensive survey consisting of 173 items corresponding to different themes (biology, health and environmental education) was constructed. Hence, the respondents answered the full questionnaire, but in this study we only analyse the 14 items from the 2-MEV instrument.

The sample for the study was drawn from both teachers and student teachers in Sweden and France. A convenience sample was made, which resulted in 377 teachers and student teachers in Sweden and 732 in France, i.e., this analysis is based on 1,109 individuals, of whom around half were practising teachers and half were student teachers. The sample consisted of six categories: in-service and pre-service primary school teachers, in-service and pre-service secondary school biology teachers and in-service and pre-service secondary school language teachers. Each category was represented by around equal numbers of participants in both countries (Mc Ewen et al., 2015).

The Swedish student teachers belonged to five different universities in Sweden, while the Swedish in-service teachers participated in in-service training courses at two of these universities or were part



of national Swedish teacher networks. In France, the sample consisted of pre-service teachers attending courses at different universities, and in-service teachers in schools or in training workshops. Participants in both countries came from a mixture of rural and urban areas.

In Sweden, an electronic version of the questionnaire was used (Artologik Survey&Report<sup>2</sup>), i.e., answers were collected automatically. For approximately half of the sample the questionnaire was distributed by e-mail and responded to online, whereas for the other half of the sample the questionnaire was completed on campus with a researcher present. In France, a paper and pencil version was used throughout the data collection and was completed anonymously in the presence of a researcher.

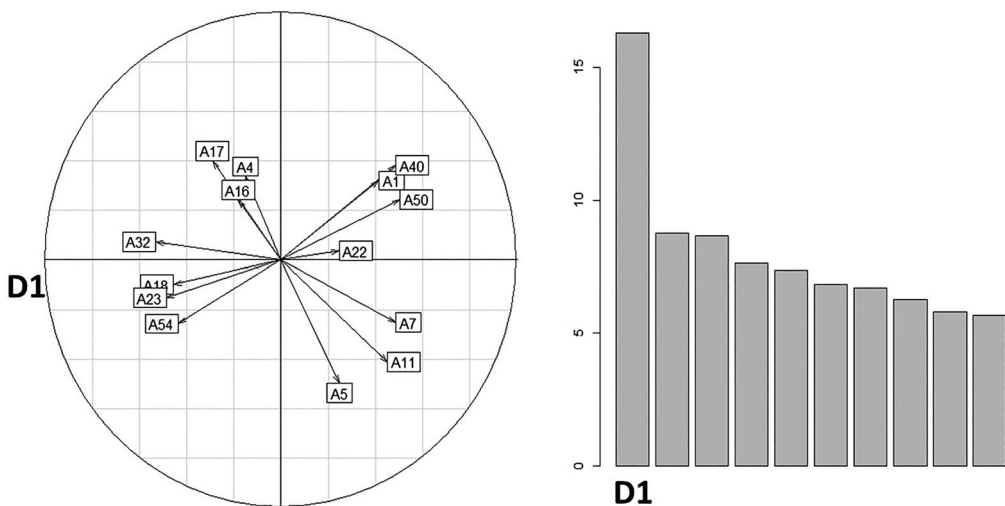
## Analyses

To test whether the environmental attitudes in this sample corresponded to the two dimensions Preservation and Utilization, a *Principal Component Analysis* (PCA) was made. In order to investigate how the environmental attitudes varied between groups of individuals, a *between-class analysis* was performed (Chessel, Dufour, & Thioulouse, 2004; Dolédec & Chessel, 1987). This analysis was performed to test the significance of variation across countries regarding environmental attitudes and allows the identification of items that differentiate most between the countries (Munoz et al., 2009). Additionally, Pearson's chi-squared tests ( $\chi^2$ ) were carried out, comparing the two countries for each of the 14 items tested.

