# TOURISTS' PERCEPTIONS OF CLIMATE CHANGE IMPACTS IN ROVANIEMI, FINLAND

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## Abstract

Rovaniemi, a popular destination for Arctic tourism is facing significant challenges due to the climate change. The shift in weather patterns is impacting the winter tourism industry, altering the traditional appeal of a destination and its activities. This Master thesis examines how tourists perceive the impacts of global warming and how it is influencing travel decisions, preferences, and the attractiveness of the destination. A survey distributed to the tourists in Rovaniemi during the winter months collected the data on tourirts demographics, travel background, awareness of climate change, and perceptions of the destination's attractiveness under various climate scenarios. Quantitative and qualitative analysis showed that while the image of snow plays a crucial role in tourists decision making, tourists demonstrated the flexibility in adapting their preferences in response to climate change. Promoting alternative, non-snow-related activities like the Northern Lights, wellness experiences and Santa Claus themes activities are recommended for maintaining attractiveness of Rovaniemi in times of climate change. The study provide valuable insights for future research and local decision makers in developing sustainable tourism strategies to address the challenges of climate change.

**Keywords**: climate change, winter tourism, tourists perceptions, destination attractiveness, tourism adaptation strategies

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# 1. INTRODUCTION

## 1.1. Background to the study

Tourism is one of the most important sectors, playing a considerable role in the global economy (World Travel & Tourism Council, 2024). Rovaniemi, the capital of Finnish Lapland, also known as an 'Official Home of Santa Claus', is an example of tourism being an important sector of economic development. As noted by Popescu and Corboș (2010), the city's economic and social vitality relies on tourism more than in other regions in Finland. In recent years, tourism in Rovaniemi has been actively increasing, particularly as an image of the winter destination.

In 2022, tourism in Lapland accounted for 14,3% of Finnish market share. Over 3,2 million registered overnight stays were registered, with a significant increase in international travellers compared to the COVID-19 year. The statistics for 2022 shows the significant growth in passenger arrivals to key airports in Lapland, with Rovaniemi Airport experiencing a noticeable increase compared to previous years (House of Lapland, 2023).

Rovaniemi, often referred to as an Arctic destination, is popular for its snow-related activities, Christmas-themed attractions and an overall 'winter wonderland' atmosphere. The highest tourism statistics can be seen during the winter months from November to April. For example, during the winter of 2022-2023, over 2,2 million overnight stays were registered, with 1,4 mln of them being international (House of Lapland, 2023).

However, Rovaniemi destination attractiveness is becoming a concerning issue due to the climate change. The Arctic Region, including Lapland, is experiencing a dramatic climate change, with warming being twice as high as the global average rate (NOAA, 2023). Increased temperatures and changing weather patterns are particularly affecting the snow recover and the reliability of snowfall. Destinations that are known for their winter landscapes and outdoor snow and ice-dependent activities are facing uncertainties towards the future of winter tourism industry (Scott, Hall, & Gössling, 2012).

This shift in weather patterns not only affects the tourist experience but also has economic implications for businesses reliant on winter tourism (Steiger, Scott, & Abegg, 2019). A

study by Tervo-Kankare, Hall, and Saarinen (2013) has raised the question of challenges Christmas tourism businesses in Rovaniemi are facing due to several warm and snowless seasons started. The results show that the attractiveness of Rovaniemi as a winter destination affected by climate change is generally negatively perceived by tourists. It also shows that adaptation mechanisms, strategies and marketing approaches need to be reviewed to sustain tourism in the region in times of climate change.

Therefore, further analysis of tourists' perceptions is significantly important in developing Rovaniemi as a destination that is affected by climate change. Research on tourist perceptions of climate change can provide valuable insights into tourist adaptability, preferences and potential future success of proposed strategies, helping destinations to prepare for changes that are coming with the climate change instability.

This thesis aims to analyze the connection between tourists perceptions and climate change impacts in Rovaniemi, Lapland. Particularly the study explores to what extent tourists consider climate change as an important factor when selecting Rovaniemi as their destination. What it more, it examines whether promoting alternative, non-snow-related attractions can mitigate the impacts of climate change on the destination's attractiveness. The study is supported by the the theoretical framework to discuss the connection between tourists perceptions, destination attractiveness and demand. The outcomes of the study will provide valuable insights, that can be used for Rovaniemi tourism development and future theoretical implementations.

### 1.2 Previous research on tourist perceptions of climate change

The interest in how tourists perceive climate change has been gaining the interest in tourism studies. Understanding the perceptions is important as they significantly influence tourist behaviour and choices (Hall & Higham, 2005) and shape demand for certain types of tourism activities and destinations (Braun et al., 1999). What is more, understanding tourist perceptions of climate change can be useful for developing effective communication strategies and sustainable tourism products (Scott, Hall, & Gössling, 2012).

The key findings of the previous studies on tourists' perceptions of climate change are

varied. Some studies have discussed how climate change perceptions affect travel destination choice (Ngxongo, 2021; Guliyeva, 2018; Lise & Tol, 1999; Lin & Wang, 2023; Hamilton & Lau, 2006). The studies reveal that while selecting travel destinations tourists are increasingly considering environmental factors, such as climate change. This tendency can have an impact on the destinations that are particularly vulnerable to climate change, such as small island destinations or polar regions (Becken, 2007).

Research that has been studying nature-based tourism (Deason et al., 2023; Prideaux et al., 2010; Askew & Bowker, 2018; Jiménez‐García & Peterson, 2019) have concluded that the short-term effects of climate change do not influence the travel decision perceptions of tourists in a big part. Their desire to visit the nature-based destination remains almost unchanged (climate predictions are made without considering theatrical changes that may occur in the near term).

A significant contribution to the topic has been made by studies on perceptions of climate change and travel behaviour. The studies have come to different conclusions. Some studies show that tourists are becoming more aware of environmental and climate change issues (Scott & Gössling, 2019; Gössling et al., 2020), while others suggest that awareness remains relatively low, particularly among certain demographic groups (Hall & Lew, 2009).

Other studies say that even though tourists' awareness about the impacts of climate change is growing, it has a limited influence on actual travel behaviour. For example, the study of Dube et al., (2018) concluded that most of the respondents are primarily aware of climate change, however, this does not align with the awareness of their carbon footprint during their travels. Gössling et al., (2006) found that while tourists expressed concern about climate change, this concern did not significantly affect their choice of destination or mode of transport. Similarly, Scott et al., (2012) discussed a conflict between tourists' awareness of climate change and desire to change their habits to help reduce negative effects.

Research focusing specifically on tourists' perceptions of climate change in the Arctic, including areas like Rovaniemi, is relatively limited. The recently published paper by Varnajot (2020) studied how tourists perceive and experience the Arctic region, particularly Rovaniemi, Lapland. The activity of crossing the Arctic Circle was taken as

the main concept in the paper, analysing how this ritual shapes tourists' understanding and representation of the Arctic. This study gives important insights on how tourists' perceive Arctic, however, is not concentrating on climate change for the most part.

Another paper by Tervo-Kankare et al. (2013) examines more particularly Christmas' tourists' perceptions of environmental changes in the winter season in Rovaniemi. It highlights that the tourism industry is facing issues in maintaining the image of Rovaniemi as a winter wonderland in times of climate change. The findings show that tourists generally perceive climate change impacts and planned adaptation mechanisms as negative, posing problems for tourism stakeholders, and forcing them to rethink their current strategies.

