



Empowering through ‘nature’?

The role of ‘nature’ within *Girls* on Ice* Program
for long-term impacts on young women in
science, art, and outdoor exploration

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Abstract

Inequality and environmental degradation are deeply intertwined, severe problems of our time. While taking steps to address these problems, structural changes on different levels include changes of social constructions of privilege and oppression, of marginalized groups, and non-human life. Empowering outdoor educational programs are one way to take steps towards equality by using natural environments for educational goals, while simultaneously challenging those social constructions.

Building on the academic literature and theories on structural inequality, the debate around 'nature' and outdoor science education, this thesis aims to explore the role of 'nature' in the outdoor science education program *Girls* on Ice*. This program aims to empower young women through outdoor exploration, arts, and science.

Empirically, this thesis draws on interviews with eight people who are involved in the program. Two of them have been founding a branch of the Girls* on Ice Program, while the other six have been joining the program as participants. Through the use of inductive thematic analysis, the findings show that 'nature' in the program acts as a dynamic, active frame. It serves simultaneously as a setting, subject of consideration, and entity to relate to. Those aspects, in combination with a strongly supportive social environment, lead to an intensified and cared-for emotional connection to nature, empowerment in different dimensions, the consideration of career choices in male-dominated areas, and the formation of a supportive social network.

Overall, this study contributes to a better understanding of how 'nature' could contribute to the process of societal change towards equality and sustainability. For this reason, incorporating immersive nature experiences into education may represent an essential step towards reducing systemic barriers in science and outdoor exploration, and therefore, also, towards a more sustainable society.

Keywords: environmental education, outdoor education, empowerment, human-nature relationships, gender inequality, nature connectedness, nature exposure

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1. Introduction

When I was a child, my favorite activity was running through nearby pine forests with the neighbor's dog. I enjoyed running along small, winding paths, smelling hot pine needles in the sun, hearing the crispy sound under my feet, and feeling a gentle breeze on my face. I took a lot from this time: exploring, acting independently, and calming down. Later, I learned about climate change, structural inequality and the biodiversity crisis in school, which scared me. I was puzzled by the ambiguity of the facts I had learned and the behavior - or rather, the lack of action - of the people around me. Through my studies, I learned more and more about the problems, yet I remain puzzled about what this knowledge means in reality. How can I use that knowledge for good? What role does 'nature' actually play in the lives of other people? Are there differences in how different people can relate to nature? Can a relationship with nature be conveyed, and can it help change the current circumstances? Because of these and other questions, for my thesis, I decided to choose a topic at the intersection of global crises, social inequality, and people's relationship with nature.

1.1 Background

To address our global crises, large-scale transformations are essential (Calvin et al. 2023). These transformations require not only political changes but also shifts in individual behavior, because political shifts alone are not necessarily able to influence individual action. Here, education, which aims to change personal behavior, plays a central role (McGuire 2015). In the context of education for sustainability, especially educational concepts that involve direct contact with 'nature' become relevant, as they offer positive effects on sustainable behavior as well as on personal development (McGuire 2015; Bryce et al. 2024).

Access to these forms of education, access to natural environments, and to important resources is unevenly distributed globally. This inequality is not only linked to individual assets but also affects specific groups, such as women* (Martinez-Alier et al. 2016). These groups arise based on interdependencies of different individual characteristics, like race, class, or gender, which can either condition privilege or discrimination, for example, access to chances (Brah & Phoenix 2004).

In areas most relevant to global development and sustainability, such as decision-making, leadership, or the scientific community, women* still face gender-based inequalities, resulting in underrepresentation of this group (UIS 2019). Achieving equality, including gender equality, is essential for creating an ecologically and

socially sustainable society. Therefore, it's important to emphasize that recruiting women* should not be seen as a solution to global problems. Instead, women should exert equal influence in global development. For this reason, public structures need to open up to greater diversity, and the affected groups must take their places in previously restrictive areas. This issue is sensitive because, officially, structures that are open to diverse groups often contain hidden barriers that, in practice, hinder open spaces.

One way to start reducing (gender-based) barriers is empowerment. Empowerment is a complex concept that involves a process leading to an individual's or group's independence (Bryce et al. 2024). It is not about portraying a group or its individuals as needing support, but rather about addressing and removing barriers, ending dependencies, and generally creating space for the equal participation of certain populations in relevant fields. Therefore, empowerment programs are based on the assumption that changes in individual behavior can lead to changes in structural conditions within complex chains of interpersonal interactions (Bryce et al. 2024). In the context of gender-related and environmental inequalities, outdoor educational programs offer a way to empower participants while also fostering the positive effects of interaction with the natural environment (Allen-Craig & Hartley 2012; Bryce et al. 2024).

In this study, similar to the qualitative research conducted by Bryce et al. (2023), the focus will be on exploring how the transformative effects of outdoor experiences can help reduce various forms of inequality. It focuses on the impacts at a micro level of empowerment, which may have wider influences. Hereby, I want to follow the study of Bryce et al. (2024), who argue that more research is needed on micro-level contributions to empowerment (Bryce et al., 2024, p. 430). Empowerment in the context of this study involves both reducing gender-specific inequalities and other forms of inequalities, such as unequal access to 'nature'. Consequently, the study will contribute to an understanding of the circumstances under which and how 'nature' can help, on a small scale, combat the global problems, which I learned about when I was a child.

While keeping an eye out for a program that combines education in nature with female* empowerment, I learned about a program called *Girls* on Ice*.¹ The program enrolls nine teenage girls* in a free eleven-day glacier expedition every year (Young et al. 2020). The expedition is led by all-female* instructors, including science and art educators and one mountain guide, and follows a structured program (Young et al. 2020, 2023). The program has already conducted some research, focusing on the practical (tacit) skills gained by participants, changes in

¹ * Inspiring Girls* Expeditions welcomes cisgender girls and transgender, agender, Two Spirit, nonbinary, intersex, and genderqueer youth. In this study, the * is used in the same way.

environmental identity, and how best-practice advice is integrated into creating a more inclusive science and outdoor exploration community. Additionally, a Master's Thesis was written in 2019 to evaluate the Swiss branch of the organization. As I was writing my master's thesis about this program, I had the opportunity to gain insights into the strategy team of the Swiss branch, which contributed to a more detailed understanding of the organization and its objectives.

1.2 Research problem

Being deeply interested in how to make people aware of and (re)connect with their surroundings in a way that might influence their future decision-making, I was fascinated by the program. While fitting my research interests perfectly, the aspect of developing a connection to 'nature'² is not the main focus of the program; instead, it aims to empower. The founders of the program decided to found a program aimed at changing the gender balance in natural sciences, which can serve as an effective approach to address this issue (Bryce et al. 2024). The concept of 'nature' is multifaceted and widely debated across disciplines (Castree 2005). In the following sections, it will be examined in greater detail. Nature connectedness refers to the relationship of a person with nature (Richardson et al. 2020). 'Nature', nature connectedness, and empowerment seem to be substantial parts of the program Girls* on Ice, but 'nature's long-term influences on the participants have not been subject to research, yet.

For this reason, I decided to take a closer look at this aspect, thus using my studies to turn personal questions into research questions. I find it interesting to focus my project on how 'nature' might shape the experiences of the participants during the expedition, especially those experiences they perceive as empowering.

1.3 Aims and research questions

This thesis aims to explore the role of 'nature' within the *Girls* on Ice* Program. 'Nature' in academic discourse can be approached from multiple perspectives. For this reason, the ideals of 'nature' held by the program's founders and participants are relevant, as well as their relationship with 'nature'. To highlight the long-term effects of the program, this thesis focuses on former participants who participated in the expedition several years ago.

The main research question (MRQ) asked here is:

MRQ: What roles does 'nature' play in an educational program that aims to empower young women, especially in the long term?

² Due to the complex academic debate around the concept of 'nature', the term is shown in quotation marks when referring to 'nature' as a diverse concept in the sense of this debate.

To answer the MRQ effectively, I created sub-questions covering various aspects.

Those sub-questions (SQ) are:

SQ1: How is ‘nature’ presented and communicated in the program from the view of the founders?

SQ2: How is ‘nature’ experienced and understood by the program participants?

SQ3: What long-term effects (emotional, behavioral, and career-wise) do participants perceive as connected to their experiences of nature at the program?

The questions are displayed in Figure 1.

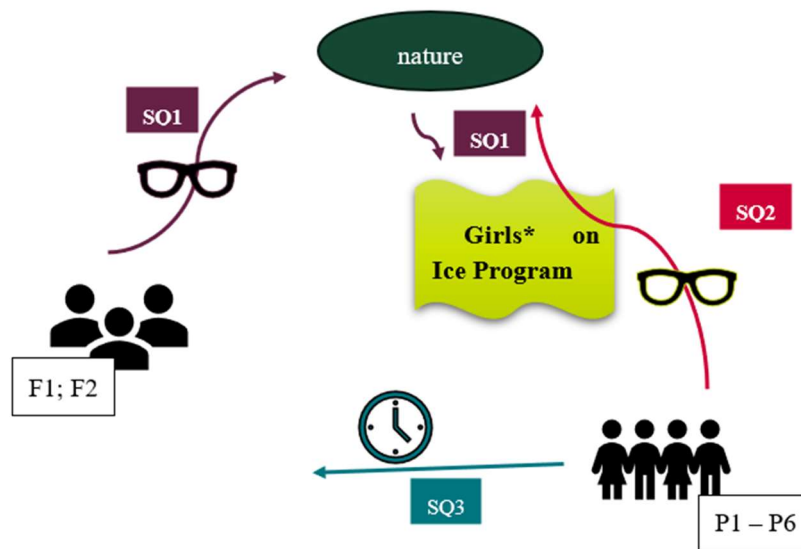


Figure 1: Scheme of the sub-questions. F1 & F2 refer to the founders, SQ 1-3 to the subquestions, the pairs of glasses to “perception”, and the clock to “retrospective”. Own figure.

The study relies on empirical findings from semi-structured interviews with two founders and six former participants of the *Girls* on Ice* Program. It explores the founders’ personal connection to ‘nature’, individual understandings and perceptions of the term (see Section 4.1). To answer the second research question, former participants are invited to share their experiences with ‘nature’ (see Section 4.2). Section 4.3 refers to the long-term impacts that participants associate with the program. The role of ‘nature’ in the *Girls* on Ice* Program is discussed in Section 5. The thesis concludes with a section that synthesizes the study’s findings and offers suggestions for future research (see Section 6).

2. Literature review

This section provides an overview of relevant literature and scholarly discourse on key concepts, which helps to understand the study's context. I want to begin the literature review with a section on the academic debate surrounding the questions, "What is 'nature' and how do people relate to it?" In the second part of the literature review, the current research on outdoor education in the context of empowerment will be presented. Next, an overview of the current research regarding inequality will be given. Since inequality and environmental degradation are interconnected within a complex system, their relationship will be discussed.

2.1 The role of 'nature'

The question of whether humans are separate from 'nature' has been present in the academic debate for a long time. The distinction between the human species and the rest of 'nature', along with different treatment, raises the question of whether value and ethics should be assigned only to humans (anthropocentric view) or to all life in the universe (ecocentric view) (Kopnina et al. 2018).

Noel Castree, one of the leading authors in this field, begins his book on 'nature' with the following statement: "Nature is one of the most widely talked about and investigated things there is" (Castree 2005, p. 18). As he emphasizes in the foreword, the concept of 'nature' or things being 'natural' has always been subject to change in terms of how it is discussed and what is understood by it (Castree 2005). In general, knowledge about 'nature' acts like a filter shaping our perceptions and, therefore, our understanding of 'nature'. This might lead to widely differing ideals and understandings of it. This refers to the definitions that individual academic disciplines attribute to the term, varying considerably (Soper 1999; Castree 2005).

Those perceptions, and therefore, what is considered 'natural' influences power relations and societal hierarchies (Castree 2005). This refers not only to the everyday understandings that people have by nature, but also to academic understandings that influence those hierarchies (Castree 2005). In academia, the discussion of what can be understood as 'nature' immediately falls into the complex, "hoary philosophical debate between so-called 'realists' and 'relativists'" (Castree 2005, p. 21). The debate centers around the question: *Is 'nature' something 'outside', separate from humans, or something being constructed through our perception?*

Soper (1995) argues that the centers of the debate are either understanding ‘nature’ as completely constructed or embedded in a materialist reality. While the constructivist perspective sees ‘nature’ as a construct historically used for oppression, the ecological view tends to portray ‘nature’ as in need of protection (Soper 1995). From her perspective, “feminist constructivism” and “ecological naturalism” are in tension, which could be solved through an interdisciplinary approach that integrates feminist perspectives into ecological discourse (Soper 1995). Additionally, she is very critical of returning to traditional, oppressive societal structures to live more sustainably. She advocates for an understanding of ‘nature’ that is both humanist, centering on the needs of humanity, and realist, accepting that ‘nature’ has a material reality. In her understanding, humans are both part of nature and apart from it. In the following, this section moves from the question of what can be understood by ‘nature’ to the relationship between humans and ‘nature’.