## Results

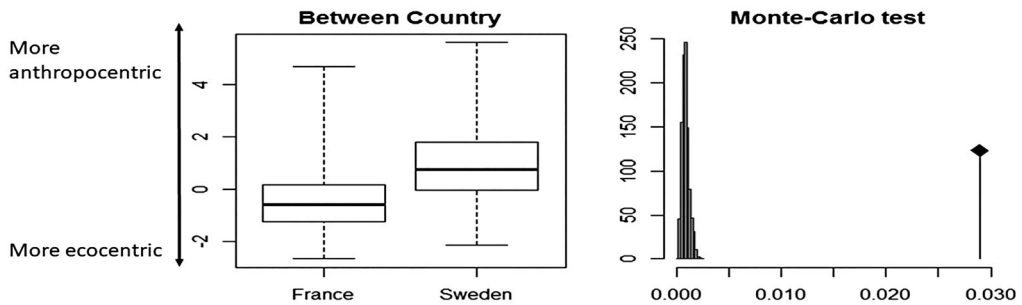
### Two Opposing Attitudes

Based on Swedish and French samples, the PCA analyses revealed that the two distinctive dimensions of the 2-MEV model (Munoz et al., 2009; Wiseman & Bogner, 2003) are not independent. Moreover, based on the histogram of PCA eigenvalues, it is clear that only the first component (D1 on Figure 1) is interpretable (other components are background noise, based on Cattell's



**Figure 1.** PCA analysis showing the relationship between the two main Principal Components and the 14 items concerning Environmental attitudes. The arrows reflect the items as labelled in Table 1. The clear separation of the items into two groups along the x-axis (D1) supports the characterization of the items as pertaining to either Utilization (to the left) or Preservation (to the right).

<sup>2</sup><http://www.artologik.com/se/SurveyAndReport.aspx>



**Figure 2.** Overall differences between the environmental attitudes in Sweden and France—*Between-class analyses*. The difference between Swedish and French samples is significant ( $p < 0.001$ ; Monte-Carlo test).

scree plot; Cattell, 1966). The correlation circle (see Figure 1) shows items related to Utilization on the left side and items related to Preservation on the right side, illustrating the relative dependence between the two sets of items.

The between-class analysis showed differences between the two countries as illustrated in the diagrams in Figure 2 (Monte Carlo test was highly significant,  $p < 0.001$ ). It shows that Swedish teachers score significantly higher for anthropocentric attitudes and score lower on ecocentric attitudes than their French colleagues. This global overview of the differences between the two countries is detailed in the following tables (Tables 2 and 3). The tables show the items differing significantly between both countries.

### ***Ecocentric Attitudes Predominate***

The result of the analysis of the 14 items (Table 1) is presented in Tables 2 and 3. In these, the two options on the left in the questionnaire, have been combined (“Agree or somewhat agree”), as have the two options on the right (“Don’t agree or somewhat disagree”).

An overall interpretation of the results regarding the items considered to be related to the topic “Preservation” (an ecocentric attitude) is that within both countries, most teachers and student teachers hold an essentially ecocentric attitude; more than 80% of both the French and the Swedish groups agreed to the statements *We must set aside areas to protect endangered species* (A1), *Humans will die out if we don’t live in harmony with nature* (A7), *I enjoy trips to the countryside* (A22), *It is interesting to know what kinds of animals live in ponds or rivers* (A40) and that *All contemporary plant species should be preserved because they may help in the discovery of new medicines* (A50). Regarding the item A5 (*If an intensive chicken farm were to be created near where you live, you would be against this because it may pollute the groundwater*) and item A11 (*Industrial smoke from chimneys makes me angry*), the picture is not as clear, with less than 70% agreeing to these statements in both countries.<sup>3</sup>

### ***Anthropocentric Attitudes Less Common***

When it comes to the items related to the topic “Utilization” (anthropocentric attitudes), the overall pattern points in the same direction, although not as convincingly: a minority of both groups agree to the seven statements. This means that a minority of the respondents agree to the statements *Nature is always able to restore itself* (A4), *Our planet has unlimited natural resources* (A16), *Society will*

<sup>3</sup>Maybe environmental protection supervision and regulations in both countries function well, meaning that there are not many industries with smoke that causes harm and if new enterprises were to be established, such as a chicken farm, there might be strict regulations regarding pollution of the environment. These two items (A5, A11) might thus not be totally relevant for the societal contexts in these countries and therefore might not relate only to an anthropocentric or an ecocentric concern.