To analyse tourists' perceptions of climate change various theoretical approaches and conceptual frameworks have been applied. The Theory of Planned Behaviour (TPB) were used to understand how tourists' attitudes to climate change influence their travel decisions, environmentally responsible behaviour and mitigation behaviours (Hsu, Croy, & Mair 2010; Qiao & Gao 2017; Han et al., 2016). Another approach that has been widely used is the Value-Belief-Norm (VBN) theory. It analyses how individual values influence their beliefs about climate change issues. This theory provides a framework to analyse to what extend tourists' are willing to engage in pro-environmental behaviours and what are their preferences for sustainable tourism offerings (Han, Hsu, & Lee, 2009; Han et al., 2016). The concept of Risk Perception has also been used to understand how tourists perceive the risk associated with climate change, such as extreme weather patterns or changes in natural attractions. That was also connected to how these perceptions influence their travel decisions and destination choices (Scott, Gössling, & de Freitas, 2008; Van Eck et al., 2020; Curnock et al., 2019). Furthermore, the Adaptive Capacity framework has been employed to analyse how tourists are adapting to new environmental conditions and climate change issues related to the tourism destinations. This covers the changes in travel patterns, duration of the travel and preferences in the destinations (Becken, 2013; Nelson et al., 2023). These theoretical approaches provide a deeper understanding of the complex motivations behind tourists' responses to climate change, helping to analyse the complex connection between tourists' perceptions, of climate change.

The research methodologies in studying tourists' perceptions have varied. Hall & Higham

(2005) and Braun et al. (1999) mainly used qualitative approaches to understand the subjective perceptions and decision-making attitudes of tourists. In contrast, quantitative studies were applied in the works of Guliyeva (2018), Lise andTol (1999), Ngxongo (2021), Tervo-Kankare et al. (2013), Dube, Nhamo, and Chikodzi (2018) and Gössling et al. (2006) to analyse tourists' perceptions of climate change and evaluate different factors such as awareness, travel behaviour and choices. Studies like those by Deason et al. (2023) and Prideaux et al. (2010) combined both qualitative and quantitative approaches to provide a broader understanding of how short-term climate change effects influence tourists' decisions. Ethnographic methods were also used in the research of Varnajot (2020), where observation and in-depth interviews were conducted to study tourists' experiences and perceptions. Overall, different methodologies have been used to analyse the tourist's perceptions.

Previous research on tourists' perceptions of climate change varies, highlights the complexity of the topic. Different studies analyse tourist travel behaviours, preferences, and attitudes and how they are connected to the tourism in times of climate change. The research reveal how tourists' perceptions are affecting the destination attractiveness and to what extent tourists are aware of the climate-related issues. Different theoretical approaches are used in analysing the nuances of tourist perceptions of climate change with a mix of qualitative and quantitative methods that enrich the understanding of this topic.

### 1.3. Research gaps and study aims

Understanding tourists' perceptions of climate change is important. However, there is a considerable gap in the research on tourists' perceptions towards climate change, especially in the Arctic regions. While previous studies have been discussing the general effects of climate change on perceptions, the limited attention was drawn to tourists perceptions and decision-making in Arctic destinations like Rovaniemi.

Climate change has a significant influence on Arctic destinations (Lemelin et al., 2010) and more locatized studies on tourist perceptions need to be conducted. A study by Dankel et al. (2020) notes that there is need for more focused research on how tourists perceive and respond to the climate changes in the Arctic. Moreover, the current research is mainly analysing environmental and financial effects of climate change on tourism, less

emphasising the sociocultural dimensions and the tourists' perspectives (Hall & Higham, 2005). The lack of research into tourists perceptions on climate change impact in Arctic destinations, like Rovaniemi underline the need for more focused studies on the connection between climate change and tourism in the region.

By selecting Rovaniemi as study areas, this Master thesis aims to fill the existing gaps in the literature, contributing to more detailed research on tourists perceptions of climate change impact in the Arctic destination. The study will provide valuable insights into the way tourists see climate change and how it affects their travel perceptions and decision-making (Gössling et al., 2008; Dube, 2016; Becken, 2007). Perceptions also address tourists' actions towards mitigation and/or adaptation of tourism strategies. This can therefore inform local businesses and policymakers how to adapt and innovate their strategies to ensure sustainable tourism development (Gössling, Scott, & Hall, 2012). By adjusting to tourists' changing perceptions, destination can succeed in managing the tourist flows, protecting the natural and cultural heritage and maintaining the competitiveness in the tourism market (Scott, Hall, & Gössling, 2012).

The developing nature of climate change impacts in Rovaniemi makes it crucial to develop the adaptation strategies to maintain it as a winter tourism destination. This includes diversifying the tourism offerings by promoting non-snow-dependent activities, investing in snow-making facilities and developing long-term policies to mitigate climate change impacts (Dawson, Scott, & Havitz, 2013). To remain Rovaniemi as a appealing destination in times of climate change, the more critical context for understanding how tourists perceive and respond to climate change is required.

This Master's Thesis aims to fulfil the research gaps in the previous research by analysing the tourists' perceptions of climate change impact in Rovaniemi, Lapland. The following research questions are to be answered:

**RQ1:** To what extent do tourists consider climate change as a factor in their travel decision-making process when choosing Finnish Lapland as a destination?

**RQ2:** Can promoting alternative non-snow-related attractions mitigate the influence of climate change on destination attractiveness in Rovaniemi?

By focusing on these areas, this Master thesis aims to contribute to a complex understanding of how climate change is affecting tourist perceptions, their travel decisions and expectations towards the destinations like Rovaniemi, Lapland. This will provide the valuable insights for the future research and be an important tool for the stakeholders and policymakers in developing the adaptation strategies in times of climate change.

### 1.4 Structure of the study

The structure of the thesis is built to analyse the tourists' perceptions of climate change impact in Rovaniemi, Finland. The study begins with the Introduction, which highlights the importance of tourism in the area and how it is affected by the climate change. Further, the thesis looks into the previous literature and research to understand how global warming affects tourist perceptions, behaviours and destination choices, particularly in Arctic conditions.

The Theoretical Framework described after shows how complex are tourists perceptions, that are formed under different factors and are significantly influencing destination attractiveness and demand. The Methodology section follows, describing methods of the study, data analysis and collection process together with ethical considerations.

The Results of the study present the data collected, showing how climate change is affecting tourists' decisions and perceptions of Rovaniemi's winter tourism appeal. Afterwards, the Discussion section interprets these findings according to the previous literature and theories and explores the implications for local tourism strategies.

The thesis ends at the Summary section, which summarizes the findings and highlights the insights gained from the study. All sources used in the study are listed in the References section. The supplementary materials, such as survey and QR-code card distributed to tourists are provided in Apendix 1 and 2.

# 2. ARCTIC IN TIMES OF CLIMATE CHANGE

## 2.1 Environmental characteristics of Earth's polar regions

The polar regions, also known as the Earth's polar zones, are most commonly geographically defined by the North Pole and the South Pole, at approximately 66.32 respectively. Different geographers, scientists and researchers are also identifying polar regions by different boundaries and classifications. According to Köppen's climatic classification, areas are considered to be polar if the average temperature of the hottest month does not exceed 10°C (Beck et al., 2018). Other ecologists specify Polar due to its plant and animal ecosystems, with the tree line boundary in the Arctic and Polar Front in the Antarctic (Stonehouse, 1989).

Despite different classifications, the North Pole (Arctic region) and the South Pole (Antarctic Region) are both characterized by their extremely cold temperatures, unique ecosystems, and specific geographical features. The Antarctic Circle is primarily based on the continent of Antarctica and the surrounding Southern Ocean. It is known as an ice-bound desert, mainly with a maritime ecosystem, no permanent human habitation and ground cover (Glen, 1991).

The Arctic Region is mainly composed of the Arctic Ocean and surrounding seas. The land-based parts include the territories of eight counties: Finland, Sweden, Norway, Denmark, Iceland, Canada, United States of America and Russia. Human activity has a high role in the area. It is a homeland of around 4 million people, with the population of indigenous people counting roughly 10% (Larsen & Fondahl, 2015). The Arctic boundaries can be characterized by the tree line of the forest-tundra ecosystem, special climatic features, permafrost extending on the land and sea ice on the ocean.

