



Attitudes Towards the Polar Regions as a Reflection of the Sense of Responsibility for the Environment. Theoretical Background for Further Study

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The last two hundred years in the recent history of the Earth have been a period dominated by rapidly increasing human activity. Today, the discussion on the effects of anthropopressure takes the form of critical reflection on the negative impact of humanity on the natural environment. Although sparsely populated, the effects of this impact are particularly visible in the polar regions. The consequences of anthropopressure take the form of melting ice caps and glaciers, warming and thawing of permafrost, changes in sea ice structure, erosion of sea coasts, changes in the scale of Arctic fauna and flora, and a warmer climate. Research conducted in the US shows that its citizens have knowledge about polar regions, but that the level of this knowledge is low. The scope of general knowledge, the level of education, and social and demographic features (age, gender, income) may influence the formation of social opinions reflected in legislative and political solutions concerning the polar regions. Social science research has already shown that changing people's attitudes is much more effective if the process starts in adolescence, at the beginning of institutional education. In such a situation, diagnosing the attitudes of young citizens toward polar areas is important for their further development, especially if these attitudes are to be treated as a reflection of wider attitudes toward the natural environment. In this article we set forth to review how attitudes related to the polar regions, may be used as an example of general mechanisms of changing attitudes towards the environment in general. We provide analysis that can be used as background for designing empirical research and further – for designing educational and social plans promoting environmental responsibility.

Keywords: polar regions, environment, education, consciousness, attitudes

INTRODUCTION: ANTHROPOCENE AND ANTHROPIC PRESSURE

The last two hundred years of Earth's history have been dominated by rapidly increasing human activity (Wilson, 2012; Pyron, 2018; Safina, 2018). Nowadays extensive consequences of this human influence on the natural environment are defined as the new geological era of the Anthropocene (Lewis et al., 2015). The critical phenomenon of anthropopression within the human and social sciences emphasizes the negative influence of human species on the environment, also causing

climate change. This kind of approach is also shared by natural scientists, such as the chemist and Nobel Prize laureate, Paul Crutzen, who coined the term Anthropocene (see also: Zalasiewicz et al., 2010; Steffen et al., 2011). It is significant that, as an employee of the Oceanography Institute at the University of California in San Diego, he recognized the immense impact of humans on the natural environment. His concern about destruction caused by humans in nature is shared by representatives of other sciences (Safina, 2018).

Braidotti (2013), one of the most prominent thinkers in contemporary humanistic discourse on humans and their role in ecosystems, has proposed a new approach for understanding the relationship between human culture and the natural environment. Instead of contrasting these two notions, Braidotti initiated thinking about those terms as two ending points on the same continuum. This approach connects culture with nature and emphasizes the impossibility of drawing an absolute distinction between those two. Such a way of thinking is strongly related to Arne Næss's "deep ecology," in which he argued that a true understanding of nature is based on biodiversity treated as an autotelic value (1989). It is Næss who, in probably the most evocative way, emphasized that it is impossible to divide culture from nature, as both overlap in many areas (see also Wilson, 1988).

Deep ecology is related to the serious concern about the natural environment with which humans have to maintain links to fulfill one of the specific human needs – biophilia. This notion describes the human need to stay in touch with "bios". Wilson (1984) and Wilson (2011), following the initial idea proposed by Fromm (1980), became one of the strongest advocates of preserving biodiversity on earth (2016). By proposing to protect half of the planet from human access, he hopes to maintain the planet's natural resources in a sustainable way.

Purdy (2015), argued that nature no longer exists as separable from humanity. The world we inhabit is the world we have made, and it is no longer pure. Enter the Anthropocene, the age of humans, as geologists have called this planetary epoch. Purdy argued that the challenge we face as humanity is that we either have to develop environmental politics that are more democratic or accept that they will become more unequal and inhumane. To avoid the last alternative, we need to better understand the relationship between humans and nature—our environment—as our encounters with nature are not natural, but culturally and socially produced (Purdy 2015: 14).

In general, many authors highlight the need for immediate human action toward environmental protection (Madsen, 1996; Leshner, 2005; Grimmette, 2014). Following these calls, many symbolic and very significant actions appear (e.g., climate strikes by Greta Thunberg or Nobel Prize in literature for the Polish environmental activist Olga Tokarczuk), but there is still a need to educate the broader audience about the urgency of the situation. Due to their specificity, the polar regions can be treated as litmus paper, indicating current interest in sustainability and effective environmental protection.

Before we proceed with our focus on attitudes, it is necessary to engage briefly with research on environmental communication

and visualization of climate change. Environmental communication campaigns aiming at increasing awareness regarding climate change were conducted from the 1990s (see: Sakellari, 2015; Christensen and Nilsson, 2017), in which polar bears became 'icons' (Born, 2019). Research indicates that specific cultural connotations of the Arctic – especially in the US – may stand in the way for accepting the general scientific agreement related to climate change (Stenport and Vachula, 2017), that media's visualization of climate change affect ecological citizenship (Lester and Cottle, 2009), and how communicators can deploy strategies to engage with audiences to change public attitudes (Bolsen and Shapiro, 2018). While the above is certainly fruitful, our take is somewhat different as we consider how attitudes may be considered from a sociological perspective, e.g., through the formation of attitudes at an early age.