Today, the concept of social-ecological systems becomes relevant as an integrated approach for understanding the dynamics of change within such systems in the context of a transition pathway toward sustainability (Berkes et al. 1998). The concept addresses the complexity of interactions between human societies and ecosystems through feedback mechanisms that occur across different scales. Central to the idea is the perspective that ecosystems and humanity should not be studied separately. However, the concept is being co-opted for treating humanity and ‘nature’ as separate parties. While having this concept in mind, a few concepts from environmental psychology are particularly relevant for this study, focusing on understanding the lived individual and collective experience of ‘nature’ (Clayton et al. 2017).

Environmental psychology has demonstrated that humans instinctively feel drawn to certain types of “natural environments” and that they can benefit from experiences with nature in many ways (Kaplan & Kaplan 1989; Salazar et al. 2021). Here, exposure to nature creates embodied and sensory experiences (Kaplan & Kaplan 1989; Salazar et al. 2021). These experiences help reduce stress and can regulate emotions (Kaplan & Kaplan 1989). Additionally, being in contact with specific landscapes can help restore concentration, a process that is known as Attention Restoration Theory (Kaplan & Kaplan 1989).

The concept of “nature connectedness” describes the relationship of a human being with ‘nature’. According to Richardson et al. (2020), nature connectedness can be observed through five dimensions: senses, emotion, beauty, meaning, and compassion (Richardson et al. 2020). Those dimensions show the depth of a human’s connection with ‘nature’.

Wilson (2019), building on non-Western perspectives, calls for care for not only human, but also non-human others, by seeing 'kinship' in the living beings around us (Wilson 2019). This feeling might extend care beyond the human communities, and therefore improve environmental behavior. (Wilson 2019). Indeed, knowledge about 'nature' and environmental problems without a certain emotional connection or a feeling of 'kinship' does not necessarily lead to sustainable behavior; it must be accompanied by emotional connection and experiential engagement (Children & Nature Network 2018).

Historically, nature connectedness emerged due to daily life being placed directly within natural environments. Because of urbanization and modern lifestyles, not only what is understood by 'nature', but also our relationship to it, has changed (Clayton et al. 2017). According to Clayton et al. (2017), the traditional way of experiencing 'nature' during daily interaction is disappearing in modernity, resulting in a kind of alienation.

To address this, and also account for Soper's (1995) warning not to revert to traditional lifestyles of paternalization and oppression, new experiences of 'nature' must be created. In environmental education, they suggest not only teaching about 'nature' but also how to experience it (Clayton et al., 2017, p. 13).

Accordingly, society, 'nature', and the individual can be seen as interconnected, with environmental education aiming not only at providing knowledge about 'nature' but also at creating circumstances to develop emotional and experiential attachment to 'nature' in order to foster a sustainable human-nature relationship. The way this relationship appears will influence behavior and, consequently, societal hierarchies and the distribution of power, making this discussion relevant.

2.2 The role of 'nature' in outdoor science education

Following the argumentation of the chapters above, the importance of another aspect besides the traditional environmental education emerges sharply. To realize the suggestions from above, students' attention needs to be directed towards the environment in a meaningful way (Russell & Bell 1996; Griffiths & Murray 2017).

Hereby, environmental education can include different perspectives: teaching *about*, *in*, *for*, or *with* the environment (Russell & Bell 1996). Teaching *about* the environment, conducted in a classroom, can lack this emotional connection. Teaching *for* the environment shows a political dimension that "openly challenges biases of mainstream industrial society" (Russell & Bell 1996, p.177), depending on how this teaching is conducted. Teaching *in* and *with* the environment, for example, in the context of ecofeminist education, holds the possibility to form a

deep personal connection (Russell & Bell 1996). Fitkin (2020) states that this way, empathic relationships with non-human beings can be built, which can lead to developing a moral responsibility to act toward social-ecological transformation (Fitkin 2020, p. 10).

To conclude, this type of education can foster a transformation that operates on multiple levels. It is understood as a mechanism involving exposure to ‘nature’ or natural surroundings, emotional and cognitive restoration, and nature connectedness. Therefore, an environmental ethic, sustainable practices in everyday life, and general increased well-being can develop on an individual as well as a societal level.

Therefore, outdoor educational programs that aim to empower marginalized groups help address inequality issues, as discussed in the following.

2.3 Solutions to structural inequality in global environmental issues

As stated in the introduction, the current efforts of the global community to tackle our environmental crisis are failing. A solid body of evidence demonstrates that inequality is partly linked to structural causes (Denton 2002; Griffiths & Murray 2017; MacGregor 2017a; Calvin et al. 2023; MacGregor & Mäki 2024). This shift toward sustainability involves changing our current society to adopt sustainable practices in many different dimensions. Equality work and environmental challenges are interconnected; without achieving equality, environmental issues cannot be completely resolved. Dimensions of inequality are caused by complex intersections of identities (Ergas et al. 2021). When assessing those issues, the concept of intersectionality holds a fundamental position, as it visualizes those complex intersections (Ergas et al. 2021). Intersectionality can be described as “multiple ax[es] of differentiation – economic, political, cultural, psychic, subjective and experiential – intersect in historically specific contexts” (Brah & Phoenix 2004, p. 76).

The extent and dimensions of inequality are very complex, as they are related to all aspects of people’s identities. Feminist approaches, aiming to address the needs of all humans equally, must consider that discrimination affects some individuals more than others (MacGregor 2017b). For this reason, the concept of intersectionality, introduced by Kimberlé Crenshaw (1989), helps visualize the intersections of inequality dimensions, such as race, gender, or class, which can create both privilege and discrimination (MacGregor 2017b). This ability to visualize social structures makes it especially important for research in this area. Additionally, some critics call for a unifying perspective that recognizes people as

diverse rather than emphasizing differences that can lead to divisions. In pedagogy, that means that people should engage with social groups of different identities and critically reflect on the experiences created with oppressed groups. This way, pedagogy could contribute to social sustainability (Fitkin 2020).

Furthermore, achieving equality involves many aspects. One especially important aspect is establishing equal power distribution in decision-making processes (Denton 2002). Here, the equal participation of people who have been historically oppressed must occur under their own conditions, to prevent reproducing essentialisms (Chant 2016; Esquivel 2016). The process leading to equality, in the sense of an equal share in decision-making and shaping one's own future, can be supported by empowerment, which can be fostered through education (definition in Section 1.2). Empowering education, therefore, provides students with opportunities to actively shape their own learning. Three levels of empowerment and leadership development can be distinguished:

- 1) micro level: belief and actions of an individual,
- 2) meso level: beliefs and actions in relation to others
- 3) macro level: social empowerment in a wider societal context (Huis et al. 2017).

Huis et al. (2017) explain that a temporal gap often exists between empowerment action and behavioral change. Bryce et al. (2024) describe the necessity to address individual development and explain the processes of leadership and empowerment, and how they can influence each other positively. They further mention the lack of research at the micro level of leadership and empowerment development.

3. Research design and methodology

In the previous chapters, the relevant background for getting an insight into the role of ‘nature’ in the context of the Girls* on Ice Program has been presented. To enable readers to follow the procedure of the Thesis, this chapter explains the research process and the possible limitations of the research design in detail.

3.1 Overall Approach

To address the research objectives, this study employs a qualitative approach by conducting a case study of a specific educational program, *Girls* on Ice*. This format allows for an in-depth exploration of the role of ‘nature’ in the program, capturing detailed experiences, meanings, and perspectives that might be missed with quantitative methods (Alsaawi 2014).

Any perception of a subject affects how it is presented and communicated. Therefore, I want first to understand the founders’ perspective on and relationship with ‘nature’, because it influences how the program is designed. In combination with interviewing former participants, this understanding gives hints on how this design transfers certain ways of relating to ‘nature’. To focus on long-term impacts, former participants were requested some years after their expedition had taken place.

Semi-structured interviews were conducted to gather knowledge about topics of interest. The subsequent steps taken to fulfill the research aim are described in the following section.

3.2 Case study: *Girls* on Ice* program

Girls on Ice* was founded to create opportunities for women in traditionally male-dominated fields. The glaciologist, who initiated the project recognized the potential of women-only field expeditions to address gender inequality in natural sciences (F2 2025). Being a field scientist, she designed the program as a research expedition conducted in alpine environments (F2 2025). It was performed for the first time in the year 1999 in the United States (Inspiring Girls* Expeditions 2022). Since then, the program was founded with a similar design for girls* around the world, also changing the setting to *Girls* on the water* (Seakayak expedition), or *Girls* in the forest* (hiking & packraft expedition) (Inspiring Girls* Expeditions 2022). The overarching organization above those branches is called *Inspiring Girls* Expeditions*. The goals of the different subgroup expeditions stay the same:

To ensure inclusivity, the organization fully funds the expeditions, and all necessary equipment can be provided on loan.

In the format of *Girls* on Ice* Switzerland, which is subject to this study, the participants establish a base camp near a glacier, live without modern conveniences, and acquire mountaineering skills and the ability to conduct scientific experiments (Inspiring Girls* Expeditions 2022). The application process is extensive; girls* aged 15 to 17 can apply. When selecting the nine girls*, emphasis is placed on maximum diversity within the group, high motivation, and a lack of opportunities for similar chances. To give the reader a better insight into the program, the itinerary from the website is presented here (Inspiring Girls* Expeditions 2022):

“Rough itinerary:

- Day 1: Arrival in Valais, getting to know each other, overview of the program, distribution of equipment, first night in tents
- Day 2: Train to Simplon village, hike to the moraine next to the Weissmies glacier and setting up our base camp
- Days 3-8: Exploration of the moraine and nearby glacier, scientific experiments, and introduction to mountaineering
- Day 9: Breakdown of camp, hike down to the valley, and train ride to the guesthouse at the Paul Scherrer Institute (PSI)
- Day 10: Compilation of experiment results, preparation of presentations, return of equipment
- Day 11: Presentation of results to an audience (public), farewell, journey home from the Paul Scherrer Institute”

(Inspiring Girls* Expeditions 2022)

3.3 Data collection & analysis

3.3.1 Data collection

The recruitment of interviewees proceeded as follows: After contacting the organization of Girls* on Ice Switzerland, a social media post was created and posted into an alumni group (see Appendix 1). Interested Alumni could reply via the university email. The respondents received an information sheet about the project (see Appendix 2). The founders were contacted via email with a request for an interview.

Initially, four former participants responded. A second recruitment post was shared with the support of a member of the organization, who reached out via WhatsApp. Due to the recruitment process and the low response rate, it was not feasible to

apply a specific sampling method. In total, six former participants of the expedition replied, and two of the three founders agreed on conducting an interview. The interviewees were categorized in order to interpret their perspectives separately. For this reason, two different interview guides were created, presented in Appendices 3 & 4.

The participant interviewees are all within a similar age group, above 18 years old, and have taken part in the expedition between two and four years ago. For data protection reasons, no further details on the year of participation can be given.

All interviews were conducted online via Zoom due to the geographical distribution of the former participants and the founders. Interviews took place between April and July 2025. They were designed in a semi-structured format, to enable narrative freedom (Leech 2002).

The interview guide included questions on participants' and founders' perspectives of 'nature', as well as aspects of empowerment. At the beginning of the interviews, the interviewees were able to choose an interview language - English or German. The German interview quotes used for the findings section were translated with the help of the translation software deepl.com.

The semi-structured interview guides consisted of approximately 20 questions. Not all questions were asked in each interview, as some had already been answered during the conversation. Interviews lasted between about 20 and 63 minutes (see Table 1). The interviews were recorded and transcribed manually.

Table 1: Information about the interviewees. Own table.