The environmental circumstances in the polar regions are highly variable, currently undergoing notable shifts in weather and climate patterns. Due to the acceleration of the climate change, the Arctic is facing numerous impacts. They are significantly affecting life and natural processes on land and ocean surfaces, changing the way people see and develop the Arctic.

## 2.2 The impact of climate change on the Arctic

The accelerated pace of global warming is bringing the world dangerously close to crossing multiple climate crossing points. Most of them are linked to the Polar regions, with each of them carrying severe consequences. This Master thesis will be analysing issueds related to the Arctic, there further discussion is mainly focused on climate change impacts on the Arctic region.

Earth's climate is changing, undergoing an unprecedented increase in the average temperatures. The Arctic regions are experiencing rising temperatures much faster on a global scale, with land areas being especially vulnerable to the warming trend (NOAA, 2023). As illustrated in Figure 1, most land areas have encountered an increase in temperatures, with the Arctic facing excessively high levels compared to other geographical zones.

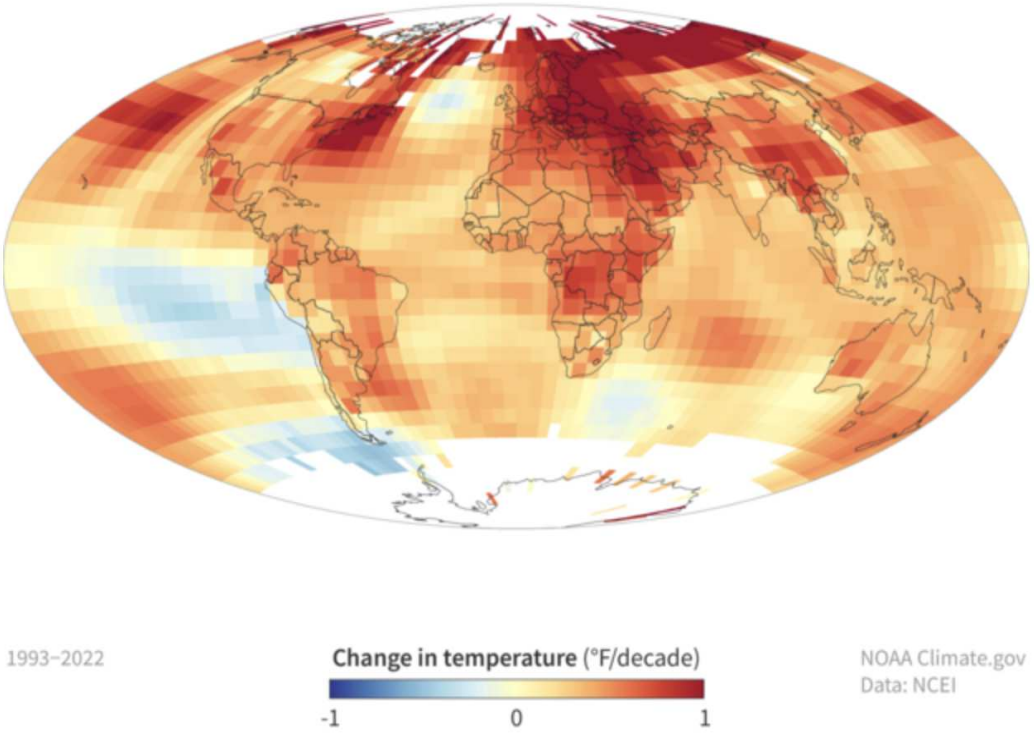



**Figure 1.** Trends in global average temperature between 1993 and 2022. Source: NOAA Climage.gov map based on the data from NOAA Centers for Environmental Information.

Studies by Chylek et al. (2022) and Rantanen et al. (2022) indicated that surface temperatures of the areas poleward of 60°N have warmed approximately 2-3 times faster than the global average during the period of 1991-2020. As documented by NOAA's Annual Climate Report (2023) since 1880 Earth's temperatures have grown by an average of 0.08° Celsius per decade. Since 1981, the warming rate has more than doubled, with temperatures rising by about 0.15 to 0.20°C each decade. Following the upcoming trend in rising temperatures, the recent year 2022, was ranked as one of the hottest years since 1880. In 2022, the average global temperature was approximately 1.15°C above the average from 1850 to 1900 (WMO, 2023).

Global warming on Earth is directly linked to the release of carbon dioxide and other greenhouse gases that are released into the surface. The warming observed over the past decades is primarily attributed to human activities such as the burning of fossil fuels and land clearing (IPCC, 2018, 2019). Each year around 11 billion metric tons of carbon, equivalent to just over 40 billion metric tons of carbon dioxide, are emitted (NOAA, 2021). Global $CO_2$ emissions have risen by over 60 percent since 1990, reaching their highest level in 2022 at 37.5 $GtCO_2$ (Statista, 2023). The amount of released carbon dioxide is much higher than the natural carbon sink can process, therefore most of the carbon dioxide that humans have released into the atmosphere in the past centuries will persist in the atmosphere for many years (NASA, 2019).

If the pace of carbon dioxide emissions continues unchanged, global temperatures are likely to attain their highest levels in the near future. Based on the World Meteorological Organization (2023) forecast the yearly mean global near-surface temperature from 2023 to 2027 is projected to range between 1.1°C and 1.8°C above the mean recorded between 1850 and 1900. As stated in the forecast there is a 66% probability that, during the next 5 years, the annual average global near-surface temperature will exceed the 1.5°C threshold above pre-industrial levels for at minimum of one year.

Long-term climate model simulations by NorACIA-RCM indicated a projected overall rise in average autumn and winter temperatures in the Arctic by approximately 3 to 6 degrees Celsius before 2080. Moreover, these models suggest that the Arctic's winter warming is expected to surpass the global average temperature rise during the same timeframe

(NorACIA, 2010).

Global warming will raise the stress not only in the Arctic but have an entire impact on the planet (Maskrey et al., 2009). The Arctic is vital in controlling climate of the Earth and has a significant impact on global weather patterns and ocean currents. Polar regions contribute to the Earth's albedo, drive the global ocean currents by sinking and circulating cold water and act as carbon sinks, trapping large amounts of carbon in permafrost, glaciers, and ice sheets (Jdix, 2016). Disturbing these various interconnected processes affects regional and global climate patterns further contributing to global warming.

Climate change is also projected to bring significant impacts within the Arctic, with some already being witnessed. The environmental circumstances in the Arctic regions are highly variable, and currently undergoing notable shifts. Among the main consequences of warming are rising sea levels, reduction of land snow and ice cover, retreating of glaciers, rising levels of precipitation, thawing permafrost, coastline erosion and changes in the ecosystem (such as shifts in the distribution and behaviour of wildlife).

Warming in the Arctic is affecting almost every part of the climate system on our planet. Among them is a significant decline in sea-ice cover. Since 1979, sea ice levels have decreased by 43% (AMAR, 2021). The projected reductions in sea ice will increase regional warming by reducing the reflectivity of the ocean surface. Due to the melting of ice sheets and glaciers the sea level is increasing. Since 1880, the sea level has risen about 21–24 centimetres (NOAA, 2022).

The warming climate will also affect the precipitation in the Arctic. The predicted decrease of 10-20% in snow precipitation by 2100 will especially shorten amount of snow in spring months. Higher temperatures will also change the quality of snow which will lead to possible ice layer formation (ACIA, 2004). Rain will be more frequent event in the Arctic due to increasing levels of precipitation. The rainfall events have aready increased by 24% from 1971 to 2019 (AMAP, 2021).

The thawing of permafrost is another sign of climate change. In recent decades the permafrost temperature has increased by up to 2°C, with the annual thawing of the growing depth in many regions. The frozen condition of the soil prevents a large amount of

greenhouse gasses, carbon dioxide and methane from being released (ACIA, 2004). The permafrost degradation also affects the wetland, bringing vegetation and species shifts and causing threats to infrastructure. Melting of the permafrost may also cause virus outbreaks that have been frozen in the environment for ages (Everett, 2020).