CHANGING ENVIRONMENT OF POLAR REGIONS

Evidently, climate change is an issue that concerns many citizens, especially in the countries that develop programs raising awareness regarding global warming and its negative influence on the polar regions, especially in the Arctic. This is especially true in Canada, where 88% of respondents express concern regarding climate change in the Arctic¹. Some of the research conducted in Finland indicate that gender, knowledge about climate warming and constructive hope become predictors of attitude towards climate change (Ratinen and Uusi-Uurti, 2020).

Although the current human presence in the Arctic and Antarctic is limited due to harsh climate conditions and difficult access, polar regions are still highly affected by human activity. The polar regions (frigid zones) of the Earth are the regions of the planet that surround its geographical poles (the North and South Poles). They are distinguished based on the amount of solar radiation received, which is significantly lower than in other regions, resulting in lower mean temperatures. This strongly limits fauna and flora in polar regions. Some authors also claim that human activities within the Arctic are, in fact, not very intense but very influential (Huntington et al., 2006). Their analysis suggests that those activities may have a larger influence on the arctic system than previously thought. This should be given special consideration, as human influence could increase substantially in the near future (McFadyen, 2011). The condition in polar regions is strongly connected with climate change and anthropic pressure in other parts of the world (ACIA, 2005). The climate and general environmental situation in the Arctic have changed significantly in the past decades. Symptoms of those changes are clearly visible in melting sea-ice cover and glaciers, melting permafrost, changing ocean currents and circulation, erosion of the sealine, change in fauna and flora of the Arctic (Arctic Biodiversity Assessment, 2013 p.675), and rise

¹See: <https://davidsuzuki.org/wp-content/uploads/2017/09/focus-canada-2014-canadian-public-opinion-climate-change.pdf> or <https://environmentjournal.ca/climate-change-remains-the-most-critical-issue-for-canadians/>.

of temperatures (Serreze et al., 2000; ACIA, 2005; Huntington et al., 2006; Overland et al., 2019). The melting and retreat of Arctic tidal glaciers and ice disappearance from the coast (fast ice, ice foot) are the two most conspicuous effects of a warmer climate on Spitsbergen in the European Arctic (ACIA, 2005). The deglaciation of Spitsbergen causes the formation of new habitats that were not previously available. The observed changes are an increase in biomass and biodiversity and the emergence of sublittoral communities in shallower waters, where ice scouring was a controlling factor (Weslawski et al., 2010).

One would expect that the more and more intense, visible, and radical changes in polar regions caused by human activity would raise concern and provoke society to change its attitudes toward natural environmental protection. This is especially important as a massive change in society's use is anticipated to take place in polar areas—such as commercial development (fishery, shipping, logistics) and the development of tourism to areas previously inaccessible for the wider public. We thus ask: What is the role of knowledge about and attitudes toward polar regions when it comes to shaping an understanding of responsibility for the environment in these regions?

SOCIAL CONSCIOUSNESS, KNOWLEDGE, AND CONCERN ABOUT POLAR REGIONS

Research in the US shows that polar knowledge proves to be limited, but certainly not absent among survey respondents. Polar knowledge, general science knowledge, and education, together with individual background characteristics (age, sex, and income), may allow the prediction of policy-relevant opinions (Hamilton, 2008). Although polar regions are out of reach for the average citizen, their presence in reports on climate change becomes increasingly visible, which also increases media presentations on this topic. The general situation in polar regions is significantly influenced by industrial investments: gas and petroleum extraction and animal industrial production (especially fish farming) in the Arctic, and the development of tourism in both the Arctic and Antarctic. All these processes increase social, political, and economic interest in the polar regions. Scientific research conducted in the Arctic and the Antarctic has become important in detecting climate change, and the results of that research are therefore important. Popularization of research findings may increase awareness related to climate change and environmental protection. Sociological analysis indicates the following:

“Large majorities of respondents express at least some concern about the polar consequences of climate change, even those with no direct impacts on mid-latitude life. Levels of concern are highest regarding the apparent risks of sea-level rise and coastal flooding (70% would be bothered “a great deal”) or polar ice melting (63%). Somewhat fewer would, more altruistically, be bothered a great deal by threats to the Inuit way of life (45%), polar bears (45%) or seals (43%)” (Hamilton, 2008).

Thus, people who evaluate their own knowledge as being of a higher level are much more concerned about climate change in general. American surveys of public opinion often find that concern about the environment is higher among young, female, or well-educated respondents and lower among those self-identified as conservative (Hamilton, 2008; Hamilton et al., 2012). These polarized results also, for the most part, agree with the meta-analysis findings of Allum et al. (2008). This kind of research has not been conducted in Europe; although IPCC reports indicate the need for extensive socio-economic analysis of social processes leading to climate changes (Larsen et al., 2014; Hoggan and Grania, 2016 p.249).

Initial surveys conducted by us in Poland on youth aged 16–17 in 2020 aimed to identify whether there was an interest in topics related to climate change and polar regions (the youth was reached by high school teachers recruited by snow-bal method. Students were asked only one question if they do recognized the name of Greta Thunberg). The marker was determined as the level of awareness of who Greta Thunberg is. As a young activist, she could be treated by youth as a person closer to their generation's reality and identity. In the group of 136 students, 45% indicated that they are not familiar with the name of Greta Thunberg, 30% of students have recognized her name and claimed they like what she does, 15% of students recognized her name and claimed they did not like what she does, and 9% of students answered they do know who Greta is, but they had no opinion about her actions. This raw data show an interesting division of opinions among young people.