	Number of interviewees and anonymized name	Expedition year	Language of the interview	Length
Participants	P1-P6	2021 - 2023	1 x English, 5 x German	20 – 41 min
Founders	F1-F2	-	1 x English, 1 x German	51 – 63 min

3.3.2 Inductive Thematic Analysis

The explorative orientation of the research questions suggested an inductive theory formation. To be able to form a new theory about a complex phenomenon, Inductive Thematic Analysis is a suitable approach. The process of analysis followed the advice of Cho & Lee (2014) to run data collection and analysis simultaneously (Cho & Lee 2014). The steps of the analysis process are the following (Mishra & Dey 2022, p. 188):

1. Initial coding
2. Focused coding
3. Theoretical themes

In the first step (open coding), codes were derived directly from the first interview by line-by-line coding using the coding software MAXQDA (Mishra & Dey 2022). Then, the codes were grouped according to the research questions. Together with these overarching codes, the following interviews were analyzed, with special care not to overlook new codes deriving from the new interviews. After the analysis of the first interviews, more interviewees were recruited, using the advice of (Chun Tie et al. 2019)), followed by constant comparative analysis. From the coding structure, an initial theory can be built.

3.3.3 Reflexivity and positionality

In qualitative research, reflexivity throughout the entire project duration is critical and should focus on “personal, interpersonal, methodological, and contextual issues in the research” (Olmos-Vega et al., 2023, p. 241). For this reason, I include subjective reflexivity into the dimensions, which will have influenced the selection of the topic and the interpretation of the data (Olmos-Vega et al. 2023). Most importantly, my own connection to ‘nature’ and the ‘outdoors’, experiences in the higher alpine surroundings, and social influences influenced my interpretation and conclusions. This is especially the case, as I got insight into the strategy team of *Girls* on Ice* Switzerland and have been attending some organizational meetings. Those insights can be viewed as both an opportunity and a limitation. The chances include a better insight into the structure and the development of the organization; a possible limitation is a bias, which might lead, for example, to a less critical view of the program. Also, my identity as a female environmental science student with a passion for the outdoors might have influenced the interviewees’ statements.

3.3.4 Trustworthiness and Quality Criteria

In qualitative research, trustworthiness is a more appropriate concept than traditional concepts (Rose & Johnson 2020). It encompasses four key dimensions: credibility, transferability, dependability, and confirmability. This study has integrated those dimensions into the process of the study.

Credibility was supported through a careful and transparent coding process (Rose & Johnson 2020). Transferability was addressed by describing the program and the study context in detail, to be able to transfer the findings to other settings (Rose & Johnson 2020). To ensure dependability, a research plan was developed (Rose & Johnson 2020). Confirmability was strengthened by documentation of decisions made during the process, to help ensure that findings are as detached as possible

from the assumptions of the researcher (Rose & Johnson 2020). Reflexivity, as described in Section 3.3.3, further contributes to the transparency of the research process. The limitations of this work are elaborated on in Section 5.2.

3.3.5 Ethical, societal aspects and sustainability

In this work, ethical and social aspects were considered. In this regard, only participants over 18 years old were considered for the interviews. They were thoroughly informed about data collection and storage. The study was conducted as sustainably as possible; the interviews took place via Zoom to avoid unnecessary travel.

4. Findings

Based on interview responses to SQ1–SQ3 are presented, addressed in Sections 4.1–4.3. Themes are listed in tables for each section, which can be found in Appendix 5.

4.1.1 The founder's perception of 'nature' and their personal relationship with 'nature'

The findings were derived from the following themes that emerged from the analysis (see Table 2, Appendix 5).

Themes: Founder's perception of 'nature'

1. Diversity of 'nature' perceptions

From the founders' perspective, the concept of 'nature' can take many different forms. Explicitly, both founders associate 'nature' with 'being outdoors'; their understanding of what 'nature' means evokes memories of their childhoods. As their discussion about their views on 'nature' continued, founder F1 described a place that can be both challenging and relaxing. This reflection reminds founder F1 of ideas she seems to connect with 'nature'.

"Yes, it reminds you again of what you really need in life, what's important, how simple things can actually be." (F1)

This quote shows the founder's view of 'nature' as more than just an outdoor space; it's a place to perceive and experience in various ways, prompting reflective thoughts. These thoughts shift her perspective on priorities, highlighting the importance of simplicity. Regarding the research question, 'nature' is seen as 'being outside' that evokes moods and reflection, and it actively shapes her thinking.

'Nature' can also be understood in various ways, such as through artistic, scientific, or mountaineering perspectives, each offering unique insights. Overall, the founders see 'nature' as not only something to be explored scientifically.

"I think that as a scientist, you already have your scientific glasses on, and you look at things and see them differently, or you observe them too, but artistic observation is a completely different perspective. [...] It just has a completely different effect. Especially now for climate change, I think it's a super good tool." (F1)

From the founder's view, art and science have different but complementary perspectives on 'nature' that can enhance environmental communication. The quote encourages examining 'nature' through multiple disciplines and emotional

connections, fostering reflection on themselves. This influences how the founders perceive and communicate the concept of ‘nature’.

2. ‘Nature’ as an interesting, intriguing phenomenon

Both founders convey a strong sense of attraction, curiosity, and motivation to explore with ‘nature’.

“I knew, I wanted to continue studying, I knew, I wanted to explore and learn, but I was not so sure that it should be Astrophysics. (laughing)” (F2)

“Or do something that interests you. [...] And that was the beginning for me, and that was also the reason why I came to the Snow and Avalanche Research Center, and why I somehow took this whole direction.” (F1)

Both quotes demonstrate the two founders’ interest in ‘nature’, which extends to the point where they both aspire to explore natural environments professionally. In the case of F2, this interest stems from curiosity about the night sky, while in the case of F1, it stems from her enthusiasm for snow. The quotes, however, show that both find a space in natural environments that awakens their urge to explore, which is why they chose to study science. ‘Nature’ becomes a “pull factor” that draws them in a specific direction, both professionally and personally. Regarding the research question, ‘nature’ is not merely understood as being ‘outside,’ but represents a phenomenon that interests and attracts them. The discussion refers to how the image of ‘nature’ as an interesting phenomenon shapes their founders’ perception.

3. Counterpart to ‘nature’: Indoors/digital world vs. ‘nature’

Both founders see ‘nature’ as the opposite of the participants’ everyday life, which is dominated by digital technology and confined to buildings.

“to live in the weather, reconnect with nature, be away from phones, and have an opportunity to just be super present. [...] reconnecting to nature in a way, that a lot of them haven’t done in a long time... because, life for teenagers right now is very digital” (F2)

This quote shows how F2 views a divide between ‘nature’ and the digital world, noting that young people’s lives are less connected to ‘nature’. Restoring this link is seen as a ‘withdrawal’ from digital and man-made worlds. The statement criticizes digitalization and advocates for a relationship with ‘nature’, portraying it as a beneficial concept outside artificial environments. The founder believes that engaging with ‘nature’ fosters a reconnection similar to that experienced by teenagers in their past. Chapter 5 revisits the ‘nature’ vs. human-made spaces distinction, examining how it influences the founders’ understanding and communication of nature.

The many facets of the perception of ‘nature’ that the founders show here will be included in the discussion (Section 5) to reflect on how the perception of ‘nature’ may have influenced the development of the program.

Themes: Founder’s relationship to ‘nature’

1. Emotions and the relationship to ‘nature’

Both founders described their personal connection to ‘nature’ mainly through their outdoor experiences, which they found to be emotionally formative. For example, F1 recalls:

“Outdoors in nature, where I was simply overwhelmed by the beauty and [...] the emotions you feel when you’re there and see something, something really beautiful.” (F1).

The citation emphasizes F1’s deep emotional bond with her environment. For the founders, ‘nature’ generally signifies experiencing beauty, awe, enthusiasm, silence, and fear. This indicates that the emotional connection is crucial to the founders’ understanding of ‘nature’. In relation to the research question, ‘nature’ is described as an essential entity to connect with. F1 also mentioned intentionally using ‘nature’ to change her state of mind, as shown here:

“That’s how it is. But always being outside, I mean, this fascination with snow... together with snowboarding, always together with movement, a little bit. Nature and movement were always very important [...] less... human... Yes, human distractions, too, also in the sense of buildings and cars and roads and noise. And things like that. Just much more peace and concentration.” (F1)

F1 describes how time in ‘nature’ calms her. She enjoys natural settings, which sharpen her focus and create emotional tranquility. Her bond with ‘nature’ is both emotional and intentional, serving as a retreat from city life. Emotions to ‘nature’ are key to her relationship with it, as discussed further in section 5.

2. The relationship to ‘nature’ as a strong influence on the founder’s life

The emotionally driven connection to ‘nature’ strongly influences the lives of both founders. It shaped their identities and inspired their careers. The founder F1 described snowboarding as an inspiration for her career.

“Snowboarding was my whole life as a teenager. Then I thought I could work at the Snow and Avalanche Research Center” (F1)

F2 was inspired to get her job by her motivation to do fieldwork.

“also get outside, to really gorgeous places and do amazing field work, and soo... I sort of... I just stumbled on it, and got really excited about it [...] I was missing this really key element of my identity, which is being outside in nature” (F2).

The citations emphasize that positive emotions towards ‘nature’ lead to the founders’ careers, which in turn enable both professional engagement with ‘nature’ and the pursuit of curiosity related to it. These citations demonstrate how it not only influenced their experiences but also shaped their way of living. This makes the inclusion of ‘nature’ in the program, which aims to transform in a way, seem obvious. The discussion revisits the relationship to ‘nature’ as a potentially central influence on life choices.

3. The relationship to ‘nature’ is individual and variable

As described above, the founder F1 consciously utilized contact with ‘nature’ to address specific personal needs, as illustrated in this citation.

“I was an adrenaline junkie, back in the day [...] together with snowboarding, always together with movement, a little bit. Nature and movement have always been very important. (F1)

This citation demonstrates how the F1’s moods and needs influence her engagement with ‘nature’. Depending on her current needs, she can interact with ‘nature’ in either an exciting or calming way. This is important because it shows that contact with ‘nature’ can be tailored to individual needs. The relationship with nature is also variable within the life context. For F2, ‘nature’ is still a part of her identity. The other founder, F1, has lost her emotional connection to some degree and expresses a wish to reconnect with ‘nature’ at some point.

The results from 4.1.1 show that ‘nature’ is viewed very positively, making ‘nature contact’ seem like a luxury. The founders realized that access to ‘nature’ and field research careers is more easily available to specific groups, especially concerning gender roles. The program was created to reduce these inequalities.

“[The original founder has] a very strong awareness of the disadvantaged groups, and then doing something for these groups, and simply making sure that more people get into science. She was always in very male-dominated fields, both as a mechanic and as a geoscientist, and breaking down these barriers is something very close to her heart.” (F1)

This statement supports the idea that personal ideals of ‘nature’ are not only linked to individual experiences but also connected to combat systemic inequality. It acknowledges the barriers that specific groups face when accessing both ‘nature’ and careers in the natural sciences. The founders state that the program’s original

founder is aware of these unequal structures and works to change them. Through the women-only expedition, she discovered a way to challenge these social barriers.

Further details on how this perception and the founders' relationship with 'nature' may have influenced the program design will be discussed in Chapter 5.

4.1.2 Presentation and communication of 'nature' in the program

To determine how 'nature' is presented and communicated in the program, excerpts from the interviews will now be presented, summarized in Table 3 (Appendix 5).

1. Nature as a demanding frame for challenges and growth

When asked how 'nature' influences the program, it quickly becomes clear that the mountain environment provides a challenging setting. To utilize this setting effectively, extensive preparations are necessary.

"That you... and also just going up the mountain like that isn't something you could do in a day, and doing a bit of preparation and working towards it is also important."
(F1)

This quote suggests the program intentionally uses the challenges of 'nature' to construct tasks, with deliberate logistical effort that serves an educational purpose. Contact with it is portrayed as demanding, incorporated through preparation and changing conditions, especially via the "three peaks" model - physical, social, and mental challenges - that push participants out of their comfort zones. Founder F1 discusses the role of boundaries in this process.

"Well, I think it pushes almost everyone to their limits. That's probably what it is, right? You're just much closer to your limits, your own limits, which makes it more difficult to behave the way you might always want [...] but where there is also much more opportunity to learn, right? And to cushion that in such a way that everyone reaches their limits but doesn't quite tip over, so they're still held back by the team" (F1)

As F1 specifies, 'nature' in this form is consciously used to approach one's own limits within a safe environment, which can foster overall inner growth. From the founders' perspective, 'nature' in the form of the "three peaks" contributes explicitly to empowering the participants by allowing them to explore their own boundaries concerning expedition-specific challenges. This is achieved, among other ways, by allowing the participants to share responsibility with the instructors as equals, as the following quote demonstrates:

"With nature and mountaineering in mind - you are very dependent on each other. You have to be able to trust each other, [...] and then also know that the others are

doing their part, so the importance of this team dynamic and everything else is extremely important”(F1)

From the founders’ perspective, responsibility boosts self-confidence and expands personal boundaries. ‘Nature’ can empower participants if they are able and allowed to take responsibility and feel supported by a team. How the empowering potential of ‘nature’ can be used, is shown in the following quote.