Coastline areas in the Arctic are undergoing high rates of erosion relative to other regions around the globe. This is due to the combined impacts of Arctic warming (warmer and ice-free water surfaces, continuing permafrost melting) and extreme events affecting the coastline (e.g. storm-driven waves). An average of 5 meters of coastline is vanishing every year in some areas (e.g. Alaska), causing land flooding, affecting wetlands and accelerating the thawing of permafrost (WWT Arctic, 2023).

Snow, ice, glaciers, and permafrost cover substantial areas of the Arctic throughout the year. As the climate warms, all the interconnected components of the Arctic are undergoing alterations. Changes to ocean level, ice and snow cover and soil degradation are therefore impacting natural systems and people's lives, bringing significant changes to the Arctic regions.

### 2.3 Challenges and opportunities for Arctic tourism due to the climate change

Arctic is among the last areas to begin tourism development. Due to hard accessibility, the presence of the sea ice cover and low temperatures, polar destinations were not the most attractive to tourists. However, climate moderation has changed the patterns of tourism activity in the regions, particularly in the Arctic. Reductions of the sea ice and rising temperatures have made a number of destinations accessible, enabling tourism in the Arctic (Cabane, 2021).

Climate warming has affected the Arctic regions for the last two centuries, bringing substantial shifts to ecological zones, wildlife and human ecology. In relation to tourism, which is highly reliant on climate and natural resources, those changes are significantly transforming the future of the industry. Ongoing alterations in Arctic ecological systems are influencing tourist destinations with some of them anticipating negative impacts, while bringing positive changes and fresh prospects for others.

Changes on land are predicted to cause shifts of the tree line towards the poles, impacting flora and fauna in the Arctic. The extension of ice-free areas, due to the retreat of glaciers and decrease in seasonal ice will allow acceleration of plant succession (Bjorkman et al., 2019). In regards to animal species, greater vegetation will cause the 'towards north' migration of numerous animal species such as reindeer, moose, brown bears, musk oxen, hares and some types of birds (Davidson & Ruhs, 2021). Greater vegetation and animal species expansion will offer tourists more to see and contribute to animal viewing, photography and nature-based tourism. However, wet ground and stagnant water may become favourable for the Arctic's notorious biting flies and the drier conditions will increase the likelihood of wildfires in Arctic regions (Synnott et al., 2021; Koltz & Culler, 2021).

The projected loss of some animal species is also indicated as a serious threat to the attractiveness of the destination. Due to climate change some of the species, for example, polar bears, are on the verge of extinction. Polar bear is considered to be an icon of the Arctic and the main attraction in some Arctic destinations. The proper ice thickness, sea level and cold temperatures are essential for polar bears' survival (Stirling & Derocher, 1993). The research made in Churchill, Canada (Dawson et al., 2009) one of the few places on Earth for polar bear watching, studied the attractiveness of the area in case of a poor polar bear population. They found that half of the respondents would be not willing to go on the trip if they were "not guaranteed to see any bears", and 62% would not visit the destination if the polar bear population would "appear unhealthy". The demise of the polar bear population would be a significant loss for the Arctic and may influence the reduction of polar expeditions for thousands of tourists. Particularly affected would be destinations that have their main tourism specialization on polar bear watching (e.g. Churchill, Nunavut, Manitoba and Wager Bay).

Global warming is also having a high effect on nature-based tourism in the mountains, particularly in the national parks. The main aim of the areas is to conserve the environmental resources and guard them from any changes. However, climate change may affect vegetation patterns, species migration, transforming hydrologic cycles and increasing wildfire threats in preserved areas. Those changes can negatively impact the appeal of the parks and increase the number of people willing to visit the park (Elsasser & Burki, 2002; Scott, 2003; Wall, 1992). However, with proper management environmental

changes can bring positive changes to the tourism industry as well. A bigger variety of vegetation or a broader number of animal species may develop photography tourism and the transformation of hydrologic cycles can increase the ducation of water sports season. Research made by Scott et al. (2007) in western North America, Rocky Mountain National Parks notified the tourists' responses towards climate change in the region and how they perceive warmer conditions during summer periods (stated as the most popular time to visit the parks). It was found that during the next 30 years, tourists would still prefer to visiting national parks despite predicted environmental scenarios.

The negative effect on national park visitation can also bring the disappearance of particularly important attractactions. The retreat of glaciers in some regions is considered to be a serious threat to tourism development. Over the past century, 111 of 150 glaciers were gone in the Glacier National Park, USA. By 2030, 35 glaciers are predicted to disappear in the same park (Hall & Farge, 2003) and glaciers less than 1000 m thick in Canada's Rocky Mountain parks (Brugman, Raistrick, & Pietroniro, 1997). In the study by Richardson et al. (2004) it was found that the predicted loss of glaciers impacted negatively the perception of tourists, most of them mentioned no interest in visiting the park in the glaciers' absence.

Higher levels of precipitation can also challenge Arctic winter tourism, that is highly dependent on the snow cover. With the precipitation patterns increasing, the snow cover, distribution, and length of the snow season will be changed (Dyer & Mote, 2006; Brown & Mote, 2009). More often rain-on-snow (ROS) events may cause the creation of ice layers on snow the ground ice (Rennert et al., 2009; Putkonen et al., 2009). Due to precipitation changes, many snow and ice-related tourism activities can be under the stress of implementation. Popular activities that are highly dependent on winter conditions are in higher risk, such as snowmobiling (Wobus et al., 2017) and dog sledging (Nilsson & Demiroglu, 2023).

Some of the climate changes will have a significant impact on regions that specialise in providing services for tourists exercising winter sports. Skiing, for instance, is seen as one of the tourism sectors that is the most vulnerable to the impacts of climate change (Steiger, 2010; Wobus et al., 2017). However, Northern countries may experience an increasing attractiveness levels. For example, changes in precipitation in Alpine areas are projected to

decline the level of natural snow cover between 30-70% by the close of this century (Marty et al., 2017). It may cause ‘up to North’ tourist shifts, who would be travelling to the Arctic for skiing purposes. However, the question stands to what extent the skiing industry can be maintained sustainably, as it is highly dependent on energy and water resources.

To conclude, climate change is significantly impacting the tourism industry in the Arctic, which lead to shifts in wildlife habitats and altered Arctic ecosystems. These changes also challenge the implementation of certain activities, such as ice and snow-based adventures or nature-based tourism. As the Arctic changes due to climate change, the tourism industry should actively respond to issues and develop effective strategies to maintain destination attractiveness.

### 2.4 The effects of climatic alterations in Finnish Lapland

Finnish Lapland as a part of the Arctic geographical area is highly affected by climate change by all means. Due to the climate change the area is predicted to face rising temperatures, higher levels of precipitation, less snow cover duration and a greater occurrence of extreme weather events (Ruosteenoja et al., 2016).

Temperature increases are highly affecting the durations of winter seasons in Lapland. It is projected that by 2100, winters in Lapland will experience an increase in temperature of around 5°C, while summers will become 2 to 3°C warmer in comparison to the climatic conditions 1961 - 1990 (Moore, 2009). Additionally, the frequency of sub-zero days is anticipated to diminish by approximately five days each decade (Moore, 2009). These changes will result in a reduced duration of the winter season and extended periods of summer and/or transitional seasons.

Warmer temperatures in the Arctic are therefore to increase the levels of the precipitation. More rain is expected in the summer periods, with more intense heavy rainfall than average rainfall (Ruosteenoja et al., 2016). From a short-term perspective, the higher levels of precipitation can positively affect the snow cover duration during winters in Lapland. An Arctic atmosphere with higher moisture content, along with consistently cold winter temperatures suitable for snowfall, is expected to result in greater and more intensified snowfall (Julhä et al., 2012; Krasting et al., 2013; Tervo-Kankare et al., 2013).