Hamilton et al. (2012) indicated that public knowledge about the polar regions, as assessed by the General Social Survey, significantly improved between 2006 and 2010—before and after the International Polar Year (2007–2008 was an extensive interdisciplinary scientific program aiming at researching opportunities offered by the unique environment of the Arctic and the Antarctic regions). He noticed however, that, increase in knowledge did not correspond with the level of concern, although in general, those who possess a higher level of knowledge (also knowledge about polar regions) tend to be more concerned about environmental protection. Hamilton's research is based on data gathered almost a decade ago, so although those results can indicate how the knowledge-concern relation can look today, it seems necessary to double-check the current relationship between those two.

In Hamilton's research, respondents were asked to assess the level of their own knowledge on polar regions. They were asked questions, such as: “Is it true that ice cover of the Arctic decreases?” and “Does the number of polar bears decrease?”. Young adults, more educated persons, and those holding liberal political views were much more worried about environment. On certain environmental topics, women expressed greater concern than men. Research on the social bases of concern about climate change, in particular, has looked closely at the roles of education and knowledge, including how these are filtered by ideology or preexisting beliefs (e.g., Madsen, 1996; Leshner, 2005; Mikulik and Babina, 2009).

Knowledge of polar regions can be treated as an indicator of general attitudes toward environmental protection. Polar regions

possess certain characteristics that can allow for such a generalization.

First, polar regions are distinctive in their landscapes, climate, fauna, and flora (Tin et al., 2012). Those elements become iconic, and they become representatives of much wider processes (polar bears represent mega-fauna being extinct; glaciers represent reservoirs of water for the planet; melting sea ice cover represents global warming; and empty snowing landscapes represent mindfulness and calm). Therefore, social awareness about preserving those elements should be expected to be higher than awareness about regions with less distinctive elements.

Second, many countries have vested interests in the polar regions and are involved on different levels, as seen through not only the membership of Arctic eight countries in the Arctic Council, but also the interest of non-Arctic states observer states in the Arctic Council (Loukacheva, 2015). The international presence of research stations at Svalbard is a further example. This creates a situation in which several countries should feel responsible for taking care of the regions. However, the psychological phenomena of dispersed responsibility may appear—in such a situation, as there is no one nominated entity that takes the lead; all involved parties may feel like they are not responsible, as maybe “someone else will take action”. A similar situation occurs when it comes to taking care of the environment on earth, where shared responsibility may decrease individual actions.

Third, polar regions are the most unpopulated regions on the planet. This may create the impression that anthropic pressure is not present there, as direct human influence is not as visible for outside observers (cities and communication infrastructures are, to a lesser extent present). This impression is misleading, as there are many other traces of human presence (whaling stations, trappers' shelters, drift wood, plastic delivered by sea currents, etc (see Węśławski and Kotwicki, 2018), and because many polar areas such as the Kola Peninsula in Russia are heavily industrialized and polluted as well as having several large cities north of the polar circle. Therefore, the initial impression of a lack of human presence in fact is very misleading, but this impression may create in humans the sense of uniqueness of this area and may evoke a special urge to prevent it from further conquest by humans.

Fourth, the spectacular polar landscapes invoke human imagination, operating mostly in reference to sight (the strongest human sense). It seems like this makes it much more convincing to speak to the human imagination based on those icons rooted in the geography and biology of the region. Lastly, the polar regions are indicated as “the only two places” on Earth where a specific polar type of climate can be experienced. This defined uniqueness makes polar regions outstanding.

CHANGING ATTITUDES?

To increase social awareness about anthropogenic threats to polar regions, social attitudes need to be addressed and possibly changed. Attempts to create responsible attitudes towards Arctic were already made especially within the stream of

environmental communication practice (Jackson and Surrey, 2005; Leiserowitz and Fernandez, 2008).

Changing attitudes – which this article addresses – is an utterly difficult task that needs to be addressed carefully. Within the social sciences, it has already been proven that changing human attitudes is much more effective if started at an early stage of institutional education (kindergarten or in the first grades of grammar school). In such a situation, defining the attitudes of youth toward polar regions may indicate general attitudes towards environmental protection and how ecological citizenship is experienced in a time of increasing anthropogenic pressure. The attitudes are hidden and not directly observable, but they act to organize or provide direction to actions and behaviors that are observable. Attitudes can also be explained as “predispositions to respond” (Zimbardo and Leippe, 1991). Attitudes vary in direction (either positive or negative), degree (the level of positivity or negativity), and intensity (the amount of commitment with which a position is held).

Attitudes are formed during a long period of informal and formal socialization, based on relations with significant others (depending on the age of the individual, parents, peers, chosen role models). Learning attitudes are a significant part of the socialization process, aiming at educating children and youth (later also to influence adults) and turning them into responsible human beings that can contribute to the society. The culture where individuals live has a strong impact on their attitudes; attitudes that seem normal and acceptable in one culture can be unacceptable or even distasteful in another culture.