“Well, so we have teams of nine roles, that the participants rotate through, so they each have a different role every day, so I think, you know, so one day, every participant is gonna be the leader, and, I think, yeah, distributing power that way is very, impactful, cause it means that everybody has a chance to lead” (F2)

Responsibilities and decision-making, therefore, are not randomly distributed based on personal character and choice, but rather, they are carefully allocated, giving each person a different role every day. These tasks also include leading the entire group. The quotes show how the program uses ‘nature’ as a challenge for goals like personal growth, team cohesion, and reflecting on roles, implemented through pedagogical methods. ‘Nature’ guides which challenges exist, serving as an educational tool. In the discussion, this aspect is revisited under the topic of how the presentation of ‘nature’ as a challenging framework influences the program design and, consequently, the participants.

2. ‘Nature’ as a space for holistic learning

However, from the founders’ perspective, ‘nature’ is not only a framework that can provide learning experiences but also a subject about which learning occurs. The instructors intentionally try to direct the participants’ attention to the environment. Here, this process is described in more detail:

“That people really ask themselves questions. I think that’s almost the most important part of the whole thing. That when you look at the landscape, you really start to ask yourself: “Ah, how does that work and how does that work, and how could I find out how it works, and what tools do I have at my disposal” (F1)

Through observation, targeted knowledge transfer, and conducting their own experiments, the participants have the opportunity to pursue their curiosity with guidance from professionals, which also supports their increasing independence. In this process, art, the natural sciences, or outdoor exploration are used to engage deeply with ‘nature’ from various perspectives. The quote clearly illustrates how ‘nature’ is applied as a learning space and learning subject within the program. These learning experiences are then intentionally reflected upon in the group and also used to achieve the goal of empowerment.

“the participants can join in and do those measurements as part of the community lab project, and I think, that is really empowering, cause they can see, that like: Anybody can kind a be a scientist” (F2)

Allowing participants to conduct experiments or mountain climbing experiences practically enables them to try out the roles of scientist or mountaineer. This active inquiry empowers them to shape their own small scientific project. ‘Nature’ is used not only as a learning space and subject but also as a setting for participants to imagine different roles and professions. It thus contributes to empowering participants, serving as a learning space, subject, and testing ground for future careers. This will be discussed in the context of holistic learning.

3. *Exposure*

Both founders explicitly describe the program’s effect as a transformation. Different factors support this transformation, one of it seems to be the connection to ‘nature’:

“so I got to see a lot of it and then participate in the last two days where you see, how much the students have sort of transformed and learned [...] we were kind of anticipating, that we were ... you know, learning about science [...] might float to the top... but really, the time outside and connection to nature seems to be the number 1 thing that people walk away with the program really holding on to. So we know, that’s really important.” (F2)

F2 explains that participants see time in ‘nature’ as the most meaningful experience of the expedition. This highlights how central ‘nature’ is to the program in F2’s opinion. She finds this surprising since the program didn’t intentionally emphasize this aspect. The transformation seems to be fostered through exposure in *Girls* on Ice*. This is made clear by the following quote:

“just living in the elements, no matter, what the weather was doing, just really transformed people’s ideas about being outside, and sort of how limited and narrow we are, in like, when we go outside, and what kinds of things you can do outside” (F2)

The program’s main idea, as outlined by the founders, is an ‘exposure’ to different stimuli. It assumes that girls* have a somewhat limited view of the world and themselves before the program, which expands through hands-on experience, showing things can be different. The approach emphasizes practice - showing or doing, rather than relying on facts. Regarding the research question, this indicates that ‘nature’ is one of the elements girls* are exposed to, leading to inner transformation. The discussion addresses how exposure to ‘nature’ contributes to empowerment and emotional connection.

4. 'Nature' creates access

Above, it has already been shown how 'nature', giving access to certain natural landscapes, and certain professions associated with it, are interpreted by the founders as privileges. However, the issue they consider much more important is that often opportunities are available, but the specific groups of people seem not to take advantage of them. The following quote illustrates how the program intends to address this:

"a lot of Girls on Ice's desire is flying around the idea of just exposing ... young women, young people to possible career paths, and possible ways of interacting with the world, that they maybe would never even thought of, or never even knew existed, whether, that's, you know, field sciences, or glacier mountaineering, expeditionary art..." (F2)*

'Nature,' as it is presented and used in the program, indirectly helps create access for the participants, both to male-dominated fields and to 'nature' itself. In doing so, the professions of a field researcher or mountain guide can be tried out. The future access to 'nature' or the form of 'nature' that the founders find attractive is made easier for the participants because they can acquire and practically apply, for example, mountain sport-specific skills. The goal of the organization is to facilitate future access to male-dominated areas, which is why the program promotes empowerment. This is especially clear in the following quote:

"empowering women to make space and have space and take up space in glaciology was definitely part of [the main founders] motive read from the beginning..." (F2)

This quote shows how 'nature' is used within the program's setting to provide an environment where women can acquire skills and gain the necessary self-confidence to, for example, pursue careers in male-dominated fields. From this perspective, 'nature' serves towards a more equal societal order, as it, facilitated by the program, contributes to reducing barriers. The possibility of using 'nature' to combat social inequalities is further discussed in section 5.

5. Ambivalent importance of 'nature' to the program

Contrary to the benefits of contact with 'nature' and its role in the program mentioned above, the founders have mixed opinions about its importance within the program. Generally, building a connection to 'nature' or changing humanity's behavior is not a primary goal of Girls* on Ice, as this quote shows:

"I then had to think about what it actually still has to do with nature for me, [...] But I don't know if that was the most important thing for me in the program..." (F1)

For her, ‘nature’ is no longer a central part of the program; it only initially motivated her participation. She finds the transformative benefits are more about social learning within the group in this remote setting. She describes ‘nature’ simply as a good way to be isolated and simultaneously challenged.

In contrast, the other founder emphasized the natural aspect of the program, offering a chance to be present. This was not just her personal view; it was also reflected in the data she received from evaluations of previous participants.

“And our purpose is to have a really in depth experience, to live in nature [...] reconnect with nature, be away from phones, and have an opportunity to just be super present. [...] reconnecting to nature in a way, that a lot of them haven’t done in a long time... because, life for teenagers right now is very digital...” (F2).

This quote emphasizes the key role of ‘nature’ in the program, including emotional connection, embodied experiences, creating distance from the digital world, and the ability to be fully present in the moment. The fact that the two founders have different views here suggests that ‘nature’ plays an implicit role in the program. Regarding the research question, the different views of the founders suggest that ‘nature’ influences the program rather implicitly. Chapter 5 discusses in more detail what this ambivalence might mean for the program and what it reveals about it.

4.2 Participant experience of ‘nature’

This chapter examines how the expedition participants viewed and experienced ‘nature’. The findings are organized according to three time frames: before (4.2.1), during (including directly after) (4.2.2), and after the expedition (4.2.3) (see Table 4 in Appendix 5).

4.2.1 Perception of ‘nature’ in childhood memories associated with mountains, family vacation and positive emotions

When asked about their associations with ‘nature’ before the expedition, participants often replied with childhood memories connected to positive emotions. In general, ‘nature’ is associated with mountains, forests, hiking, family vacations, and positive emotions:

“somehow sheltered, learning about bees in kindergarten. I also live on the edge of the forest, which is probably why I have... a closer connection to birdsong in the morning, at least, and my parents used to take us hiking when we were children... and that’s why... I’ve always loved nature.” (P3)

The data on the relationship to ‘nature’ shows it to be an emotionally experienced construct associated with vacation, joy, and curiosity. A romanticized perspective of ‘nature’ is represented, showing the relationship and experiences of the

participants before the expedition, which serves as the starting point for interpreting a possible change in the participants' understanding of nature. In the discussion, this is used insofar as it is debated from what starting point the already existing understanding of nature among the participants is changed by the experiences of the expedition.

4.2.2 Intensification and expansion; 'nature' as a powerful entity that simultaneously needs protection

1. Intensification and expansion of the relationship to nature

When asked if the expedition changed their ideals and experiences of 'nature', all the participants expressed that the expedition intensified or expanded their positive emotions towards 'nature'. Some exemplary statements are presented here:

"What has really stayed with me is that I love the mountains so much in my everyday life." (P3)

"...so I think, it didn't like change it completely, but, it made it more intense." (P4)

These statements are interpreted as an extension of the participants' relationship with 'nature' through a new landscape form, in this case, the mountains, or through altered emotions. Both quotes can be understood as either an expansion (to a new natural environment) or an intensification (increased feelings). One of the participants had difficulties distinguishing the impact of the expedition from her overall development over the past few years.

"...I don't know if anything has really changed because of that, because I've changed anyway." (P5)

While the other participants clearly associate the change in their relationship with 'nature' to the expedition, one participant mentions her doubts about which development this can be attributed to. This is interpreted as the participant having perceived a change, but not directly linking it to the expedition. Regarding the research question, this means that in most cases, the expedition is associated with a change in the relationship with 'nature'. This insight is revisited in the discussion to demonstrate how impactful nature experiences can influence understanding of 'nature' and the relationship with it.

2. Embodied Experiences and Emotions in 'Nature'

The participants shared feelings of enthusiasm, joy, admiration, and awe at connecting with 'nature' during the expedition. The trip allowed them to engage through embodied experiences, such as swimming in a glacier lake or witnessing

glacier melt while hiking on the glacier. These experiences are described in all interviews; here is one example:

“Yes, impressive, and also beautiful, and somehow surprising, because (shows with her hands) the surface of the glacier is not smooth at all, but there are lots of holes in it, which is somehow... a bit different than you’d expect...” (P5)

This citation shows how the participant experienced the glacier physically and was surprised by the difference between her imagination and reality. It highlights her learning through real experience. This indicates that expedition participants encounter ‘nature’ through tangible phenomena. In the discussion, this underscores how embodied experiences are crucial for developing an emotional connection to ‘nature’.

3. Experiencing ‘nature’ as a powerful, but vulnerable entity

The expedition’s influence was also linked to the idea that ‘nature’ was perceived as *enormous*. The following quote illustrates this:

“It has certainly influenced me in that I have become more aware of what nature actually is, how powerful nature is” (P6)

The participant explains that the expedition has significantly changed her perception of ‘nature’. The phrase “more aware of what ‘nature’ actually is” can be interpreted to mean that the participant has not previously known some of the significant aspects that now characterize her understanding of ‘nature’ after the expedition, especially the aspect of ‘nature’ as a powerful force. In relation to the research question, it can thus be concluded that the expedition has the potential to expand the participants’ understanding through direct experiences.

The experiences of ‘nature’ as an enormous power are generally related, creating a feeling of insignificance among the participants. For example, they repeatedly emphasized that the entire group had to adjust its plans due to sudden environmental changes.

The participant expresses in the above quote that she became aware of the magnitude of power that ‘nature’ can have. Along with this new perception, she also comes to know it as vulnerable during the program:

“How we humans affect them in some way or how we hurt nature... is wrong, but we actually hinder their existence” (P6)

The quote illustrates her view of human impact on ‘nature’ as “injuring”, seen as a sentient being deserving empathy. She criticizes society for environmentally harmful behaviors because she perceives them as morally wrong, linking those

behaviors to broader issues. Her statement highlights the importance of ‘nature’ experiences in shaping perceptions and ethical views. In terms of the discussion, the insights above are used to demonstrate specifically how the participants’ understanding of ‘nature’ changes through their concrete experiences.

4.2.3 ‘Nature’ as an emotional and directly experienced construct

1. Association with wilderness

When asked about their current understanding of ‘nature,’ the participants struggled to describe what ‘nature’ means to them. However, experiences with it are described clearly:

“during the expedition, I was always outdoors and in nature, and you could really see, oh yeah, there are the moraines, there was the glacier, and now it’s here, and yeah, we also saw chamois and ibexes...” (P1)

Participants can accurately describe the experiences they associate with ‘nature’. Regarding the research question, this implies that ‘nature’ is more linked to tangible, physically experienceable memories than to cognitively definable ideas. Another participant’s opinion supports this view.