However, in a long-term perspective, a significant increase in the temperatures and high levels of perceptions will cause reductions in Arctic snow covers (Tervo-Kankare et al., 2013). In the IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (2019) the future scenarios of the snow cover in Arctic regions were presented. Within the first projection (RCP4,5 3), by 2100 the Arctic snow cover is expected to decrease by 5-10%, compared to the referenced period of 1986–2005. Under the second scenario (RCP8,5), snow cover education will decrease up to 15 to 25% by the same period.

According to Moore (2009), the number of snowy days is expected to decrease by 40 to 60 days by the century's end. This, therefore, will cause the decline of the snow season by a week every 15 years. Snowless Christmas periods (December – early January) are to happen once every four years by 2100. In comparison, over the 30 years from 1961 to 1990 snowless conditions during Christmas happened just once (Moore, 2009; Tervo-Kankare et al., 2013).

General trends are also predicting the decrease in the ice cover duration, which will affect the lake's freezing conditions. Lake ice phenology is regarded as a strong indicator of climate change, projecting the decline of break-ups and freeze-up periods (Weber et al. 2016). It is predicted that by 2050 in the Arctic, the onset of spring ice (break-ups) should happen 10 to 25 days earlier, and the start of freezing conditions (freeze-ups) should occur approximately 15 days later, relative to the timeline from 1961 to 1990 between 1961 and 1990 (Dibike et al. 2011; IPCC 2019; Prowse et al. 2011).

Specifically in  Finnish Lapland, the ice cover duration is projected to decrease by 30-60 days by the end of the century. Furthermore, forecasts indicate a growing likelihood of sporadic ice-breaking and refreezing events, resulting in non-continuous ice cover during winters (Blenckner et al., 2010).

All in all, the rising temperatures, a higher level of precipitation and a reduced period of snow cover on the ground are predicted in Lapland (yet with a possibility of more substantial snowfall during midwinter in the near-term view). A shorter and less consistent duration of ice cover on lakes is expected by the end of the century as well. The alterationsin these climate environments will mostly affect winter seasons in Lapland,

impacting the destination attractiveness and worsening the conditions for some tourism activities (Hall, 2009).

# 3. THEORETICAL FRAMEWORK

## 3.1 Introduction to a framework for understanding climate influences on snow-dependent winter tourism

To adapt and mitigate the impacts of climate change on destinations, it is crucial to understand how it is affecting tourism industry. The framework presented by Scott, Gössling, and Hall (2012) offers a complex view on the ways climate change can influence tourist destinations (see Fig. 2). This is especially relevant to areas like Rovaniemi, where the natural environments are the essencial part of tourism sector. The framework shows the specific challenges and opportunities that Rovaniemi faces, emphasizing the need for future development strategies to sustain the winter tourism market.

The framework by Scott, Gössling, and Hall (2012) has suggested different pathways through which climate change impacts international tourism (see Fig. 2). The pathways include direct climatic impacts, indirect climate-induced environmental change, and indirect climate-induced socioeconomic change and policy responses of other sectors. Each pathway describes the issues and opportunities that tourism destinations and stakeholders are facing due to climate change.

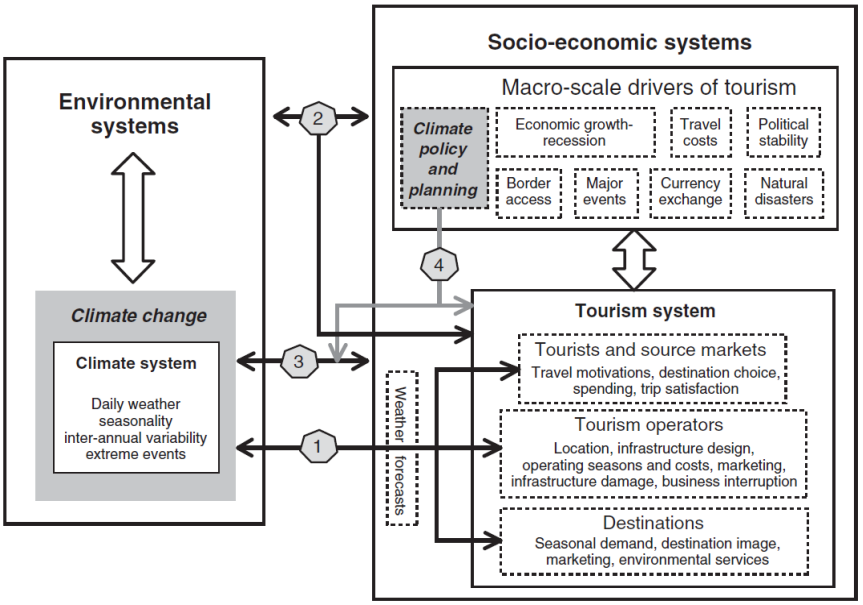



**Figure 2.** Climate change impact pathways on international tourism. Source: Scott, Gössling, & Hall, 2012, p. 215.

The first pathway (1) outlines how climate change directly impacts the duration and quality of tourist seasons. This can therefore impact operating costs, location decisions and infrastructure design within tourism destinations. Damage to infrastructure and business disruptions may also impact the attractiveness of destinations, influencing tourists' demand and choice of destination. The second pathway (2) displays how changes in the weather and climate indirectly affect the environment in tourist destinations. These changes may negatively affect the image of destination attractiveness, making the environment less appealing or enjoyable for visitors. This leads to increased costs for tourism businesses and poses long-term challenges to sustainability. The third pathway (3), indirect climate-induced socioeconomic change describes how climate change can affect broader society and the economy. It can cause reduced economic growth and discretionary wealth, heightened levels of political instability, and increased security risks. Such changes can considerably affect tourists' behaviour and destination choice, challenging tourism development. The last pathway (4) involves responses from mitigation and adaptation policies. These responses can impact tourism operating costs, destination or modal choices and overall tourism development trajectories shaping the future of the tourism industry.

In the context of Rovaniemi, Lapland, the indirect climate-induced environmental change pathway is particularly relevant. Rovaniemi as a destination is highly reliant on natural environments that attract most of the tourists. Research by Tervo-Kankare et al. (2013) examines tourists' perceptions of environmental changes in Rovaniemi during the winter season. The study highlights that the image of the winter wonderland, snowy landscapes and variety of snow activities are among the most appealing factors in choosing Lapland as a destination.

What is more, the last chance tourism phenomenon is becoming increasingly relevant in Arctic destinations (Lemelin et al., 2010). The urge to see the snow landscapes before they potentially disappear motivates tourists to visit the destination while still possible (Steen Jacobsen & Lassen, 2017). The changes in snow patterns also alter the attractiveness of destinations, increasing one time short term visits (Hall & Saarinen, 2010).

For Rovaniemi as a winter destination, that is highly reliant on snow, weather conditions are playing the crucial role. The climate change scenarios for Rovaniemi are predicting the decreasing period of winter, reduced snowfall and insecure snow and ice cover (Björn &

Markku, 2016; Moore & Prowse, 2017), that would affect the destination's attractiveness, therefore leading to a decline in tourism demand. Changes in natural attractions, such as snow and ice insecurity can deter tourists who seek the snowy Lapland winter experience. Tourists may perceive Rovaniemi as a less attractive destination, giving preference to other winter destinations (Scott, Dawson, & Jones, 2008). As a result, the demand for winter tourism in Rovaniemi could decrease, impacting the region's tourism industry and economy.

Furthermore, the tourism stakeholders may face challenges in sustainably conducting businesses. Climate change impacts can increase the operating costs with for example artificial snowmaking or the need to diversify tourism activities that are not snow-related (Steiger et al., 2017). The increased cost could deter tourists or result in higher prices for tourism experiences, further decreasing the tourism demand in the region (Scott et al., 2010). This shows that climate change has an impact on the tourism industry which needs to adjust based on tourists' preferences.