**Table 2.** Answers to the seven selected items relating to a preservation (ecocentric) attitude.

Item	Country	"Agree or somewhat agree" (%)	"Don't agree or somewhat disagree" (%)	Differences between Sweden and France. Significant differences (S). Not significant (NS)
A1: We must set aside areas to protect endangered species. (P)	Sweden	95	5	NS
	France	97	3	
A5: If an intensive chicken farm were to be created near where you live, you would be against this because it may pollute the groundwater. (P)	Sweden	57	43	NS
	France	60	40	
A7: Humans will die out if we don't live in harmony with nature. (P)	Sweden	81	19	NS
	France	80	20	
A11: Industrial smoke from chimneys makes me angry. (P)	Sweden	49	51	S**
	France	69	31	
A22: I enjoy trips to the countryside. (P)	Sweden	98	2	NS
	France	97	3	
A40: It is interesting to know what kinds of animals live in ponds or rivers. (P)	Sweden	85	15	S**
	France	95	5	
A50: All contemporary plant species should be preserved because they may help in the discovery of new medicines. (P)	Sweden	84	16	S**
	France	93	7	

Note: Percentage for each country and the results of the Pearson's chi-squared tests (\*\* $p < 0.001$ , \* $p < 0.01$ ). The instruction was: "Indicate to what point you agree with the following statements by ticking only one box between 'I agree' and 'I don't agree' for EACH of the following statements". The items where significant differences were found between the two countries are written in bold. (Agree = preservation/ecocentric).

**Table 3.** Answers to the seven selected items relating to a utilization (anthropocentric) attitude.

Item	Country	"Agree or somewhat agree"	"Don't agree or somewhat disagree"	Differences between Sweden and France. Significant differences (S). Not significant (NS).
A4: Nature is always able to restore itself. (U)	Sweden	13	87	S** (French agree to a larger extent)
	France	28	72	
A16: Our planet has unlimited natural resources. (U)	Sweden	6	94	NS
	France	6	94	
A17: Society will continue to solve even the biggest environmental problems. (U)	Sweden	35	65	S**
	France	26	74	
A18: Human beings are more important than other living beings. (U)	Sweden	31	69	S**
	France	21	79	
A23: We need to clear forests to increase agricultural areas. (U)	Sweden	16	84	S**
	France	2	98	
A32: Humans have the right to change nature as they see fit. (U)	Sweden	7	93	S**
	France	3	97	
A54: Only plants and animals of economic importance need to be protected. (U)	Sweden	2	98	NS
	France	1	99	

Note: Percentage for each country and the results of the Pearson's chi-squared tests (\*\* $p < 0.001$ , \* $p < 0.01$ ). The instruction was: "Indicate to what point you agree with the following statements by ticking only one box between 'I agree' and 'I don't agree' for EACH of the following statements". The items where significant differences were found between the two countries are written in bold. (Agree = utilization/anthropocentric).

*continue to solve even the biggest environmental problems (A17), Human beings are more important than other living beings (A18), We need to clear forests to increase agricultural areas (A23), Humans have the right to change nature as they see fit (A32) and Only plants and animals of economic importance need to be protected (A54).* This implies that neither the Swedish nor the French teachers/student teachers, hold an essentially "Utilization" (anthropocentric) attitude. However, some differences between the two countries were found.

### **Differences Between the Two Countries**

Comparing the results from the two countries for each of the 14 items, the Pearson's chi-squared tests ( $\chi^2$ ) revealed that there were significant differences between the answers for eight of the 14 items. Three of these relate to a Preservation (ecocentric) attitude (A11, A40, A50), whereas five relates to a Utilization attitude (A4, A17, A18, A23, A32). No significant differences between the countries were found for the rest of the items (Table 2 and 3).<sup>4</sup>

For seven of these eight items, the French group responds in a more ecocentric manner than the Swedish group. Regarding one item (A4), it is, however, the Swedish group whose responses are more in line with an ecocentric attitude.