“When I hear nature, then... , so it’s a bit synonymous with... maybe something like “wilderness.” [...] So, the landscape as it was originally, if humans don’t influence it too much now” (P3)

The quote depicts a clear association of ‘nature’ with wilderness, viewing it as separate from humans and human-made structures. It refers to an original state that has not been heavily influenced by people. The participants’ understanding of ‘nature’ can be interpreted as shaped by the environment of the expedition, which includes mountains, glaciers, and isolation from human-made structures. Possibly, their experiences and encounters in ‘nature’ during the expedition might have influenced their ideals of ‘nature’.

2. ‘Nature’ as a retreat, nature vs. cities/indoors

Another important theme in the analysis is ‘nature’ as a retreat:

“Enjoying being cut off from the world was actually what I took away from it the most. It was really nice. Nature as a place of retreat.” (P2)

“And I think it also helps me a lot to calm down, especially when I’ve been in contact with a lot of people, [...] just to see that and connect with it somehow” (P4)

Those citations show how participants seek contact with ‘nature’ to seek retreat, whether physically or socially. This suggests that experiences with ‘nature’ were perceived as relaxing, encouraging them to use it intentionally as a space for recovery. Regarding their understanding of ‘nature’ and their relationship with it, this suggests that perceiving nature experiences as calming led them to turn to ‘nature’ for this purpose. In the discussion, this aspect is examined in terms of how nature experiences could help develop new recovery strategies in the future.

4.3 Long-Term Effects on Participants’ Later Lives

The *Girls* on Ice* program aims to empower participants by supporting their long-term independence. However, because it was difficult to determine the extent of ‘nature’s influence on the program’s effects, the decision was made to ask participants about the impacts on their current selves generally (see Table 5 in Appendix 5).

1. Increased environmental awareness and sustainable behavior

The participants gained a deeper awareness of and an emotional bond with environmental issues when they observed visible signs of climate change and environmental degradation.

“I mean, first, it is that there is the glacier, because you really see it melting, and you somehow built a connection[...] And somehow don’t want it to disappear.” (P4)

The quote shows how the development of an emotional connection to a glacier, combined with knowledge about climate change, leads the participant to develop environmental awareness. In relation to the research question, it becomes clear that the experiences raised increased environmental awareness: The next quote shows another influence:

“And it also shows me much more, how important it is, to protect it somehow and give your best.” (P4)

She discusses how the experiences of the expedition influenced her ethical stance regarding ‘nature’, revealing that ‘nature’ must be protected. The experiences can thus be interpreted as a change in her perspective on environmental issues. The participant now wants to actively contribute to addressing problems by adapting more climate-friendly behavior:

“I was already a vegetarian, and from then on I tried to live as vegan as possible, and yes, since then I’ve also made sure that I’m as climate-neutral as possible. Yes, that really impressed me, yes.” (P1)

The participant makes it clear that, due to her experiences during the expedition, she has changed her personal behavior towards climate friendliness to this day. The discussion further explores how experiences in ‘nature’ can influence ecological behavior.

2. Enhanced appreciation of ‘nature’ and integration into the daily lives of the participants

Some participants also carried the other impacts ‘nature’ had on them, especially the conscious use of natural surroundings for recovery. The possibility of losing ‘nature’ as they know it made them appreciate it more, and thus value it more.

“Nature is something that cannot be taken for granted, something I greatly appreciate... also as a way to balance out everyday life...” (P3)

This quote illustrates how ‘nature’ gains appreciation from the participant through the realization of environmental destruction, leading to the recognition of achievements by ‘nature’ for the individual. This can be interpreted as a kind of ‘raising awareness’ of the previously unseen, unrecognized contributions and benefits of ‘nature’ for people. In relation to the research question, the expedition can thus increase the participants’ appreciation for ‘nature’ by making the value of ‘nature’ visible.

This increased awareness is evident in that they have consciously integrated ‘nature activities’ into their daily lives since the expedition, taking the form of newly discovered activities and the positive impact of distancing, both digitally and analog. An example of this is shown in the following quote:

“I discovered for myself is that I actually enjoy hiking (laughs)[...] enjoying being cut off from the world was actually what I took away from it the most. It was really nice. Nature as a place of retreat” (P2)

The experiences at the expedition emphasize how ‘nature’ can positively influence the daily lives of participants, connected with a greater appreciation of it. As a result, ‘nature-connected activities’ are more intentionally and actively incorporated into their everyday routines. Concerning the research question, this suggests that the expedition also impacts participants’ daily lives by helping them discover new personal resources and integrating them into their routines. The discussion of these findings as an example of the meaningfulness of learning to experience nature will be revisited in Chapter 5.

3. Empowerment in different dimensions

When asked about the impacts of the expedition on themselves, most of the participants stated that they became more confident.

“I think like the biggest point is trust in myself [...] also this like, getting into a new situation, like, I didn’t know anyone with Girls on Ice” (P4)*

The participant emphasizes how the expedition significantly boosted her self-confidence by confronting her with new situations that she could solve well. For empowerment, self-confidence in new situations is central. This supports the argument that this educational format is indeed suitable for empowering young women. Regarding the research question, it can thus be confirmed that the program contributes to the empowerment of young women from their perspective. The discussion addresses how confrontation with new situations and the experience of managing them well can strengthen self-confidence and, consequently, individual empowerment.

The participant’s self-awareness and self-efficacy experienced significant growth, as she also described feeling capable of hiking through the mountains on her own after the expedition. Another participant is feeling physically empowered:

“Well, I think the empowerment was mainly... I realized that I can actually do a lot more. Even physically, I can hike for hours with an ultra-heavy backpack, and we also climbed on ice, which was really cool. And I climbed into a crevasse, which was (beaming) the best moment!” (P5)

This participant described the process of realizing that she had previously underestimated her physical strength. This became obvious when she tried, encouraged by the team. The experience of practically surpassing her previously assumed limits broadens her self-perception of her physical abilities. In relation to the research question, it can be interpreted that the expedition has challenged previous, partly restrictive self-assessments (and especially underestimations), which have an empowering effect because they strengthen self-confidence and can be transferred to other situations.

Other participants reported increased social confidence. One participant, for example, shared her experience of being the only girl in an informatics class. She said that she was very shy at first because the other students talked a lot during class. However, through the program, she gained the skills needed to handle such situations effectively. The role models of the scientists in the program, with whom the participants could relate, were especially important for this process.

“Seeing women who do that in their lives, so that’s their job, that’s what they studied, it’s also, people always say, yes, girls can do that too, but if you’re just told that and

you still only see men doing it, it's somehow different than when you actually see it"
(P5)

This quote demonstrates how role models helped the participants to visualize that women can pursue careers in male-dominated fields, not only in theory but also in practice. This illustrates, in relation to the research question, how empowerment in social and gendered areas also occurred through role models and social exchange. The discussion revisits the aspect of questioning gender roles and social structures through practical experiences and visible role models with whom the participants can identify.

The discussion focuses on how the program promotes empowerment by combining physical environmental learning, experiential learning, skill-building, social networking, and the representation of women.

4. *Life choices*

All participants mentioned in the interviews that they had considered a career as a scientist because of the program. While some participants subsequently chose a natural science degree, there were also cases where various reasons spoke against it. One participant, who had already decided to study biology before the expedition, stated that the practical demonstration actually made her question her choice:

"Regarding science, I was almost a bit disappointed because I always wanted to study something like biology or whatever, and then to see that many of the people who are in leadership positions here were scientists or still are, but are thinking about quitting, or are completely changing their career fields, or have had very negative experiences. I think that also made my view of science a bit more realistic-I think I had romanticized it a lot.. hmm.. but it also almost discouraged me a little."(P2)

This citation shows how the program presents realistic examples of science careers, which provide information about future careers, even if this could potentially be discouraging. In terms of the research question, the program thus offers an opportunity to engage comprehensively with the career path of a scientist, even if this path is ultimately not pursued. The discussion references how representations in such programs can affect the participants.

5. *Social network and community*

Another long-term effect repeatedly mentioned in the interviews is the formation of lasting friendships and networks through the expedition, which also persist beyond the expedition's timeframe, if the participants are interested:

"And then, still being in this whole community and have the contact to all this amazing people, I think that is also very cool, and, yeah, it motivates me kind of to get into science"(P4)

The participant describes the social network she joined during the expedition as pleasant and motivating for a science career. The network is seen as providing benefits that may support pursuing a scientific career. The discussion revisits this, suggesting that social networking through educational programs can help access certain social spheres.

5. Discussion

5.1 Interpretation of the findings

This study examined how ‘nature’ experiences within the *Girls* on Ice* Program help promote empowerment in young women. The findings show that nature plays a key role in this process. To answer the MRQ, I consider the three sub-questions.

The founder’s perspective on ‘nature’ can be described as diverse, complex, and shaped by various disciplines. The founders perceive ‘nature’ as a versatile and interesting phenomenon that has shaped their identity and career path. At the same time, ‘nature’ is something opposite to human-made spaces and separate from humans. This aligns with Soper’s (1999) proposed understanding of ‘nature’, where humans are both a part of ‘nature’ and apart from it. From the founders’ perspective, ‘nature’ in the program is communicated as a challenging, isolating framework, as a subject and space for learning, as a phenomenon with which one can build an emotional connection, and as an access point. However, the role of ‘nature’ in the program can be primarily described as implicit. This is reflected in the program insofar as the opinions of the founders regarding the importance of ‘nature’ for the program vary considerably.

The roles, through which ‘nature’ has been integrated into the program design, go far beyond the role of a ‘space’ for an educational program. The potentials that ‘nature’ offers are utilized to achieve educational goals. In this process, the group plays a particularly important role: the social environment during the expedition is described by the participants as being highly supportive. The isolation that ‘nature’ provides, combined with the harsh surroundings, brings all expedition members automatically closer to their personal limits. Therefore, ‘nature’ as a challenging setting shapes the team so that they must take responsibility and care for each other. Participants can gradually step out of their comfort zones without becoming overwhelmed. The relatively low-irritant environment helps participants focus, learn, and experiment with new behaviors within changing group roles. The pedagogical structure of the program, centered around three peaks (main challenges: mental, physical, and social), as well as art modules, scientific experiments, and social skill exercises, enhances focus and directs participants’ attention toward feeling ‘deeply connected to nature’. ‘Nature’ as a learning space and learning subject is attractive to the participants because learning *through* and *in* ‘nature’ not only seems meaningful during the expedition but can also be applied in later life. Experiences with ‘nature’ are designed within a caring framework that promotes holistic learning, rather than turning the mountain environment into a competitive challenge to be conquered. This approach may foster experiences and

relationships that are valuing and caring, which is also reflected in participant responses. The founders aim to increase the representation of women in leadership positions. Similar to Bryce et al. (2024), they attempt to allow students to shape their own learning to some extent by exposing them to ‘nature’ and letting their curiosity guide them. At the same time, they teach the participants to leverage the environment’s characteristics to overcome potential barriers in other aspects of their future lives.

Switching to the participants’ perspective before the expedition, ‘nature’ was mainly associated with family vacations and forests - something separate from human influence. This view, as “a luxury or a place to go to for diversion rather than a system of which we are a part” (Wilson, 2019, p. 26), is shared by both groups, participants, and founders. Regarding their current perspective on ‘nature’, viewed with some hindsight, it is often linked to wilderness, originality, or being outdoors. Their perceptions of ‘nature’ can be described as somewhat nostalgic and largely romanticized. Additionally, the data shows that participants encounter difficulty when asked to define ‘nature’, although they can easily describe experiences associated with it. This suggests that the term is cognitively challenging for them to define, while their experiences with it are clearly remembered. While ‘nature’ in the context of the expedition is simultaneously described as a powerful entity that inspires respect and fear, it is also portrayed as vulnerable, but not weak, and environmental pollution is viewed as a way of harming her. To the romanticized view of ‘nature’, a perspective of her being “sacred” is added. This sacred perspective emphasizes the emotional connection participants already have to ‘nature’.

When comparing the participants’ understanding of ‘nature’ before and after the expedition, an overall change in their perception is noticeable, even though measuring nature connectedness was not the primary focus of this study. The author attributes this change to the direct, physically experienced contact with ‘nature’ and the associated emotional experiences, which resemble the understanding of ‘nature’ expressed by the founders in their interviews. ‘Nature’ becomes, in this sense, more complex, interesting, emotionally accessible, and impressive or challenging for the participants. However, this change is not linked to how ‘nature’ is verbally conveyed in this program, but rather to how experiences and encounters with and in ‘nature’ are shaped and experienced, and how the characteristics of ‘nature’ are used as a framework for empowerment. Regarding the literature on environmental psychology, the attractiveness of natural environments to humans as described by Kaplan & Kaplan (1989) is richly supported in data, by both interviewed groups. ‘Nature’ is described as a space for recreational exploration and experiences, such as sports and retreat, which aligns with Kaplan & Kaplan’s findings that ‘nature’ can be stress-reducing and calming (Kaplan & Kaplan 1989).