Rovaniemi's image and destination attractiveness are highly influenced by changing natural environments. This shows the importance of preserving the wintry essence of Rovaniemi and developing proactive adaptation measures to address negative impacts of climate change and maintain the region's sustainability in the long run.

### 3.2 Conceptual framework for analysis: the role of perceptions in defining destination attractiveness and changing demand

Climate change is one of the most significant global challenges of this century and has a huge impact on the vulnerable tourism industry. The impacts of climate change are further complicated by the perceptions of the visitors and how they view and interpret destination attributes (Gössling & Hall, 2006).

The conceptual framework of Gössling et al. (2012) provides a foundation for analysing the tourists' response to climate change. Central to this framework is the role of perceptions in defining destination attractiveness and demand (see Fig. 3). As climate change alters the intrinsic attributes of a destination, it inevitably impacts the attractiveness of a place to tourists. The perception of these changes can further influence the demand,

shaping tourist behavior and destination choices. The framework does not only analyse the current tourist responses, but also addresses the adaptive capacity of tourism destinations and offers future pathways for destinations to remain attractive in the changing climate. This is important for developing future tourism strategies and policy formulation in tourism management.

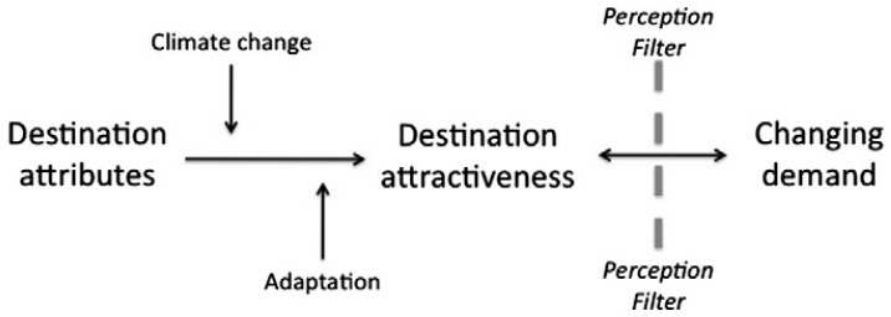



**Figure 3.** The role of perceptions in defining destination attractiveness. Source: Gössling et al., 2012, p. 42.

Destination attributes, such for example as natural resources or cultural specifics are among the main considerations for tourists when choosing a destination. If those attributes are influenced by climate change, they are put at risk of the destination's unique attractiveness (Maher et al., 2011). In the case of Rovaniemi, the natural image of snowy landscapes is important factor in tourists decision making, and change in climate patterns can potentially affect winter tourism appeal (Hall, 2005; Tervo-Kankare et al., 2013). Besides the aesthetic value of the destination, the winter conditions are also affecting activities that are a crucial part of tourist experience in Rovaniemi. Activities such as, snowboarding, skiing, husky and reindeer sledding, are highly dependent snow are under the risk of implementing. Decrease in snowfall and warmer temperatures could shorten the winter season and therefore can diminish activities appeal for tourists (Steiger & Mayer, 2008).

Therefore, maintaining the image of a winter wonderland is essential for attracting tourists to Rovaniemi. The future demand not only relies on physical realities of climate change but also on how tourists perceive these changes and the effectiveness of adaptation measures done by the stakeholders and policymakers (Scott, Gössling, & Hall, 2012). As tourists negotiate these perceived changes, the outcome can lead to shifts in demand (Scott

et al., 2007). While Rovaniemi adapts to the climate change impacts, the new products should be introduced together with the active marketing.

Adaptation strategies, such as diversifying tourism products, offering alternatives or making existing attractions more risk resilient are crucial in maintaining the destination's attractiveness in the changing climate (Uyarra et al., 2005). The favourable Rovaniemi's adaptation strategy would be to can focus on promoting the magical experience of the Northern Lights or Santa Claus Village, ensuring that even with variable snowfall patterns, the destination retains its charm (Visit Rovaiemi, 2024). In this case, the winter wonderland image of Rovaniemi remain, gradually shifting from snowy landscapes to other attractions no less important in the region. Actively promoting activities that do not require snow is also highly important to gradually introduce tourists to other no snow-related alternatives.

Overall, the usage of a conceptual framework provided by Gossling et al. (2012) allows a critical analysis of tourist responses to climate change. The framework highlights that physical climate changes are directly affecting the destination attractiveness, than in turn can impact the tourist perceptions and change the demand. Therefore, it is important to develop the effective adaptation strategies that can not only mitigate the impacts of climate change, but also influence the perception filter through which tourists view them. While analysing the tourists perceptions and incorporating them in the destination development, the demand for Rovanimei as a winter destination will evolve (Brouder & Lundmark, 2011).

### 3.3 Understanding the influence of social-demographic factors, cultural background and information sources on tourists perceptions

According to the Cambridge Dictionary (n.d), the term *perception* refers to “a belief or opinion, often held by many people and based on how things seem”. It is seen as a process of interpreting and organizing sensory information to create a purposeful encounter with the world (Lindsay & Norman, 1977). Essentially, perceptions are about getting signals from human senses like seeing, hearing, or touching and shaping them based on our knowledge, previous experience, expectations and cultural background (Gregory, 1987).

Perceptions are complex and are constantly formed by different components. While

studying tourists' perceptions it is essential to understand how perceptions are shaped and influenced by different factors – including socio-demographic backgrounds, personal preferences, and various information sources (Dube & Nhamo, 2020). As cited in Wilkins et al. (2017, p. 39): "Tourists are not a homogenous group, as they have different motivations, values, and goals".

In order to understand how tourists see and what they expect from the destination it is crucial to define the origins of tourists' perceptions. It is important to understand how the information about the destination has been delivered to the person before the trip and how it was developed. In this case, it's beneficial to distinguish between ex-situ and in-situ perceptions.

Differences between ex-situ and in-situ perceptions are mainly presented on how the travel decisions are made, with or without previous knowledge. When a person has a previous visit to a selected destination, the perceptions are based on the in-situ experiences (Tasci et al., 2007). The perceptions are usually formed from a combination of personal formerly gained in situ knowledge and "external" imput. However, perceptions are also formed before, during and after the visitation, where the specific preferable or not preferable conditions would influence the image of the destination (Fridgen, 1984).

In an ex-situ situation, all the information is 'externally' derived from the "third parties", while the tourist does not have any direct experience or background with the destination. It includes for example information retrieved from social media, advertisement, verbal communication with travel agents, friends and family members (Tasci & Gartner, 2007).

In many cases, the information delivered from ex-situ sources, such as media has a huge weight in influencing individuals (Hall, 2002). People are dependent on the media to receive information. News, social media, blogs, and newspapers provide up-to-date information about the current situation in the world. What people see and read in the media is considered 'important' and can affect travel choices. For example, the 'last chance tourism' phenomenon has been actively discussed in the media, which resulted in the increasing number of tourists coming to certain destinations (Lemetic at al., 2010). Another example of the media's influence on tourists' perceptions can be seen in how climate-related media stories can influence people's decisions. The media's ability to shape

tourists' perceptions is another example of how climate-related media is influencing people's decision-making processes. In study, Rutty & Scott (2010) queried United Kingdom citizens how they perceived the ‘Heatwave in Mediterranean´ newspaper article and whether this would influence their holiday plans. 32% of the respondents stated that the story had an influence on their travel choices and only 12% were not influenced anyhow.

However, some research on this topic indicates that short-lived media stories do not have a significant and permanent impact on destination perceptions (Hall, 2002). The decision making, on the other hand, is more dependent on the planning horizons and level of commitment to the journey. In the study by Rutty and Scott (2010), it was found that 58% of the people who have already booked their trip to the Mediterranean would not change their plans. The trips with high commitment for example `once-in-a-life- trips´, VFR (Visiting Friends and Reactions), and business travel are also less likely to be affected by external factors as media (Gössling & Hall 2006; Forsyth, Dwyer, & Spurr, 2007). Consequently, while studying tourists' perceptions it is important to define under what conditions travel plans are being made and what sources of information were used to become acquainted with the destination.