Znaniecki and Thomas (1918), in one of the earliest definitions of attitude, proposed to think of attitude as a mental state of readiness, organized through experience, using a directive influence upon the individual's response to all objects and situations with which it is related. Later, Zimbardo and Leippe (1991) defined attitude as an evaluative character toward some object based upon cognitions, affective reactions, behavioral intentions, and past behaviors.

Katz (1960), in his classical research, has recognized the importance of the study of attitudes and noted that there are four roles denoted for attitudes. First, attitudes allow to organize an individual's daily activities and responses to events that occur; Second, attitudes help in achieving goals and in avoiding punishment; Third, attitudes contribute to the enrichment of self-esteem; and fourth, attitudes, and values allow for the expressing of emotions and behaviors. In an obvious way attitudes affect an individual's performance and behavior toward other humans and the general surrounding environment.

Pickens (2005) linked the notion of attitude with perception, the process in which an individual interprets and organizes feelings to create a meaningful experience of the world. In other words, the person interprets the stimuli based on previous experience and socialization.

Lippmann (1946) proposed a concept of attitudes concerned with how indirectly people know the environment in which they live and how they believe it to be a true picture. He claims that, for individuals, the real environment is too overwhelming to handle cognitively, and this forces humans to reconstruct reality in the

form of simpler representations (stereotypical thinking). Based on these stereotypical representations, attitudes are formed. To maintain cognitive balance, humans tend to defend attitudes that are already formed. Lippmann (1946) also defined the concept of “images in human heads” (stereotypes) that nurture certain attitudes, support them, and make people act in certain ways.

Psychologically and sociologically, attitude is defined as a “coherent structure consisting of three components: affects, behaviors and cognition”. This definition is widely accepted by social sciences, as it can be operationalized easily; however, various paradigms underline the importance of different components: behaviorism emphasizes behavior as a key component in attitudes, psychoanalytical approaches focus on affects, and cognitive approaches refer mostly to opinions. Therefore, a behavioral approach focuses on the application of either aversive or positive stimuli, which is a base for the process of conditioning that leads to avoiding stimuli or searching for it. Psychoanalytic theories apply an approach in which attitudes may be treated as a self-defense mechanism aimed at protection of the self. Changing attitudes is possible by identifying internal conflicts in personality and exposing them. In this process, subconscious conflict moves into the conscious level, which allows dealing with the problem in an effective way. Lastly, cognitive approaches aim at changing attitudes by providing specific types of information, which at first may create cognitive dissonance and later will cause a search for change of attitude to maintain cognitive balance. (Mosler, 2001 pp.569–577, Patchen, 2006 p.2–5).

Affect, behavior, and cognition are three interrelated components of attitudes that stay in dynamic interdependent relations (Eagly and Chaiken, 1993; Philipchalk, 1995). Connections among those three elements are significant, and a change in one of them directly affects the others. According to Philipchalk (1995), the study of attitudes is critical, not only because it results in discoveries about how people feel, think, and behave, but also because those discoveries allow them to shape attitudes. Only very rarely can attitudes be identified as isolated ones. In most cases, they are interconnected with other attitudes; therefore, changing one of them may cause chain reaction-provoking change in other attitudes.

Recent research distinguishes between explicit and implicit attitudes (Scior and Werner, 2015). The concept of explicit attitudes means that the respondents are often asked by using questionnaires in which they indicate what they think, feel, or intend to do. However, the concept of implicit attitudes means that the respondents are not always aware of their attitudes; therefore, more sophisticated methods have to be used. Following the concept of implicit attitudes, various ways originating from projective methods are used (for example, displaying a large number of words from which subjects have to choose the right words expressing their attitudes in the most adequate ways). Scior and Werner (2015) summarized that implicit attitude tests provide a better indicator of individual behaviors.

In sociology, researching attitudes is an important stream of research, as identifying current attitudes allows the application of practical changes aimed at finding solutions for social problems. Changing attitudes is a challenging but possible task, requiring an

extended theoretical background. Depending on the paradigm applied, various strategies are proposed. If a behavioral-cognitive paradigm is to be followed, to cause change, one needs to influence those two elements (behavior and opinions). Pickens (2005) claims that to change attitudes, it is recommended to contact the cognitive and emotional components of the attitude. When an individual has negative attitudes toward a particular topic, it is possible to change attitude by bringing new, relevant information on the subject.

Ajzen and Fishbein (1980) in their theory of reasoned action, advocated the ABC model (Affection-Behaviour-Cognition) and concentrated on efforts to examine the relationships between attitudes. Ajzen and Fishbein (1980) interpret attitude as a tendency to react consistently to a given stimulus, as sympathetic, or not sympathetic, and attitude is currently a mixture of prominence beliefs about the output behavior, with the individual evaluation about the outcome behavior. All this, can be reflected in a specific measurable scale. Ajzen and Fishbein (1980) argued that it is important to understand the behavior before it can be changed, as motivation is a key component in influencing behaviors.