Concerning the literature regarding the role of ‘nature’ in outdoor science education, the program fulfills the first obstacle to be overcome, the direction of the attention of the students (Russell & Bell 1996; Griffiths & Murray 2017). Through the encouragement to ask and answer questions by themselves, they become intensively engaged with their ‘natural’ surroundings. The program gives a lot of space for emotions in general, for joy, enthusiasm, fear, and to be supported in learning how to handle them together. Most participants speak about an intensified connection to ‘nature’, which means an expansion of their understanding through new experiences and skills. Clayton et al. (2017) suggest not only educating *in* and *about* nature, but also educating, *how to experience* nature to be able to keep a connection her (Clayton et al. 2017).

The expedition fits into the categories of teaching *in* and *with* the environment, opening the possibility of developing a personal connection to ‘nature’, which also aligns with data from the interviews. The literature highlights the importance of direct bodily experience, which was frequently mentioned in the data about the expedition (“being in the elements,” “cold,” “thunder”) (Russell & Bell, 1996). When immersed in the environment, the learning teaches participants how to benefit from increased mental well-being later on. Additionally, learning and free time are not separated; participants are constantly immersed in their learning environment. As a result, learning can happen during individual learning times when focus and interest are present. This free choice, according to the interests of the participants, helps them to learn about ‘nature’ in various ways and thus discover it for themselves later on. These factors are likely to boost learning outcomes. This way of teaching can build relationships with ‘nature’ and foster a sense of responsibility toward her (Fitkin, 2020, p. 10).

Regarding the empowerment aspect, the results were consistent with the organization's goals. The *Girls* on Ice* Program’s participants emphasized that they learned to trust in themselves and tried out different roles during the expedition. Following the literature, the program therefore addresses mostly internal empowerment on a micro and meso level, focusing mostly on individual development, which is a very important aspect of gender equality according to Bryce et al. (2024). The interviewed girls all felt empowered. Additionally, they mainly chose careers in either science or male-dominated fields. Still, in the context of this study, it cannot be determined whether mostly science-interested girls applied to the program or if the program had a significant influence on this outcome.

‘Nature’ is interpreted as contributing to empowerment by creating challenges that, when overcome, enhance self-awareness. This was connected primarily with successfully solving problems and fulfilling different roles within the group, along with a stronger emotional connection to nature. The group serves as a support and

reflection space, playing a fundamental role in this process. The participants learned to identify new role models they can relate to and learn from, created a network, and gained new perspectives, including about themselves.

Additionally, it becomes clear that at no point in the interviews are individual performance or mountaineering-specific difficulty levels mentioned, as is usually the case when talking to mountaineers. I interpret this as an indication that the mountaineering difficulty level is tailored to the participants. Performance does not seem to be the main focus; instead, the emphasis appears to be on individual growth.

In the long run, the physically engaging ‘nature’ adventures of the program seem to have contributed to increased environmental awareness among participants, making processes like climate change more visible and tangible, and showing how these processes impact, for example, mountain landscapes. Participants have, in part, tried to make their own behavior more sustainable through these experiences. Similar results were also found by Young et al. (2020). Additionally, the intrinsic value of ‘nature’ grew, and nature-related activities became part of some participants’ daily lives. Years after the expedition, participants still felt empowered in their self-confidence and seriously considered a career in the natural sciences, which they sometimes pursued, benefiting from the realistic description they received of this career. This was further supported by the fact that the social network created by the program continued to stay connected for them.

To conclude and answer the third research question, it can be interpreted that ‘nature’ in the program plays multiple interconnected roles that contribute to empowering young women over time. It functions as an active and demanding framework that fosters participants’ transformation. Here, art, science, and outdoor exploration serve as mediators of this transformation. This transformative learning occurs through immersive exposure to ‘nature’ and reflecting on this experience with a group, which acts as a supporter and a safe space for individual empowerment. ‘Nature’ also serves as a holistic learning environment and a source of career inspiration for the participants. By providing access to this space through a free expedition, systemic barriers are challenged. Therefore, ‘nature’ can offer opportunities and advantages that are made accessible through such a program.

5.2 Strengths and limitations of the used methodology

The results of this study are limited by certain factors. The data consists of interviews, without direct observation of the program, limiting insights to the verbalized self-reflection of the interviewees. To reach an adequate sample size, all interested interviewees were included in the study, which may have resulted in a sampling bias. Also, research about the “long-term” impacts of the program are limited to two to four years after the expedition. The observation of the extent to

which participants connected with ‘nature’ was limited to questions; it would have been more effective to focus on this aspect through the measurement of ‘nature connectedness’. Also, the interpretation would have profited from multiple perspectives from different disciplines, accounting for the interdisciplinarity of the topic.

5.3 Limitations of the program and practical implications

Based on the relevant literature, some limitations of the program and practical implications shall be discussed.

In the program, the concept of socio-ecological systems is partially integrated, mainly through teaching the impacts of human-induced climate change. Participants reported increased environmental awareness and behavioral change after direct contact with visible phenomena of climate change. These findings align with those of Young et al. (2020), who described shifts in environmental identity due to the program. The impressions gained during the expedition, therefore, were connected to the larger context of the global environmental crisis and inspired participants to take responsibility for ‘nature’. When thinking about social-ecological transformation and behavioral change, future educational programs should include immersive and embodied experiences in their curricula.

Another lesson from *Girls* on Ice* is the emphasis on collaboration rather than competitive models of education. Instead, following the advice of Chant (2016) and Esquivel (2016), the founders aim to establish Girls* on Ice as a strong community that can support and connect individuals from historically oppressed groups, allowing participation on their own terms (Chant 2016; Esquivel 2016). Supportive peer networks that include and uplift marginalized groups are a crucial step toward equality. *Girls* on Ice* built these groups in very isolated, ‘nature’ locations, which participants identified as a significant aspect, as it was mentioned in every interview. This isolation, both physical and digital, provided space for participants to create a safe social environment according to their wishes, explore different roles, and discuss, undistracted. Isolation can be either beneficial or harmful depending on the social setting, but when implemented with care and support, it can serve as a powerful tool for empowerment, teamwork, or personal growth.

From the perspective of the program’s founders, access to ‘nature’ is not self-evident. The *Girls* on Ice* program shows a way to make ‘nature’ emotionally and spatially more accessible, and at the same time, to use this process as a means to empower participants and strengthen their motivation to care for ‘nature’. Overall, it can be concluded that the experiences conveyed in the program have a

transformative potential regarding personal development, participant empowerment, as well as their behavior and moral positioning in the context of sustainability.

Specifically, several suggestions can be drawn from the study's findings. First, it would be beneficial to politically facilitate access to 'nature' to harness the advantages of contact with and relationship to 'nature'. Second, it would be advisable to establish "outdoor empowerment" combined with adequate time, exposure to 'nature,' and a suitable group within a broader context in schools or kindergartens to teach ways to experience 'nature,' as suggested by Clayton et al. (2017), while simultaneously strengthening self-determination and independence. Third, I believe it is important to critically question whether it is desirable to associate 'nature' in a societal and individual sense primarily with 'untouched wilderness' and as the opposite of cities, as the participants' understanding of 'nature' seems to reflect after the expedition. Experiences that only connect experiencing 'nature' to remote alpine environments might pose a barrier to future connections with 'nature' if people lack access to this "wilderness". Therefore, the effectiveness of the program may vary individually depending on the daily circumstances in which a person lives. Access to and a stronger emotional bond with 'nature' can thus lead to improved strategies for personal recovery-something that would be beneficial for society as a whole. Overall, a strict intellectual separation of city/daily life and 'nature'/leisure/retreat can naturally enhance the restorative function of 'nature,' which is associated with retreat, but it also narrows what 'nature' can mean for society, for example, as a basis for life.

5.4 Open questions and future outlook

Some suggestions for future research shall be made.

This study focuses the roles of 'nature' in the program. All dimensions of nature connectedness showed up in the interviews, but a detailed observation of their occurrence in the data has not been the subject of this study. For deeper insights into educational processes in the Program *Girls* on Ice*, specific measurements of nature connectedness through a suitable method could be conducted, for example, directly before and after the expedition. This would outline the impact and relationship of and to 'nature' more clearly than in this study. Also, studies could concentrate on how the participants' connection to nature might be included in their later life, which is important to address the environmental crisis.

Additionally, it would be helpful to address some limitations of this study by conducting a similar study with participants who contributed to the expeditions a longer time ago. This would allow researchers to learn about the impacts of such programs when participants are already in a different stage of life. It also reads from

data that 'nature' roles is rather implicitly contributing to the program. Therefore, future studies could focus on empowering programs that include 'nature' more explicitly, exploring possible differences in handling.

This study focused on empowerment through 'nature' in an educational program. Future research could focus on other contexts of empowering processes through 'nature', for example in an unguided context.

6. Conclusion

This qualitative study aimed to explore the role of ‘nature’ in an educational program. It contributes to a better understanding of how ‘nature’ can be incorporated into educational programs that aim to promote equality and visualize its potential impacts on people’s learning and personal growth. To achieve this, semi-structured interviews were conducted with six former participants and two founders of the program *Girls* on Ice*. The study examined how the perceptions and ideals of ‘nature’ held by the founders and participants are reflected in the experiences gained during the expedition, and which of these experiences participants perceived as related to their understanding of ‘nature’. Particular attention was given to the long-term effects on participants, which they associate with this influence.

The findings show that in the Program Girls* on Ice, ‘nature’ actively contributes to the individual development of the participants. It provides a setting for challenge and growth, and serves as a subject for learning, empowerment, and personal development, while also being an entity with which participants can personally relate. This potential of ‘nature’ is revealed through embodied, immersive experiences over eight days, combined with a social environment perceived as very supportive. Long-term impacts included increased environmental awareness, a sense of responsibility for nature, greater self-confidence, and empowerment on various levels.

Educational empowerment programs alone cannot address systemic inequality. Still, this study shows how ‘nature’ can play an essential role in education and, therefore, help address broader societal challenges. The *Girls* on Ice* Program fulfills its goal of encouraging young women to explore careers in traditionally male-dominated fields. It boosted their self-confidence and strengthened their connection to ‘nature’.

The findings are limited due to a short follow-up period and the financial and thematic scope of this study. Understanding how ‘nature’ can be integrated more actively to support our society, for example through education should be an important goal of our research community to face our current global crisis.