Other independent factors, such as socio-demographic characteristics are also influencing the perceived image of the destination. Age, cultural and educational background together with personal preferences play a crucial part in shaping tourist perceptions.

Age is a key element that affects tourists' perceptions of the destination. older visitors' perceptions may vary from those of younger ones, leading to varying behavioral patterns (Oh et al., 2012). Depending on whether information comes from direct experiences or from sources like media, travel agencies, friends, and family, tourists might have different impressions (Liu et al., 2015). It was found that elderly people tend to rely more on these external sources of information because their ability to process information can decline with age (Homburg & Giering, 2001; Namkung & Jang, 2009). On the contrary, young travellers tend to look for information by themself, doing previous independent research on the destination, activities, seasonality and opportunities. Younger people also have a higher ability to proceed with new ideas associated with new services or products provided at the destination, while older people may have conservative attitudes towards new offers (Im et

al., 2003). Weather preferences also play an important factor in shaping tourist's perceptions towards different age groups. Research has shown varying preferred temperatures among young and adult travellers from different countries, indicating that young people are more resistant to higher temperatures than older ones (Rutty & Scott, 2010; Scott, Jones, & Konopek, 2008).

Culture is another factor that is influencing the perceptions of tourists. Distance between 'home' and 'travelled to' country may have an extremely great effect on how how tourists perceive the destination (Huang et al., 2013; Liu et al., 2018). In this case, it is important to define the term cultural proximity. Cultural proximity refers to similarities between two regions in history, lifestyle, religion, ethnicity, language and geography among others (Straubhaar, 2002). In the study by Kastenholz et al. (2013), it was found that cultural closeness may influence positively the perceived image of the destination, causing great levels of acceptance, visitation and satisfaction. It also showed that domestic tourism markets generally have more clear perceptions than international visitors. Other studies also analyze the cultural value of different tourism markets, where some of the unattractive features may be unpreferred for one cultural group, others may be perceived as positive. For example, many international visitors tend to avoid torrential downpours, however, Indian tourists prefer to travel during the monsoon season, seeing it as a time of renewal and refreshment (Dhanesh, 2010).

The influence of the individual educational level and degree of specialization also affect the perceptions of tourists. Wong et al. (2016) studied how education affects travel decision-making and revealed that people with higher education are engaged in international travelling more than those less educated. Other research also shows the importance of individual specialization and educational awareness about the destination's nature (Gössling et al., 2007; Dearden & Monopawitz, 2010). People who have limited knowledge about the visiting place are usually less affected by the negative changes and may not even notice them. The study by Dearden and Monopawitz (2010) was conducted between beginner and experienced divers, indicating that novice divers have limited knowledge about how climate change is affecting the health of coral reefs and could not indicate these alterations during their experiences. On the other hand, experienced divers have a clear image of the coral reef status in different destinations.

While studying the tourists' perceptions, it is important to understand how different factors are affecting travel decision-making and how the destinations are seen by the tourists. Perceptions are not statics and are constantly shaped by different factors as socio-demographic characteristics, cultural backgrounds, personal preferences, and information sources. Age, nationality, previous travel experience, and educational level play an important role in how tourists perceive the destinations. As the tourism industry face the impacts of climate change, acknowledging tourists perceptions are crucial in developing future strategies that cover needs and expectations of different groups of people.

### 3.4 The adapting capacity of tourists in response to climate change

Finnish Lapland is confronting numerous effects of global warmng, which are significantly impacting the tourism sector. However, there is an opinion that tourists are considered to adjust to the changing conditions, risks and opportunities raised by climate change (Scott, Dawson, & Jones, 2008). Even though the adaptive capacity of tourists remain under researched, tourists may adjust their perceptions to new environmental conditions and shift the focus to different preferences.

The adaptive capacity of tourists can be understood through different situations. Scott, Hall, and Gössling (2012) highlighted the high level of resilience and flexibility of tourists behavior in times of climate change, with many of them willing to modify their destination choices, activities and traveling times.

By adjusting to the new weather conditions, tourists tend to change their choices of destination. This tendency can be seen by tourists shifting their preferences to the higher altitudes destinations compared to the traditional hotspots (Moreno & Becken, 2009). This also affects the travel seasonality, as tourists want to avoid to extreme weather conditions typical for the high tourists seasons (Becken & Wilson, 2013). Tourists are showing the adaptive behaviur to changing condition and also promote the distribution of tourism flows above the ‘hot tourists season’. With the new technologies and innovations, tourists adaptation is also increasing. Access to real-time weather information allows travelers to make well-informed decisions regarding their itineraries (Buhalis & Law, 2008).

Moreover, with the active promoting of eco-friendly destinations and sustainable practivies, the number of climate-conscious travels are growing, showing that the adaptation strategies implemented are effective.

Based on the article by Kyle et al. (2004) place attachment theory can be also interpred as a scenario where tourists are adjusting to the existing environmental changes. The connection to the destination itself can be stronger than the changes posed by climate change. That connection to the place is evolving throught affective, cognitive, and conative elements: people's emotions, thoughts, intentions and actions (Kyle et al., 2004). In case of Rovaniemi, affective component refer to tourists emotional connection to Lapland as 'winter wonderland' supported by the 'Christmas feeling'. Cognitive element dives into people's beliefs and knowledge about unique Lappish culture and environment. Behaviours and actions that people take in relation to the place refer to the conative aspect, for example revisiting Lapland to experience the winter magic one more time.

Tourists desire to travel to destinations with natural environments can also come from seeking pleasure, satisfaction and social or physiological benefits (Kaplan & Kaplan, 1989; Ulrich et al., 1991). Over time, people project their personal and social experiences on natural settings that give these places deep significance and meaning. Despite the climate changes in the destination, tourists may continue to feel connected to Lapland because of the developed attachment: memories, experiences and meanings.

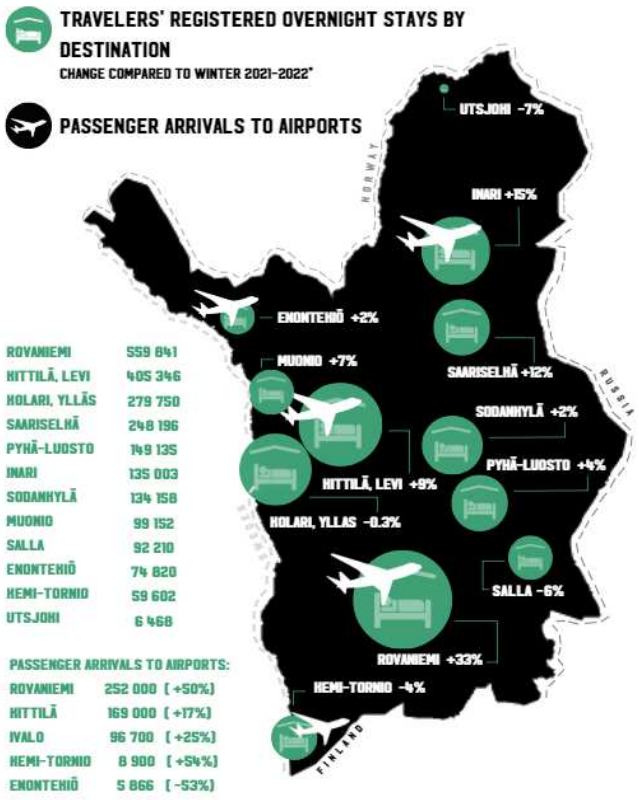
While overall adaptation of tourists is feasible, it can also affected by different aspects that prevent flexbility, such as as economic burgens, personal preferences or cultural factors (Simpson et al., 2008). It is crucial to remember that adaptive capacity is not universally accessible and desirable, highlighting the complex nature of tourists perceptions and responses to climate change.