Out of the eight statements for which significant differences were found, there are three in particular which concern the relationship between the human and the non-human biological world. These are:

A4: Nature is always able to restore itself. (U)<sup>5</sup>

A18: Human beings are more important than other living beings. (U)

A32: Humans have the right to change nature as they see fit. (U)

Another statement which is of interest in relation to previous research on environmental attitudes is A17: *Society will continue to solve even the biggest environmental problems*. The differences between the two countries regarding these specific items are further described below.

- Nature is always able to restore itself

Regarding the item concerning whether the respondents agree or do not agree to the statement *Nature is always able to restore itself* (A4), the French teachers and student teachers agree to a larger extent than the Swedish group, implying a more anthropocentric or utilization attitude among the French sample, even if among both groups over 70% do not agree to this claim. This is the only statement for which the Swedish group's replies indicate a more ecocentric attitude than the French group's.

- Human beings are more important than other living beings and have the right to change nature

When it comes to the results from the two items A18: *Human beings are more important than other living beings* and A32: *Humans have the right to change nature as they see fit*, the Swedish teachers and student teachers agree to a significantly larger extent than the French sample. This indicates that in this case, for these items, the Swedish groups hold a more anthropocentric attitude than do the French groups.

- Society will continue to solve even the biggest environmental problems

Regarding the item *Society will continue to solve even the biggest environmental problems* (A17), the Swedish group agrees to a significantly higher degree than the French, implying that Swedish groups have more faith in the actions taken by society to solve environmental problems, even if for both groups, over 60% do not agree or somewhat disagree agree.

<sup>4</sup>Regarding the item concerning whether it is necessary to clear forests to increase agricultural areas (A23), a difference between the two countries is that in Sweden there is an ongoing debate about whether to let previously agricultural areas be actively afforested and thus develop into monocultural forests. To agree with this statement might therefore not necessarily imply a utilization or anthropocentric attitude for the Swedish sample, but instead possibly show a concern about a biodiverse landscape.

<sup>5</sup>With this attitude, one can claim that it does not matter how humans "behave": Nature is always restored.

## Discussion

The aim of this paper was to explore teachers' and student teachers' attitudes to nature and the environment in a Swedish context and compare these to attitudes in another European country, in this case France. We also wanted to find out if there was a clear discrepancy between the two value-based factors Utilization (U) and Preservation (P), reflecting an anthropocentric and ecocentric attitude respectively, as reported by Munoz et al. (2009), using the same instrument and analysis.

The *Principal Component Analysis* (PCA) revealed a distinct opposition and a dependence between these two dimensions, while previous studies suggested that they were more independent (e.g., Munoz et al., 2009). This study therefore indicates that there is a link between a strong anthropocentric attitude and a weak ecocentric attitude, and likewise a link between a strong ecocentric attitude and a weak anthropocentric attitude. As previously mentioned, there are claims that a sense of sustainability can be developed that is neither anthropocentric nor ecocentric (e.g., Bonnett, 2002), and that this two-dimensional way of describing ethical attitudes towards the environment is too simplistic (see e.g., Kronlid & Öhman, 2013; Quinn et al., 2016). Our findings nevertheless imply that within this Swedish and French sample and with the instrument used here, these attitudes are clearly two opposing dimensions.

The overall picture of the environmental attitudes explored in our study is that the teachers and student teachers both in Sweden and in France hold mainly ecocentric attitudes. Regarding Sweden, this corresponds to the conclusions by Jagers and Matti (2010), implying a prevailing ecocentric attitude among the randomly selected Swedish citizens in their study.