The theory of reasoned action reflects a social psychological approach to understanding and predicting behavior (Ajzen and Fishbein, 1980). Human behavior is reviled based on existing intentions, which indicate the degree of effort that people are willing to invest to do something. The more severe the intent, the more likely it is to occur. One can better understand the relationship between the elements in attitudes if one accepts the assumption that humans are rational and that they take into account the implications from their actions. Subjective norms, is a concept that discusses the impact of the social environment on behavior and is used as a basic component in the theory. The term describes the normative level of stress that is perceived by the individual, whether to perform or not perform a certain action. The individual tends to perform the behavior when he believes that “significant others” think he should do it. “Significant others” can be (as mentioned before) parents, spouses, close friends, co-workers, managers, and so on (Ajzen and Fishbein, 1980; Ajzen, 1991).

Ajzen (1991) claimed that as long as an individual believes he has the resources and opportunities, that will encounter the least number of obstacles, the more they can control his behavior. Ajzen (1991) adds that the observed behavioral control concept is suitable to Bandura theory (Bandura, 1977), for example, the observed self-efficacy (perceived self-efficacy) when referring to the individual’s judgment of how well the required action to deal with the situation can be performed. Self-assessment of future success depends on the experience of the subjective perception of difficulty in meeting a new challenge.

Changing attitudes is a long process that requires effort and determination. Educators should understand that the process is not easy and must develop realistic expectations about time and change. Further, the processes of socialization and the attitudes that are created are accompanied by beliefs and values and are affected by various factors such as family, religion, culture, and socio-economic factors (Pickens, 2005). Individual characteristics are also major factors that can affect attitude change. Thus, to

predict the chances of an attitude change, it is important to examine not only the characteristics of the attitude, but also the attributes of the attitude's owner (Carmil and Breznitz, 1991).

Chaiklin (2011) studied the relationship between attitudes, behavior, and social practice and noted that attitudes are important in creating general societal approaches to important social issues and challenges. Voas (2014) points out that social norms are created in a way that the individual appreciates and relates to the subject as good, or bad. He claims that until the last century, psychologists were the ones who had studied the issue of attitudes, and sociologists have neglected this issue, even though they referred to the gap between what the individual says vs. what he does. Therefore, it is important to examine the issue of attitudes as normative statements about the social order rather than the individual's subjective feelings, likes, or does not like.

Voas (2014) argued that today, the sociology of attitudes is underdeveloped. He attributed great importance to sociological attitudes, positing that since humans base actions on attitudes, we think about society and the rights and obligations of the people. The attitude judgment is personal and expresses values. Understanding the nature of attitudes from a sociological perspective helps to decide what to measure and how important it is to examine and clarify beliefs, preferences, and the relationship between values and attitudes. Understanding the sociological aspects of attitudes also helps clarify the status of some key concepts, such as concern and responsibility.

Extensive research on theoretical approaches to changing attitudes has already been carried out and has also been applied in the everyday social practice of changing attitudes. Moreover, theoretical tools were successfully employed in the process of modifying precise types of attitudes—those toward nature, the environment, and their protection. There are many examples of the influence of human attitudes on environment. Anable et al. (2006) provided an extensive review of relations between public attitudes to climate change and everyday human habits—in this case, transport, and commuting behaviors. They emphasized the need to raise public awareness of this link. They claimed, however, that in order to create effective change, many levels of action need to be taken: at the objective and subjective and at the individual and collective levels. The authors also claimed that the psychological process of changing attitudes may be very slow: behavior changes first, and only later is there a change in attitude. They also underline the need to apply deliberative methodologies that deviate from traditional 'top-down' methods of information provision: two-way communication and learning by doing.

Frantzen and Vogl (2013) provided a country ranking of public environmental concerns based on an analysis of data collected by the International Social Survey Programme from 33 countries over the past 2 decades. Their data highlighted the fact that environmental concerns have recently decreased in almost all nations. They observed clear connection between the wealth of the country and a higher level of concern about environment. This observation corresponds with the classical concept of Abraham Maslow—the pyramid of needs. Needs of higher level can be fulfilled only after basic physiological needs are satisfied.

Patchen (2006) offered sociological insight into changing public attitudes and followed a classical sociological approach

by analyzing demographic data and linking results with possible ways of creating change in attitudes. He stressed that, to create effective change in attitudes, one needs to personalize information—this allows identification and connection between personal narrative, information, and the effects of behavior. He emphasized the role of both individual actions and collective efforts inspired by organizations. Lachapelle et al. (2012) added to this the need for coherent political decisions made by policymakers at various levels of societal organizations.

There are also very practical examples of how to influence a change in attitudes towards climate change by using educational actions. Sousa et al. (2016) described an educational experiment in which a pond habitat was used to confront students with biodiversity. By using a quantitative research methodology based on a Likert scale commonly used in sociology, they proved that a project increased students' knowledge and attitudes towards biodiversity. This is just one of several examples of changing public attitudes and increasing awareness of biodiversity, climate change, and wide environmental protection.