References

- Allen-Craig, S. & Hartley, C. (2012). Exploring the Long-Term Effects for Young Women Involved in an Outdoor Education Program. *Journal of Outdoor Recreation, Education, and Leadership*, 4 (2), 88–91
- Alsaawi, A. (2014). A Critical Review of Qualitative Interviews. SSRN Scholarly Paper, Social Science Research Network. <https://doi.org/10.2139/ssrn.2819536>
- Berkes, F., Colding, J. & Folke, C. (1998). Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience: Fikret Berkes, Carl Folke, Johan Colding (Eds.), Cambridge University Press, Cambridge, 1998, 459 pp, +xvi, US\$ 80.00, ISBN 0-521-59140-6. 24, 459. [https://doi.org/10.1016/S0169-5150\(00\)00067-0](https://doi.org/10.1016/S0169-5150(00)00067-0)
- Brah, A. & Phoenix, A. (2004). Ain't IA Woman? Revisiting Intersectionality. *Journal of International Women's Studies*, 5
- Bryce, C.J.C., Dadswell, K., Dallat, C. & Parker, A.G. (2024). Perceptions of empowerment and leadership in the context of outdoor education: a qualitative study in women participants. *Journal of Outdoor and Environmental Education*, 27 (3), 413–436. <https://doi.org/10.1007/s42322-023-00136-2>
- Calvin, K., Dasgupta, D., Krinner, G., Mukherji, A., Thorne, P.W., Trisos, C., Romero, J., Aldunce, P., Barrett, K., Blanco, G., Cheung, W.W.L., Connors, S., Denton, F., Diongue-Niang, A., Dodman, D., Garschagen, M., Geden, O., Hayward, B., Jones, C., Jotzo, F., Krug, T., Lasco, R., Lee, Y.-Y., Masson-Delmotte, V., Meinshausen, M., Mintenbeck, K., Mokssit, A., Otto, F.E.L., Pathak, M., Pirani, A., Poloczanska, E., Pörtner, H.-O., Revi, A., Roberts, D.C., Roy, J., Ruane, A.C., Skea, J., Shukla, P.R., Slade, R., Slangen, A., Sokona, Y., Sörensson, A.A., Tignor, M., Van Vuuren, D., Wei, Y.-M., Winkler, H., Zhai, P., Zommers, Z., Hourcade, J.-C., Johnson, F.X., Pachauri, S., Simpson, N.P., Singh, C., Thomas, A., Totin, E., Arias, P., Bustamante, M., Elgizouli, I., Flato, G., Howden, M., Méndez-Vallejo, C., Pereira, J.J., Pichs-Madruga, R., Rose, S.K., Saheb, Y., Sánchez Rodríguez, R., Ürgen-Vorsatz, D., Xiao, C., Yassaa, N., Alegria, A., Armour, K., Bednar-Fiedl, B., Blok, K., Cissé, G., Dentener, F., Eriksen, S., Fischer, E., Garner, G., Guivarch, C., Haasnoot, M., Hansen, G., Hauser, M., Hawkins, E., Hermans, T., Kopp, R., Leprince-Ringuet, N., Lewis, J., Ley, D., Ludden, C., Niamir, L., Nicholls, Z., Some, S., Szopa, S., Trewin, B., Van Der Wijst, K.-I., Winter, G., Witting, M., Birt, A., Ha, M., Romero, J., Kim, J., Haïtes, E.F., Jung, Y., Stavins, R., Birt, A., Ha, M., Orendain, D.J.A., Ignon, L., Park, S., Park, Y., Reisinger, A., Cammaramo, D., Fischlin, A., Fuglestedt, J.S., Hansen, G., Ludden, C., Masson-Delmotte, V., Matthews, J.B.R., Mintenbeck, K., Pirani, A., Poloczanska, E., Leprince-Ringuet, N. & Péan, C. (2023). *IPCC, 2023: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland. Intergovernmental Panel on Climate Change (IPCC).* <https://doi.org/10.59327/IPCC/AR6-9789291691647>
- Castree, N. (2005). *Nature*. 1. ed Routledge, Taylor & Francis Group. <https://doi.org/10.4324/9780203448410>
- Chant, S. (2016). Women, girls and world poverty: empowerment, equality or essentialism? *International Development Planning Review*, 38 (1), 1–24. <https://doi.org/10.3828/idpr.2016.1>
- Children & Nature Network (2018). *Home to us all: How Connecting with Nature Helps Us Care for Ourselves and the Earth*
- Cho, J. & Lee, E.-H. (2014). Reducing Confusion about Grounded Theory and Qualitative Content Analysis: Similarities and Differences. *The Qualitative Report*,. <https://doi.org/10.46743/2160-3715/2014.1028>

- Chun Tie, Y., Birks, M. & Francis, K. (2019). Grounded theory research: A design framework for novice researchers. *SAGE Open Medicine*, 7.
<https://doi.org/10.1177/2050312118822927>
- Clayton, S., Colléony, A., Conversy, P., Maclouf, E., Martin, L., Torres, A., Truong, M. & Prévot, A. (2017). Transformation of Experience: Toward a New Relationship with Nature. *Conservation Letters*, 10 (5), 645–651.
<https://doi.org/10.1111/conl.12337>
- Denton, F. (2002). Climate change vulnerability, impacts, and adaptation: why does gender matter? In: Masika, R. (ed.) *Gender, development, and climate change*. (Oxfam Focus on Gender). Oxfam. 10–20.
- Ergas, C., McKinney, L. & Bell, S.E. (2021). Intersectionality and the Environment. In: Schaefer Caniglia, B., Jorgenson, A., Malin, S.A., Peek, L., Pellow, D.N., & Huang, X. (eds) *Handbook of Environmental Sociology*. Springer International Publishing. 15–34. https://doi.org/10.1007/978-3-030-77712-8_2
- Esquivel, V. (2016). Power and the Sustainable Development Goals: a feminist analysis. *Gender & Development*, 24 (1), 9–23.
<https://doi.org/10.1080/13552074.2016.1147872>
- Fitkin, A. (2020). Land, Body, Liberation: An Ecofeminist Pedagogical Approach to Place-Based Education. *WWU Graduate School Collection*,.
<https://cedar.wwu.edu/wwuet/961>
- Griffiths, M. & Murray, R. (2017). Love and social justice in learning for sustainability. *Ethics and Education*, 12 (1), 39–50.
<https://doi.org/10.1080/17449642.2016.1272177>
- Huis, M.A., Hansen, N., Otten, S. & Lensink, R. (2017). A Three-Dimensional Model of Women’s Empowerment: Implications in the Field of Microfinance and Future Directions. *Frontiers in Psychology*, 8, 1678.
<https://doi.org/10.3389/fpsyg.2017.01678>
- Inspiring Girls* Expeditions (2022). Inspiring Girls* Expeditions. *Inspiring Girls* Expeditions*. <https://www.inspiringgirls.org/> [2025-08-15]
- Kaplan, R. & Kaplan, S. (1989). *The experience of nature : a psychological perspective*. 1. publ.. <https://permalink.obvsg.at/bok/AC00288594>
- Kopnina, H., Washington, H., Taylor, B. & J Piccolo, J. (2018). Anthropocentrism: More than Just a Misunderstood Problem. *Journal of Agricultural and Environmental Ethics*, 31 (1), 109–127. <https://doi.org/10.1007/s10806-018-9711-1>
- Leech, B.L. (2002). Asking questions: Techniques for semistructured interviews. *PS - Political Science and Politics*, 35 (4), 665–668.
<https://doi.org/10.1017/S1049096502001129>
- MacGregor, S. (2017a). GENDER AND ENVIRONMENT. An introduction. In: MacGregor, S. (ed.) *Routledge Handbook of Gender and Environment*. 1. ed. Routledge. 1–6. <https://doi.org/10.4324/9781315886572>
- MacGregor, S. (ed.) (2017b). *Routledge Handbook of Gender and Environment*. 1. ed Routledge. <https://doi.org/10.4324/9781315886572>
- MacGregor, S. & Mäki, A.U. (2024). We Do Not Want to Be Mainstreamed into a Polluted Stream?: An Ecofeminist Critique of SDG 5. In: Partzsch, L. (ed.) *The Environment in Global Sustainability Governance*. 1. ed. Bristol University Press. 220–245. <https://doi.org/10.2307/jj.8595634.15>
- Martinez-Alier, J., Temper, L., Del Bene, D. & Scheidel, A. (2016). Is there a global environmental justice movement? *The Journal of Peasant Studies*, 43 (3), 731–755. <https://doi.org/10.1080/03066150.2016.1141198>
- McGuire, N.M. (2015). Environmental Education and Behavioral Change: An Identity-Based Environmental Education Model.
- Mishra, S. & Dey, A.K. (2022). Understanding and Identifying ‘Themes’ in Qualitative Case Study Research. *South Asian Journal of Business and Management Cases*, 11 (3), 187–192. <https://doi.org/10.1177/22779779221134659>

- Olmos-Vega, F.M., Stalmeijer, R.E., Varpio, L. & Kahlke, R. (2023). A practical guide to reflexivity in qualitative research: AMEE Guide No. 149. *Medical Teacher*,. <https://www.tandfonline.com/doi/abs/10.1080/0142159X.2022.2057287> [2025-05-02]
- Richardson, M., Dobson, J., Abson, D.J., Lumber, R., Hunt, A., Young, R. & Moorhouse, B. (2020). Applying the pathways to nature connectedness at a societal scale: a leverage points perspective. *Ecosystems and People*, 16 (1), 387–401. <https://doi.org/10.1080/26395916.2020.1844296>
- Rose, J. & Johnson, C.W. (2020). Contextualizing reliability and validity in qualitative research: toward more rigorous and trustworthy qualitative social science in leisure research. *Journal of Leisure Research*, 51 (4), 432–451. <https://doi.org/10.1080/00222216.2020.1722042>
- Russell, C.L. & Bell, A.C. (1996). A Politicized Ethic of Care: Environmental Education from an Ecofeminist Perspective. Warren, K. (ed.) (Warren, K., ed.) *Women's voices in experiential education*, 172–181
- Salazar, G., Monroe, M.C., Jordan, C., Ardoin, N.M. & Beery, T.H. (2021). Improving Assessments of Connection to Nature: A Participatory Approach. *Frontiers in Ecology and Evolution*, 8, 609104. <https://doi.org/10.3389/fevo.2020.609104>
- Soper, K. (1995). Feminism and Ecology: Realism and Rhetoric in the Discourses of Nature. *Science, Technology, & Human Values*, 20 (3), 311–331
- Soper, K. (1999). The politics of nature: Reflections on hedonism, progress and ecology*. *Capitalism Nature Socialism*, 10 (2), 47–70. <https://doi.org/10.1080/10455759909358857>
- UIS (2019). *Women in Science*. (Fact Sheet No. 55). The UNESCO Institute for Statistics (UIS).
- Wilson, R. (2019). What is Nature? *The International Journal of Early Childhood Environmental Education*, 7 (1), 26–39

Popular science summary

Our global community faces severe, interconnected problems: the biodiversity crisis, climate change, and increasing inequality. These issues are linked to our modern lifestyles, which often harm the environment and marginalized communities. In particular, gender inequality is a significant problem: about half of the world's population - women and girls - are underrepresented in environmental leadership roles and in science. Many researchers agree that unless we address inequality, we cannot solve our ecological crisis.

But here's the issue: Simply knowing about these problems usually doesn't lead to action. One explanation that research has found is an emotional connection, especially to nature.

In my research, I examined an educational program designed to tackle gender inequality in the natural sciences: It is called *Girls* on Ice*, an eleven-day glacier expedition entirely led by women. The program aims to empower young women and encourage them to pursue careers in natural sciences or leadership roles. The organization's goal is to give people, who might not otherwise have this chance, exposure to nature and potential career paths.

In my project, I examined how nature itself influences this process and whether the program has a lasting impact on participants. I interviewed two founders of a branch of the organization and six former participants. I aimed to find out how participants use the skills from the expedition long after the program, but I was only able to speak with participants from two to four years ago.

I realized that nature plays a vital role in the program. The participants explained that nature was not just the place where the expedition took place, but it also challenged them, sparked their curiosity and excitement, and helped them grow closer together as a team. The extended time spent outdoors in the mountains fostered a deep emotional connection to nature.

The team of women created a social space where the Girls* could try different roles, as group leaders, mountain guides, and scientists. For the participants, these experiences were very valuable, changing their perspectives on nature and themselves, and encouraging them to consider careers in male-dominated fields. They told me that they have learned to trust themselves much more than before, and now they incorporate nature experiences into their daily lives.

My results may motivate other education programs to include more nature in their curriculum. Also, the research community can use my findings to better understand

how a connection to nature encourages sustainable behavior and supports progress toward equity.

My study was small, and I could only speak with participants two to four years after the expedition. For future research in this area, it would be helpful to follow up with participants over a longer period or explore ways other educational settings can use nature to promote empowerment.

Answering those questions might help us discover a way of living that supports both human and non-human life.

Acknowledgements

I would like to thank my interviewees for the inspiring and interesting talks we had! You made this thesis possible, and I wish you all the best with all your dreams and ideas. Thank everyone who is working in Girls* on Ice for taking action. Your work is irreplaceable!

I sincerely want to thank my supervisors, Jasmine Zhang and Karolina Taczanowska. Thank you for your inspiring and kind guidance throughout this project and for always being there to give advice.

Thank you also to my friends, family, colleagues, orchestra members, animals, and everyone I talked to about the project, who helped recharge my energy and hosted me while I was working on the thesis. Special thanks also to the natural surroundings, which I got to know and enjoy walking through while thinking about my project.

Appendix 1: Social Media Post



Call for interviewees amongst the alumni of Girls*on Ice!

Dear alumni of Girls* on Ice Switzerland/Austria!

Would you like to find learn more about your time at Girls*on Ice and the project's long-term impact? If that is the case, I would be very grateful to be able to talk to you.

My name is Alex, I am studying Environmental Sciences at BOKU Vienna (Wien) and SLU Uppsala (Sweden) and I am incredibly passionate about the idea, the goals and structure of Girls* on Ice.