However, when comparing the data from the two countries in our study, some significant differences were found. These indicate that the Swedish teachers and student teachers most often have a more anthropocentric attitude than those in the French sample. Hence, the difference hypothesized on the basis of our literature review, that teachers and student teachers in Sweden have a more ecocentric and less anthropocentric and patrimonial attitude than those in France, is not supported by our study. For example, regarding the statement *Human beings are more important than other living beings* (A18) and *Humans have the right to change nature as they see fit* (A32), the Swedish group agreed to a larger degree than the French group. This can be related to the findings reported by Torbjörnsson (2014), that interest in environmental matters and sense of responsibility for environmental issues among Swedish youth has declined during the first decade of the twenty-first century and is slightly lower than the OECD mean. This is in spite of the relatively long tradition of environmental education and caring for nature, as described by Breiting and Wickenberg (2010), and the long tradition of outdoor life connected to the right of public access (Sandell & Öhman, 2010). The fact that the Swedish teachers and student teachers in our study seem to have a higher confidence in society's capacity to solve environmental problems is also consistent with the finding reported in Torbjörnsson (2014) that young people in Sweden are more optimistic regarding possibilities for solving environmental problems compared to other European countries. The reason for this might be found in the belief in a well-functioning environmental supervision mentioned above, but maybe it could also be due to the lack of action competence or action willingness among the "Germans" or Scandinavian people, as described by Cans (1997).

When it comes to environmental education, and the attitudes held by the over 1,000 teachers and student teachers in our study, our results could indicate that the direction argued for by a number of scholars (e.g., Kopnina, 2014; Bonnett, 2013)—to encompass all living organisms in teaching for sustainability—might still be lacking in schools to some extent and maybe in Swedish schools in particular. If the statement made by Oakley (2011), mentioned previously, that the environmental problems we face stem from "the anthropocentric Western characterizations of humanity as separate from other species and the natural world" (Oakley, 2011, p. 8), an increased focus on these issues in environmental and sustainability education seems to be relevant. Chansigaud (2017, p. 68) is, however, sceptical regarding the power of education to change our ways of perceiving nature, since values

and attitudes are deeply rooted in our cultural heritage. As argued by numerous scholars, a possible approach might be, to encourage the use of aesthetics and emotions in teaching and learning science as a way to achieve an understanding of the fact that we are all part of the living world (e.g., Bonnett, 2007; Hodson, 2003; Nyberg, 2017) and to integrate the learning of science with the life of the students, thus to close the disjunction reported by Cobern et al. (1999). For example, as argued by Nyberg (2017), working with living organisms in biology lessons, indoors or outdoors, might be one way to integrate cognitive learning with sensory experiences and thereby possibly start building a sense that all living beings are part of the ecosystem of the Earth, which could “thus serve as a starting point for framing humans’ relationship with nature” (Nyberg, 2017, p. 154).

Regardless of the differences found between Sweden and France in our study, we can conclude on the basis of our study that the teachers and student teachers in both countries hold mainly ecocentric attitudes. This may possibly translate into teaching which promotes ecocentric attitudes among students, although attitudes and knowledge among teachers does not necessarily translate into attitudes and knowledge among their students. The fact that anthropocentric attitudes also exist, and that, according to our data, ecocentric and anthropocentric attitudes might be two opposing dimensions, is something that needs to be addressed in education, if teachers’ and students’ attitudes towards nature are to be challenged. Since it has been questioned whether a bio/ecocentric position also means an environmentally friendly position (Kronlid & Öhman, 2013), this is something that it would be interesting to research further, as well as how teachers’ environmental attitudes are enacted into teaching and how they influence the students. Nevertheless, whether environmental education in schools throughout the world is to be normative or pluralistic (see e.g., Jickling & Wals, 2012 or Kopnina, 2014), we believe that the attitudes among teachers will have some influence on the beliefs and attitudes among their students and thereby among the generations to come.

## Limitations of the Study

The study is based on a survey with over 1,100 participants. To be able to draw more nuanced and more in-depth conclusions regarding pre- and in-service teachers’ views on nature and the environment, interviews and possibly observations would also be desirable as a complement, especially as there might not be a straightforward connection between ecocentric/biocentric attitudes and environmental concerns. Another possible limitation is that the cultural differences between the two countries might play a role when it comes to the participants’ interpretation of some of the items in the survey. (e.g., as discussed in Footnotes 3 and 4, pp. 16–17). Therefore, the specific conclusions drawn from these separate items should be interpreted with some caution. Nevertheless, we believe this study gives some indication of pre- and in-service teachers’ attitudes towards nature and how these attitudes might vary between the two European countries Sweden and France.