INCREASING SOCIAL AWARENESS OF ENVIRONMENTAL PROTECTION

All of the above-mentioned processes of anthropic pressure cause increasing threats to nature and the protection of the environment. The polar regions are very distinctive and unique and are also symbolic. Increasing social awareness about the need for protection of these regions has immense meaning in the general approach of humans toward nature and the sustainable management of social resources. Therefore, educating the public seems to be of crucial importance. Many authors indicate that there is a growing need to extend links between science and society, as this may increase consciousness about negative human influences on the environment (see Barbour, 2008; Harrison et al., 2009). An increasing level of education may cause changes in attitudes toward both polar regions and the environment in general. However, a Hamilton (2008) indicated, possessing a high level of knowledge does not always result in increasing concern about the environment. It seems that an emotional component needs to be added, as this one can be treated according to psychological and psychoanalytic approaches as a factor that causes the change (Firdaus et al., 2016).

Today, public opinion is confronted with opposing narratives in an increasingly polarized media landscape. On one hand, there is a promotion of the extended fear of nature (underlining all types of threats that potentially could be related to nature-diseases, accidents, dangers). On the other hand, the need for connection with nature-biophilia is being exposed as a natural human desire that needs to be fulfilled to develop properly. Facing the Anthropocene in the 21st century, social sciences are obliged to propose meaningful effective tools that may change human attitudes towards the environment. Development of social awareness and consciousness about anthropic pressure in the Anthropocene is our duty and obligation. Ensuring effective

communication with the public can be achieved if there is a strong link between science and institutions representing public opinions (Harrison et al., 2009). Providing direct access to the scientific results of research can fill the gap and may provide the emotional component needed to effectively change attitudes.

SUGGESTIONS FOR EMPIRICAL RESEARCH

It seems quite obvious that there is a burning need for empirical research of attitudes toward polar regions to create effective programs of protecting them. Following the context described above, we argue that it seems as though it could be effective to apply a cognitive-behavioral approach fostering modification of attitudes by providing information on the polar regions. We assume as well that certain types of behaviors (like traveling to polar regions) cause emotional experiences that eventually strengthen attitude; therefore, we apply the hypothetical assumption that experiencing emotions connected with the subject may change attitudes towards polar regions. For instance, future research could explore whether respondents' attitudes toward polar regions are connected with attitudes toward the protection of the environment in general. Using the theoretical background presented above, we thus suggest the following: First, social attitudes toward polar regions in selected categories of respondents (especially young people as those who will soon become decision makers) should be

identified. Secondly, an analysis of whether identified attitudes can be treated as reflections of more general attitudes toward the responsibility for environmental protection and climate change must be conducted. Finally, methods aimed at increasing awareness of polar regions and responsibility for environmental protection, following a cognitive-behavioral approach strengthened by an emotional component (presentation of scientific research), can be proposed.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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REFERENCES

- ACIA (2005). *Arctic Climate Impact Assessment*. Cambridge: Cambridge University Press, 1042.
- Ajzen, I., and Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behav. Hum. Decis. Process.* 50 (2), 179–211. doi:10.1016/0749-5978(91)90020-T
- Allum, N., Sturgis, P., Tabourazi, D., and Brunton-Smith, I. (2008). Science Knowledge and Attitudes across Cultures: A Meta-Analysis. *Public Underst Sci.* 17, 35–54. doi:10.1177/0963662506070159
- Anable, J., Lane, B., and Kelay, T. (2006). *An Evidence Base Review of Public Attitudes to Climate Change and Transport Behaviour*. Available at: <https://webarchive.nationalarchives.gov.uk/+http://www.dft.gov.uk/pgr/sustainable/climatechange/iewofpublicattitudetocls5730.pdf>
- Arctic Biodiversity Assessment (2013). *Status and Trends in Arctic biodiversity CAFF, Borgir Nordurslod Akureiri*. Iceland.
- Bandura, A. (1977). Self-efficacy: toward a Unifying Theory of Behavioral Change. *Psychol. Rev.* 84 (2), 191–215. doi:10.1037/0033-295x.84.2.191
- Barbour, R. (2008). *Doing Focus Group*. London: Sage.
- Bolsen, T., and Shapiro, M. A. (2018). The US News Media, Polarization on Climate Change, and Pathways to Effective Communication. *Environ. Commun.* 12 (2), 149–163. doi:10.1080/17524032.2017.1397039
- Born, D. (2019). Bearing Witness? Polar Bears as Icons for Climate Change Communication in National Geographic. *Environ. Commun.* 13 (5), 649–663. doi:10.1080/17524032.2018.1435557
- Braidotti, R. (2013). *The Posthuman*. Cambridge: Polity Press.
- Carmil, D., and Breznitz, S. (1991). Personal Trauma and World View-Are Extremely Stressful Experiences Related to Political Attitudes, Religious Beliefs, and Future Orientation? *J. Traum. Stress* 4 (3), 393–405. doi:10.1002/jts.2490040307
- Chaiklin, H. (2011). Attitudes, Behavior, and Social Practice. *J. Soc. Soc. Welfare* 38, 31.
- Christensen, M., and Nilsson, A. E. (2017). Arctic Sea Ice and the Communication of Climate Change. *Popular Commun.* 15 (4), 249–268. doi:10.1080/15405702.2017.1376064
- Eagly, A. H., and Chaiken, S. (1993). *The Psychology of Attitudes*. Fort Worth, TX: Harcourt Brace Jovanovich, 10.
- Firdaus, A., Shabudin, A., Rahim, R. A., and Foo Ng, T. (2016). Strengthening Scientific Literacy on Polar Regions through Education, Outreach and Communication (EOC). *Int. J. Environ. Sci. Education* 11 (12), 5498–5515.
- Frantzen and Vogl (2013). *Two Decades of Measuring Environmental Attitudes: A Comparative Analysis of 33 Countries*. Available at: <https://www.sciencedirect.com/science/article/pii/S0959378013000563>.
- Fromm, E. (1980). *The Heart of Man*. Harper Collins.
- Grimmette, K. A. (2014). *The Impacts of Environmental Education on Youth and Their Environmental Awareness. [B.Sc. Dissertation]*. Lincoln, NE: University of Nebraska. Retrieved from <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?Article=1134&context=enstudtheses>.
- Hamilton, L. C., Cutler, M. J., and Schaefer, A. (2012). *Public Knowledge about Polar Regions Increases while Concerns Remain Unchanged*. Issue brief, 42.
- Hamilton, L. C. (2008). Who Cares about Polar Regions? Results from a Survey of U.S. Public Opinion. *Arctic, Antarctic, Alpine Res.* 40 (4), 671–678. doi:10.1657/1523-0430(07-105)[hamilton]2.0.co:2
- Harrison, J. A., Cohen, J. H., Hinchey, E., Moerke, A., and von Dassow, P. (2009). Developing and Implementing an Effective Public Outreach Program. *Eos Trans. AGU* 90 (38), 333–334. doi:10.1029/2009eo380001
- Hoggan, J., and Grania, L. (2016). *I Am Right and You Are an Idiot: The Toxic State of Public Discourse and How to Clean it up*. Canada: New Society Publishers.
- Huntington, H. P., Boyle, M., Flowers, G. E., Weatherly, J. W., Hamilton, L. C., Hinzman, L., et al. (2007). *Climatic Change*, 82, 77–92. doi:10.1007/s10584-006-9162-yThe Influence of Human Activity in the Arctic on Climate and Climate Impacts *Climatic Change*