To find out more about the project, empowerment and leadership development, especially in connection with the setting in the high altitudes, that make the

program so special, I am currently writing my Master Thesis with the title:
“Empowering through ‘nature’. The role of ‘nature’ within Girls* on Ice Program
as a social space for long-term empowerment of young women in science, art and
outdoor exploration”.

More information you will find in the Info sheet attached. Please contact me
through aays0001@stud.slu.se.

Thanks a lot already!

Many greetings,

Alex

Appendix 2: Infosheet for participation in the interviews

Call for interviewees amongst the alumni of Girls*on Ice!

Dear alumni of Girls* on Ice Switzerland/Austria!

Would you like to share about your time at Girls*on Ice program and its long-term impact on you, so that more people can learn from that? If that is the case, I hope you would consider talking to me!

My name is Alex, I am studying Environmental Sciences at BOKU Vienna (Wien) and SLU Uppsala (Sweden). To find out more about the program, its elements about empowerment and leadership development, especially in connection with the physical settings, I am currently writing my Master Thesis with the title: “The role of ‘nature’ within Girls* on Ice Program for long-term impacts on young women in science, art and outdoor exploration”.

To understand what role ‘nature’ played in how you experienced the program and what impacts it has had on you, I would like to warmly invite you to talk with me through a semi-structured interview. Upon agreeing to conduct the interview, I will ask you to sign a consent form. I am also putting down a list of information below in case you want to know more about my Master Thesis Project, and the data collection.

Best wishes, and I hope to hear from you soon!!

Alex

What is the purpose of this research?

The purpose of this study is to explore the role of ‘nature’ at an empowering programme for young women in “science, art and outdoor exploration”. It concerns the global goals of reaching diversity, equality, inclusion and justice with a focus of gaining a better understanding about the emotions connecting to the surroundings in this process, especially in the long-term.

Why do I need you?

I invite you to participate in this project, because you are an alumnus of the Girls* on Ice Program and therefore, you are able to share insights of your perspective on the topic.

What would I be asked to do if I want to take part?

In the form of an interview (30 to 60 minutes), I will ask you to talk about your personal experience during the expedition, your opinions and perspectives on the natural surroundings and on 'nature' in general and about possible impacts, the program had on your later life. You can decide on a location for our interview, meeting in person or online.

What happens to the data collected?

All data will only be used as agreed with you in the consent form in the appendix. The interviews will be recorded, transcribed and sent to you for approval. The collected data will be used as a base for my Master Thesis, and might be included into other outcomes of my research, such as presentations or publications. My Master Thesis will be made available publicly upon completion.

How is confidentiality maintained?

As I am writing explicitly about Girls* on Ice, a sufficient anonymisation will not be possible. As I also would like to use quotes, you may be identifiable within the alumni of Girls*on Ice. I will not use your name or other personal data in the research outputs. The original interview data and transcripts will be stored securely; the recordings will be destroyed a year after the completion of the Master Thesis (possible late 2026).

What happens if I do not want to take part or if I change my mind?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw up until the end of the Master Thesis without giving a reason and without detriment to yourself.

In the case of something going wrong during the interview, you may stop from any participation immediately.

Will I be paid for participating in the research?

You won't be paid for your participation; however, I believe the outcomes of my research will be beneficial to you, as well; the final Master Thesis will be publicly available, and I would be more than happy to give you a presentation on the research outcomes once I am finished with it.

What if I want to make a complaint?

In case you would like to complain for whatever reason, please contact the researcher for minor complaints. For formal complaints or if you are not satisfied with the response of the researcher, please contact her supervisor (Jasmine Zhang: jasmine.zhang@slu.se).

I choose to take part: What do I have to do?

Read the attached form carefully. Reply to the email and include the following text in your reply:

‘I confirm that I have received the consent and information form emailed to me on DD MM 20YY. I confirm that I understand how my personal data will be processed. I am aware that participation in this project is voluntary and that I can end my participation at any time without justifying it. By sending this email, I consent to my personal data being processed as part of the independent project “Empowering through ‘nature’. The role of ‘nature’ within Girls on Ice Program as a social space for long-term empowerment of young women in science, art and outdoor exploration”.’

Appendix 3: Interview questions for the former participants of the expedition:

1. Start recording
2. Welcome, thanks for participating, short presentation of my project (one minute – what is my topic?) -> *“The purpose of this study is to explore the role of ‘nature’ at an empowering programme for young women in ‘science, art and outdoor exploration’ ...”*

3. Main part:

- **Part G*OI Program (Expectations, experiences, reflections on philosophy)**

Could you quickly present yourself as well and tell me about Girls* on Ice?

When you applied for the program, what did you **expect** from it?

Could you describe a typical day on the expedition for me? How did you **experience** the program?

How did you experience the program’s philosophy regarding human-nature relations?

What was the most interesting topic you remember from the expedition? Why?

How was it presented?

Did you have experiences both indoor and outdoor during the program’s duration, for instance, due to bad weather? Did you notice difference in experiences?

How did it feel, to be outside up in the mountains for so long?

What do you think about G*OI being a girls* only program?

How would you describe the group setting during the expedition? How was your relationship to the other participants? And the instructors?

- **Part Participant (reflection on effects in current time)**

What did you learn on the expedition, that you still use in your life?

How would you describe your interests in and relationship with nature?

(definition of nature, activities in nature, nature landscape, past, views on society/nature relation)

Looking at the present: What role did the expedition play in your life and how is that now?

Would you say, that the expedition changed your view and relationship to ‘nature’ by the nature around you?

- **Part long-term effects**

What is your view on initiatives that empower women? How has the program experience contributed (or not) to your own empowerment?

What is your career choice now? How did you come to decide that?

Are you working in a field as any kind of minority?

What do you think about gender problematics in the fields “science, art and outdoor exploration? How was your personal experience with those problems?

After: Take time to read through questions once more if you got everything covered!!

Then THANK the interviewee

Appendix 4: Interview with the founders of the organisation

1. Start recording
2. Welcome, thanks for participating, short presentation of my project (one minute – what is my topic?) -> *“The purpose of this study is to explore the role of ‘nature’ at an empowering programme for young women in ‘science, art and outdoor exploration’ ...*
3. Main part:

- Part Personal Questions

Could you quickly present yourself as well and tell me about your story with Girls* on Ice?

What is your career choice now? Could you tell me your story, how did you come to decide that?

What do you think about gender problematics in the fields “science, art and outdoor exploration? How was your personal experience with those problems?

How would you describe your interests in and relationship with nature?

(definition of nature, activities in nature, nature landscape, past, views on society/nature relation)

- Part Problems and G*OI as a solution

How did it come, that you founded this program? -> focus on transformative moment

Why did you choose this format? Nature??

What is your view on initiatives that empower women? How shall the program contribute (or not) to the empowerment of the participants?

Which impact would you wish, that program or similar programs have on the society?

Do you think, the program plays a role in the establishment of an equal power distribution in decision-making processes regarding environmental management?

- Part G*OI reflection

Could you describe a typical day on the expedition for me? Which experiences should the participants get?

In which way is ‘nature’ part of the participants’ transformative experiences?

How would you describe the program’s philosophy regarding human-nature relations?

How do you present the topics on the expedition? Why? How do you perceive and communicate the nature you show the Girls*?

How do you awaken scientific curiosity?

Why did you make G*OI being a girls* only program?

Which goals do you have regarding the group setting during the expedition?

Would you say, that the expedition changes the view and relationship of the participants to 'nature'?

In a summary: What exactly would be the goal you see in G*OI for the participants and do you think it is being reached?

After: Take time to read through questions once more if you got everything covered!!

Then THANK the interviewee

Stop recording

Appendix 5: Evolving themes

Table 2: Findings SQL: Evolving themes: The founder's perception of and personal relationship with 'nature'. Own table.

Themes: Founder's perception of 'nature'	Description
1. Diversity of 'nature' perceptions	In the first place, 'nature' is associated with 'being' outside. When asking further, 'nature' can be the subject of diverse considerations – it can simultaneously be challenging and dangerous, or silent and provide retreat. It is perceived differently from the perspective of art, science, or leisure exploration. It is not only a subject of research but also of emotional experience.
2. 'Nature' as an interesting, intriguing phenomenon	For both founders, 'nature' is interesting in the sense that it is attractive to them, invites them to explore, be curious, and challenges them, becoming emotionally experienceable.
3. Counterpart to 'nature': Indoors/computer vs. nature	Both founders view the digital world and the indoors as counterparts to the natural world.
Themes: Founder's relationship to 'nature'	Description
1. Emotions and the relationship to 'nature'	The relationship to 'nature' is connected to various emotions, such as enthusiasm, passion, awe, calmness, and fear. Also, it has positive impacts on the emotional well-being of the founder.
2. The relationship to 'nature' as a strong positive influence on the founder's life	The relationship to 'nature' shaped their identities and career paths, and ultimately led to the founding of the program.
3. The relationship to 'nature' is individual and variable	Contact with 'nature' can be tailored to personal needs, such as the desire for quiet or a higher risk appetite. It also changes within the founders' lives: While one of the founders states that it has always been essential for her, the other one lost her emotional connection to it in recent years.

Table 3: Findings SQ1: Evolving themes: Presentation and communication of 'nature' in the program. Own table.

Themes: Presentation and communication in the program	Description
1. Nature as a demanding frame for challenges and growth	'Nature' creates a framework for the program characterized by isolation and the posing of challenges. The isolation simultaneously provides a space for the development of a special group dynamic and offers distance in both digital and analog forms. The objective dangers of the mountain environment contribute to the personal development of the participants, strengthen team cohesion, and represent worthwhile goals that can be achieved together.
2. Nature as a subject and space for holistic learning	'Nature' is both a subject to be learned about and a space where learning and living take place. The participants are thus immersed in their learning environment. The participants themselves determine the direction of learning, and knowledge transfer occurs through the media of art, science, and outdoor exploration. This setting thus enables a holistic learning environment that encompasses learning about oneself, various social processes, and 'nature'.
3. Exposure as a driver for the connectedness of the participants	The expedition offers a lot of uninterrupted time in 'nature'. This allows it to be experienced in various facets and states. The exposure gradually leads to an emotional bond with it, which is created through embodied experiences. Participants evaluate this connection as being essential to the overall expedition.
4. 'Nature' creates access	The program aims to provide access to male-dominated areas and to 'nature' itself. This is achieved through empowering experiences on the expedition combined with discussions, learning mountaineering skills, reflections, and embodying role models.
5. 'Nature' isolates	'Nature' provides isolation, which can mean both an opportunity and a challenge. The isolation is both digital and analog and influences group dynamics.
6. Ambivalent role of 'nature' to the program: Instrumental vs. Relational presence	The founders have ambivalent opinions about the role of 'nature' in the program. One founder believes that 'nature' is merely a space serving specific purposes, which eventually also could be fulfilled in other settings; the other founder sees 'nature' as a central aspect of the program.

Table 4: Findings SQ2: Evolving themes: Participant understanding of and experiences with 'nature'. Own table.

Time frame in relation to the expedition	Themes: Participant understanding of and experiences with 'nature'
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Before the expedition:	Perception of ‘nature’ in childhood memories associated with mountains, forests, family vacations and positive emotions
During and directly after the expedition:	Noticeable Intensification and expansion, Nature as a powerful entity while simultaneously being something vulnerable and in need of protection
After the expedition	Reflection after the expedition: Association with the expedition surroundings, Nature as a dynamic, emotional, and directly experienced construct, understanding more complex (cognitively diffuse, sharply defined by embodied experiences), active change towards more sustainable behavior

Table 5: Findings SQ3: Evolving themes: Long-term effects of the program on the participants. Own table.

Themes: Long-term effects of the program on the participants	Description
1. Increased environmental awareness and sustainable behavior	Participants became more aware of environmental issues when shown images of melting glaciers and other signs of climate change. This awareness led to concrete behavioral changes that extended beyond the scope of the expedition.
2. Enhanced appreciation of ‘nature’ and its conscious integration into the daily lives of the participants	Direct experiences with ‘nature’ fostered environmental responsibility and gave it value. Participants also incorporated nature activities into their lives.
3. Empowerment in different dimensions	Participants reported an increase in self-trust in both physical and social dimensions. Additionally, the women-only program altered their perceptions of gender.
4. Life Choices and Identity	Most participants reported that they had considered a career in science after the expedition. Others developed a more realistic view of the job.
5. Social Network and Community	Participants remain engaged with the community surrounding the program. They stay in touch with the other participants and participate in community activities.

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