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No potential conflict of interest was reported by the authors.

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## References

- Andersson, B., Kärrqvist, C., Löfstedt, A., Oscarsson, V., & Wallin, A. (1999). *Nationell utvärdering 98. Tema tillståndet i världen*. (IPD-rapport nr 14, Na-spektrum nr 21). Mölndal: Göteborgs Universitet, Inst. för pedagogik och didaktik.
- Bogner, F. X., & Wiseman, M. (2006). Adolescents' attitudes toward nature and environment: Quantifying the 2-MEV model. *The Environmentalist*, 26, 247–254.
- Bonhoure, G. (2008). Une discipline dans l'éducation au développement durable: les sciences de la vie et de la Terre [A discipline within education for sustainable development: Life and Earth sciences]. *Rapport à Monsieur le Ministre de l'Éducation Nationale*. Rapport n° 2008-004, janvier 2008.
- Bonnett, M. (1999). Education for sustainable development: A coherent philosophy for environmental education? *Cambridge Journal of Education*, 29(3), 313–324.
- Bonnett, M. (2002). Education for sustainability as a Frame of Mind. *Environmental Education Research*, 8(1), 9–20.
- Bonnett, M. (2007). Environmental education and the issue of nature. *Journal of Curriculum Studies*, 39(6), 707–721.
- Bonnett, M. (2012). Environmental concern, moral education and our place in nature. *Journal of Moral Education*, 41(3), 285–300.
- Bonnett, M. (2013). Sustainable development, environmental education, and the significance of being in place. *The Curriculum Journal*, 24(2), 250–271. doi:10.1080/09585176.2013.792672
- Breiting, S., & Wickenberg, P. (2010). The progressive development of environmental education in Sweden and Denmark. *Environmental Education Research*, 16, 9–37. doi:10.1080/13504620903533221
- Cans, R. (1997). Les trois sœurs de l'écologie [The three sisters of ecology]. In J. M. Besse & I. Roussel (Eds.), *Environnement: Représentations et concepts de la nature [Environment: Representations and concepts of nature]* (pp. 209–211). Paris: l'Harmattan.
- Carvalho, G., Clément, P., Bogner, F., & Caravita, S. (2008). *BIOHEAD-Citizen: Biology, Health and Environmental Education for better Citizenship, Final Report*. Brussels: FP6, Priority 7, Project N° CITC-CT-2004-506015.
- Castéra, J., Clément, P., Munoz, F., & Bogner, F. X. (2018). How teachers' attitudes on GMO relate to their environmental values. *Journal of Environmental Psychology*, 57, 1–9. doi:10.1016/j.jenvp.2018.04.002
- Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research*, 1(2), 245–276.
- Chansigaud, V. (2017). *Les Français et la Nature. Pourquoi si peu d'amour? [The French and Nature. Why so little love?]*. Arles: Actes-Sud.
- Chessel, D., Dufour, A. B., & Thioulouse, J. (2004). The ade4 package-I-One-table methods. *R News*, 4(1), 5–10.
- Clément, P. (2004). Construction des umwelts et philosophies de la nature [Construction of umwelts and philosophies of nature]. *Soc. Linéenne Lyon* (co-éd. Univ. Catholique Lyon: Fac. Sc. & Fac. Philo: J.M.Exbrayat & P.Moreau, *L'homme méditerranéen et son environnement*), p. 93-106.
- Clément, P. (2011). Didactique des Sciences et Education au Développement Durable: processus et enjeux [Science didactics and Education for Sustainable Development]. *Forêt Méditerranéenne*, XXXII n°2, « Observer et s'adapter au changement climatique en forêt méditerranéenne », p. 229-240. <http://hal.archives-ouvertes.fr/hal-01024884>, <http://www.foret-mediterraneenne.org/fr/catalogue>
- Clément, P., & Caravita, S. (2011). *Education pour le Développement Durable (EDD) et compétences des élèves dans l'enseignement secondaire* [Education for Sustainable Development and students' skills in secondary education] – Rapport d'une étude commandée par l'UNESCO (88 pp.). Paris: UNESCO. <http://hal.archives-ouvertes.fr/hal-01026073>
- Cobern, W. W., Gibson, A. T., & Underwood, S. A. (1999). Conceptualizations of nature: An interpretive study of 16 ninth graders' everyday thinking. *Journal of Research in Science Teaching*, 36, 541–564.
- Cottureau, D. (2014). *L'éducation à l'environnement : l'affaire de tous? [Environmental education: everyone's business?]*. Paris: Belin.
- Dewey, J. (1938/1997). *Experience and education* (New ed.). New York: Simon & Schuster.
- Dolédéc, S., & Chessel, D. (1987). Rythmes saisonniers et composantes stationnelles en milieu aquatique. I: Description d'un plan d'observation complet par projection de variables [Seasonal rhythms and stationary components in the aquatic environment. I: Description of a complete observation plan by projection of variables]. *Acta Oecologica. Oecologia Generalis*, 8(3), 403-426.