- Jackson, T., and Surrey, G. (2005). Motivating Sustainable Consumption. *Sustain. Dev. Res. Netw.* 29.
- Katz, D. (1960). The Functional Approach to the Study of Attitudes. *Public Opin. Q.* 24 (2), 163–204. doi:10.1086/266945
- Lachapelle, E., Borick, C. P., and Rabe, B. (2012). *Public Attitudes toward Climate Science and Climate Policy in Federal Systems: Canada and the United States Compared*. doi:10.1111/j.1541-1338.2012.00563.x
- Larsen, J. N., Anisimov, O. A., Constable, A., Hollowed, A. B., Maynard, N., Prestrud, P., et al. (2014). “Polar Regions,” in *Climate Change 2014: Impacts, Adaptation, and Vulnerability*. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Available at: https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-PartB_FINAL.pdf
- Leiserowitz, A. A., and Fernandez, L. O. (2008). Toward a New Consciousness: Values to Sustain Human and Natural Communities, Environment. *Environ. Sci. Pol. Sustainable Development* 50 (5), 62–69. doi:10.3200/ENVT.50.5.62-69
- Leshner, A. I. (2005). Where Science Meets Society. *Science* 307 (5711), 815. doi:10.1126/science.1110260
- Lester, L., and Cottle, S. (2009). Visualizing Climate Change: Television News and Ecological Citizenship. *Int. J. Commun. [S.I.]* 3, 17, 2009 . oct. 2009
- Lewis, S. L., and Maslin, M. A. (2015). Defining the Anthropocene. *Nature* 519, 171–180. doi:10.1038/nature14258
- Lippmann, W. (1946). *Public Opinion*. New Brunswick, NJ: Transaction Publishers, Vol. 1.
- Loukacheva, N. (2015). Polar Law and Resources. *Arctic Rev. L. Polit.* 6 (No. 2), 175. doi:10.17585/arctic.v6.182
- Madsen, P. (1996). “What Can Universities and Professional Schools Do to Save the Environment?,” in *Earth Summit Ethics: Toward a Reconstructive Postmodern Philosophy of Environmental Education*. Editors J. B. Callicott and F. J. Rocha (New York, NY: Albany State University of New York Press), 71–91.
- McFadyen, E. (2011). Antarctic Future – Education. Learning about Antarctica in the 21st Century: A Review of Selected Education Resources Available to Primary Teachers. Gateway Antarctica. Christchurch: University of Canterbury. *Rev. Top. PCAS* 13, 1–13. Available at: <https://ir.canterbury.ac.nz/handle/10092/13905>
- Mikulik, J., and Babina, M. (2009). The Role of Universities in Environmental Management. *Polish Jour. Env. Stud.* 18 (4), 527–531.
- Mosler, H. J. (2001). “Changing Environmental Attitudes and Behaviors in Populations: Simulation Studies Based on Socio-Psychological Theories,” in *Integrative Systems Approaches to Natural and Social Dynamics*. Editors M. Matthies, H. Malchow, and J. Kriz (Berlin: Heidelberg: Springer). doi:10.1007/978-3-642-56585-4_36
- Overland, J., Dunlea, E., Box, J. E., Corell, R., Forsius, M., Kattsov, V., et al. (2019). The Urgency of Arctic Change. *Polar Sci.* 21, 6–13. doi:10.1016/j.polar.2018.11.008
- Patchen, M. (2006). *Public Attitudes and Behaviour about Climate Change*. Indiana, USA: Purdue University West Lafayette. Available at: https://www.columban.jp/upload_files/data/EE0063_attitudechange.pdf.
- Philipchalk, R. P. (1995). *Invitation to Social Psychology*. Orlando, FL: Harcourt Brace College Publishers.
- Purdy, J. (2015). *After Nature: A Politics for the Anthropocene*. Cambridge, MA: Harvard University Press. doi:10.4159/9780674915671
- Pickens, J. (2005). Attitudes and Perceptions. In *Organizational Behavior in Health Care*. Sudbury: Jones and Bartlett Publishers, 43–75.
- Pyron, R. A. (2018). *We Don't Need to Save Endangered Species. Extinction Is Part of Evolution*. Available at: https://www.washingtonpost.com/outlook/we-dont-need-to-save-endangered-species-extinction-is-part-of-evolution/2017/11/21/57fc5658-cdb4-11e7-a1a3-0d1e45a6de3d_story.html?utm_term=.2b456fb82ef7 (Accessed October 13, 2019).