- Giolitto, P., & Clary, M. (1994). *Eduquer à l'Environnement [Educate for the Environment]*. Paris: Hachette Education.
- Girault, Y., & Sauvé, L. (2008). L'éducation scientifique, l'éducation à l'environnement et l'éducation pour le développement durable. Croisements, enjeux et mouvances [Science Education, Environmental Education and Education for Sustainable Development. Crossings, challenges and movements]. *Aster*, 46, 7-30.
- Hart, P. (2007). Environmental education. In S. K. Abell, & N. G. Lederman (Eds.), *Handbook of research on science education* (pp. 493-533). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.
- Hodson, D. (2003). Time for action: Science education for an alternative future. *International Journal of Science Education*, 25(6), 645-670.
- IUCN. (1980). *World conservation strategy: Living resource conservation for sustainable development*. Gland: IUCN.
- Jagers, S. C., & Matti, S. (2010). Ecological citizens: Identifying values and beliefs that support individual environmental responsibility among Swedes. *Sustainability*, 2(4), 1055-1079.
- Jickling, B., & Wals, A. (2012). Debating education for sustainable development 20 years after Rio: A conversation between Bob Jickling and Arjen Wals. *Journal of Education for Sustainable Development*, 6(1), 49-57.
- Kopnina, H. (2014). Future Scenarios and environmental education. *The Journal of Environmental Education*, 45(4), 217-231.
- Kopnina, H. (2015). Cultivating a value for non-human interests through the convergence of animal welfare, animal rights, and deep ecology in environmental education. *Education Sciences*, 5, 363-379.
- Kronlid, D., & Öhman, J. (2013). An environmental ethical conceptual framework for research on sustainability and environmental education. *Environmental Education Research*, 19(1), 21-44.
- Lange, J.-M. (2008). L'éducation au développement durable au regard des spécialités enseignantes [Education for Sustainable Development with regard to teaching specialities]. *Aster*, 46, 123-154.
- Latour, B. (1999). *Politiques de la nature [Politics of Nature]*. Paris: La Découverte.
- Liefländer, A. K., & Bogner, F. X. (2014). The effects of children's age and sex on acquiring pro-environmental attitudes through environmental education. *The Journal of Environmental Education*, 45(2), 105-117.
- Mc Ewen, B., Clément, P., Gericke, N. M., Nyberg, E., Hagman, M., & Landström, J. (2015). Female and male teachers' pro-environmental behaviour, conceptions and attitudes towards nature and the environment do not differ: Ecofeminism put to the test. *Asia-Pacific Forum on Science Learning and Teaching*, 16(1), 1-30.
- Munoz, F., Bogner, F., Clément, P., & Carvalho, G. S. (2009). Teachers' conceptions of nature and environment in 16 countries. *Journal of Environmental Psychology*, 29, 407-413.
- Nyberg, E. (2004). Life cycles – for caring and learning about organisms and their environment - a starting point towards an understanding of environmental issues. In P. Wickenberg, H. Axelsson, L. Fritzen, G. Helldén, & J. Öhman (Eds.), *Learning to change our world - Swedish research on education & sustainable development* (pp. 313-328). Lund: Studentlitteratur.