- Ratinen, I., and Uusihahti, S. (2020). Finnish Students' Knowledge of Climate Change Mitigation and its Connection to Hope. *Sustainability* 12, 2181. doi:10.3390/su12062181
- Safina, C. (2018). *Defense of Biodiversity. Why Protecting Species from Extinction Matters*. Available at: <http://e360.yale.edu/features/in-defense-of-biodiversity-why-protecting-species-from-extinction-matters> (Accessed February 13, 2018). doi:10.31085/9785392284825-2019-264
- Sakellari, M. (20152015). Cinematic Climate Change, a Promising Perspective on Climate Change Communication. *Public Underst. Sci.* 24 (7), 827–841. doi:10.1177/0963662514537028
- Scior, K., and Werner, S. (2015). *Changing Attitudes to Learning Disability*. London: Mencap.
- Serreze, M. C., Walsh, J. E., Chapin III, F. S., Osterkamp, T., Dyurgerov, M., Romanovsky, V., et al. (2000). Observational Evidence of Recent Change in the Northern High-Latitude Environment. *Clim. Change* 46, 159–207. doi:10.1023/a:1005504031923
- Sousa, E., Quintino, V., Palhas, J., Rodrigues, A. M., and Teixeira, J. (2016). Can Environmental Education Actions Change Public Attitudes? an Example Using the Pond Habitat and Associated Biodiversity. *Plos One* 11 (5), e0154440. doi:10.1371/journal.pone.0154440
- Steffen, W., Grinevald, J., Crutzen, P., and McNeill, J. (2011). The Anthropocene: Conceptual and Historical Perspectives. *Phil. Trans. R. Soc. A.* 369 (1938), 842–867. doi:10.1098/rsta.2010.0327
- Stenport, A. W., and Vachula, R. S. (2017). Polar Bears and Ice: Cultural Connotations of Arctic Environments that Contradict the Science of Climate Change. *Media, Cult. Soc.* 39 (2), 282–295. doi:10.1177/0163443716655985
- Tin, T., Bastmeijer, K., O'Reilly, J., and Mayer, P. (2012). “Public Perception of the Antarctic Wilderness: Surveys from an Educated, Environmentally Knowledgeable European Community,” in *Proceedings of Science and Stewardship to Protect and Sustain Wilderness Values, Rocky Mountain Research Station*. Editors A. Watson, J. Murrieta-Saldivar, and B. McBride (Fort Collins: Rocky Mountain Research Station), 109–117.
- Voas, D. (2014). Towards a Sociology of Attitudes. *Sociological Res. Online* 19 (1), 1–13. doi:10.5153/sro.3289
- Weslawski, J. M., Wiktorski, J., jr., and Kotwicki, L. (2010). Increase in Biodiversity in the Arctic Rocky Littoral, Sorkapland, Svalbard, after 20 Years of Climate Warming. *Mar. Biodiv.* 40, 123–130. doi:10.1007/s12526-010-0038-z
- Węślawski, J. M., and Kotwicki, L. (2018). Macroplastic-new Vector for Boreal Species Dispersal on Svalbard. *Polish Pol. Res.* 39 (1), 165–174.
- Wilson, E. O. (1984). *Biophilia. The Human Bond with Other Species*. Harvard University Press.
- Wilson, E. O. (1988). *Sociobiology*. Harvard University Press.
- Wilson, E. O. (2011). *The Diversity of Life*. Penguin Books. doi:10.1002/9783527610419.ntls0164
- Wilson, E. O. (2012). *The Social Conquest of Earth*. New York, London: Liveright Publishing Corporation.
- Zalasiewicz, J., Williams, M., Steffen, W., and Crutzen, P. (2010). The New World of the Anthropocene. *Environ. Sci. Technology* 44 (7), 2228–2231. doi:10.1021/es903118j
- Zimbardo, P. G., and Leippe, M. R. (1991). *The Psychology of Attitude Change and Social Influence*. New York, NY: McGraw Hill Book Company.
- Znaniecki, F., and Thomas, W. I. (1918). “Introduction”. *The Polish Peasant in Europe and America: A Classic Work in Immigration History*. University of Illinois Press.

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