- Nyberg, E. (2017). Aesthetic experiences related to living plants – a starting point towards framing humans' relationship with nature? In O. Franck, & C. Osbeck (Eds.), *Ethical literacies and sustainability education: young people, subjectivity and democratic participation* (s. 137-157). Basingstoke: Palgrave Macmillan.
- Oakley, J. (2011). Animality in environmental education: Toward an interspecies paradigm. *Canadian Journal of Environmental Education*, 16, 8-13.
- Öhman, J. (2006). *Den etiska tendensen i utbildning för hållbar utveckling: Meningsskapande i ett genomlevande perspektiv [The Ethical Tendency in Education for Sustainable Development: A Practical Understanding of Meaning-making]* (Diss.). Örebro universitet, Örebro.
- Östman, L. (Ed.). (2015). *Naturmötesspraktiker och miljömoraliskt lärande [Nature encounter practices and environmental moral learning]*. Uppsala: Uppsala universitet. Acta Universitatis Upsaliensis.
- Quillot, R. (2000). Crise et retour de l'idée de nature [Crisis and return of the idea of nature]. In R. Quillot (dir.), *La nature [Nature]* (pp. 3-38). Paris: Ellipses, coll. Philo.
- Quinn, F., Castéra, J., & Clément, P. (2016). Teachers' conception of the environment: Anthropocentrism, non-anthropocentrism, anthropomorphism and the place of nature. *Environmental Education Research*, 22(6), 893-917.
- Roger, A., & Guéry, F. (Eds.). (1991). *Maitres et protecteurs de la nature [Masters and protectors of nature]*. Seyssel: Éditions Champ Vallon.
- Sandell, K., & Öhman, J. (2010). Educational potentials of encounters with nature: Reflections from a Swedish outdoor perspective. *Environmental Education Research*, 16(1), 113-132.
- Schneller, A., Johnson, B., & Bogner, F. (2015). Measuring children's environmental attitudes and values in northwest Mexico: Validating a modified version of measures to test the model of ecological values (2-MEV). *Environmental Education Research*, 21(1), 61-75.
- Swedish Environmental Protection Agency. (2017). The right of public access. <http://www.swedishepa.se/Enjoying-nature/The-Right-of-Public-Access/>
- Swedish National Agency for Education. (2011). Curriculum for the compulsory school system, the pre-school class and the recreation centre (Lgr11). <https://www.skolverket.se/publikationer?id=3984>
- Torbjörnsson, T. (2014). *Solidaritet och utbildning för hållbar utveckling: en studie av förväntningar på och förutsättningar för miljömoraliskt lärande i den svenska gymnasieskolan [Solidarity and Education for*



- Sustainable Development: a study of expectations of and conditions for environmental moral learning in the Swedish upper secondary school secondary school*] (Diss. (sammanfattning)). Uppsala universitet, Uppsala, 2014. Uppsala.
- Urgelli, B. (2011). *Les logiques d'engagement des enseignants face à une question socioscientifique médiatisée: le cas du réchauffement climatique [The roles of teacher's engagement in a mediated socio-scientific issue: the case of global warming]*. Thèse de doctorat de didactique des sciences, sciences de l'information et de la communication. PRES-Université de Lyon, 2009.
- Wiseman, F. X., & Bogner, M. (2003). A higher-order model of ecological values and its relationship to personality. *Personality and Individual Differences*, 34, 783–794.
- Wiseman, M., Wilson, G., & Bogner, F. X. (2012). Environmental values and authoritarianism. *Psychology Research*, 2 (1), 25–31.