All in all, the adaptive capacity of tourists regarding climate change is a complex issue, that covers changes in travel patterns, preferences and destination choices. While the tourism industry if facing the effects of climate change, understanding the way tourists adapt to the climate changes is important for sustainable development of the tourism destinations.

# 4. METHODOLOGY

## 4.1 Study area

Rovaniemi, most commonly refered to as a city of the Santa Claus is situated in the south of the Arctic Circle and serves as the administrative capital of Lapland - Finland's bigest and northernmost province. The region is known for its landscapes, Northern Lights and developed tourism industry.




Winter tourism industry in Lapland has been an important foundation of economic development, providing a number of work opportunities and contributing to the local economy. Following the COVID-19 pandemic, the sector has been going through a fast recovering, showing the growing numbers in tourism statistics. According to the latest statistical report (House of Lapland, 2023), winter accommodation sales in Lapland reached to €180,4 million and the Lapland's market share reached 22,4%.

**Figure 4.** Travellers registered overnight stays by destination and passengers arrivals to Lapland. Adapted from: House of Lapland, 2023.

The study areas has been chosen due to the increasing tourists interest Rovaniemi as a destination. During the winter 2022 - 2023 (November - April) around 559 841 overnight stays were registered in Rovaniemi (see Fig. 4) with the greatest proportion of the international travelers was presented by visitors from the United Kingdom France, Germany, Netherlands, Belgium and others (House of Lapland, 2023). The monthly

overview of registered overnight stays shows the increase in visitation during winter months reflecting to the city's seasonality and attractiveness as a winter holiday destination (House of Lapland, 2023).

The connectivity of Rovaniemi during winter months is increasing it’s international appeal. Rovaniemi airport, serving as a main travel hub for tourists in Lapland, received 252 000 passenger arrivalsdueing winter 2022 - 2023, with a significant 50% increase compared to previous year period (see Fig. 4, p. 32). The numbers highlight the growing accessibility of the area for tourists worldwide and region’s developed integration into the glocal tourism connectivity.

Rovaniemi presents a dynamic tourism study area, that continie to grow despite the effects of COVID-19. It’s strategic location together with developed infrastructure, connectivity and tourism offerings are forming the image of Rovaniemi as a global winter destination. The city's ability to attract both domestic and international tourists help it to keep its status as an essential hub for Arctic tourism

### 4.2 Data collection

To collect the comprehensive data into tourists perceptions on climate change impacts the survey method was used. The survey used for data collection is provided in the Appendix 1. This approach aimed to gather the quantitative data and qualitative insights on tourists background information, their perceptions towards climate change and its influence on their travel decisions.

Rovaniemi was selected as a location for the research as it is main winter tourism destination in Lapland (see Fig. 4, p. 32). It makes it a suitable case study for collecting data from a wide variety of tourists. The data was collected during the winter months, from January to March 2024, covering Rovaniemi's winter tourist season. The timing was chosen to ensure a high level of response from winter tourists, who had a direct experience with tourism in Rovaniemi.

To engage participants, the survey was introduced to the tourists in different tourist locations within Rovaniemi. Tourists were presented with a QR-code card, that forwarded them to the survey link using their mobile phones (see Appendix 2). Cards were distributed

at the Rovaniemi Train Station, Santa Claus Village and at Local Safari Company ‘Wild About Lapland’. These popular tourist places were chosen to ensure a wide sample of responders, covering different demographic groups.

The process of data collection have been planned to effectively capture tourist perceptions of climate change impacts in Rovaniemi, Lapland. The timing during peak winter months and QR-code cards distributed at key high-traffic locations allowed effective collection of the data for future analysis.

### 4.3 Survey design

The study was conducted and designed using Webropol.com, an online survey platform. The survey has been designed tp ensure the effective analysis on connection between climate change perceptions and Lapland attractiveness as a tourist destination. This survey allowed to collect the data on tourists' background infromation, their awareness of climate change issues and its influence on their travel decisions and preferences. The survey is divided into three parts: respondents demographical and travel background characretists, climate change awareness and perceptions, and tourism preferences under varying climate scenarios. Both close-ended and open-ended questions were presented to collect data for quantitative and qualitative analysis. Likert scales were also used to measure the tourist's perceptions towards climate change and its influence on their decision-making process.

The first part of the survey is designed to gather the demographic and background information about the respondents: gender, age, nationality, level of education, travel history, duration of the trip, booking methods, information sources and pre-booking time. This section is important as it allows to analyse how tourists with different demographic and travel background perceive and are impacted by climate change.

The second part examines the tourists awareness of different climate change issues and to what extend they perceive Lapland as an attractive destination under different climate change scenarios. To measure those the likert scale was used, a question type that is commonly used for its effectiveness in assessing attitudes and perceptions (Likert, 1932). Further in this section, the open questions are presented to identify if tourists have experienced climate change during their stay and whenever they consider Lapland as a 'last chance tourism' destination (Lemelin et al., 2010). This will provide the qualitative

insights for the analysis, allowing more deep understanding of the responses.

The last part of the survey focuses on the impact of climate change on tourists preferences, bringing questions about different attractions and activities in Rovaniemi during winter time. This section aims to analyse how flexibility tourists preferences are in response to climate change. The importance of how they perceive snow-related and no-snow dependent activities can provide the valuable insights for developing future strategies and marketing campaigns (Scott, Hall, & Gössling, 2012).

The survey has been designed to analyse the connection between tourists demographic and travel information, climate change awareness and tourism preferences in Lapland. By using the structured approach with a combination of selection, open and scales questions, the survey allows in-depth analysis of tourists perceptions of climate change impacts.

### 4.4 Data analysis

In order to analyse the tourists perceptions to the climate change impacts in Rovaniemi, different methods has been used. The analysis included descriptive statistics to analyse quantitative data and thematic analysis for qualitative data.

Descriptive statistics was used to summarise demographic and travel background data of the respondents by calculating frequencies, percentages, means, and standard deviations. Descriptive statistics were also used to analyse Likert scales concerning tourist awareness of climate change and their travel preferences under different climate change scenarios. The mode, median, and frequency distributions were detected. The data has been analysed using SPSS tool (Pallant, 2020).

For open questions related to tourists experiences of climate change and their view on last chance tourism, thematic analysis has been used (Braun & Clarke, 2006). This qualitative analysis helps to gain deep insights that were not captured through quantitative methods. Coding was done manually to identify common patterns and themes, which have been reviewed after.

Both quantitative and qualitative findings were integrated to discuss the research questions

of this Master thesis. The mixed-methods approach provided a view on both statistical trends and the tourists personal narratives, allowing the deep discussion of the climate change on tourist perceptions and behaviors.

### 4.5 Ethical considerations

Ethical research is conducted on the basis of reliabilty, respect and accontality. These important principles are presented by the Finnish National Board on Research Integrity (TENK) and are an integral part of this Master thesis, ensuring that the quality and credibility of it is maintained (TENK, 2023).

This thesis was strictly following the guidelines to prevent any form of plagiarism. As defined by TENK (2023), plagiarism includes the unacknowledged use of other people's work, ideas or findings. To prevent plagiarism, this Master thesis ensure that all sources, ideas and data are accurately cited and referred to rightful authors, contributing to a culture of respect and honesty in academic world.

The data for this research was collected according to TENK (2023), emphasizing the protection of participants' rights, confidentiality, and the voluntary and anonymous nature of participation. Respondents were informed of their right to withdraw their answers, by contacting the thesis author and\or supervisor. The survey's design and implementation were planned to ensure the best practices for the respondents.

Throught the guidance of the Finnish National Board on Research Integrity's report (2023), this thesis highligh the principles of research integrity, prevent plagiarism and ensure ethical research practivities and survey conduction. The research aims to contribute to the academic community, serving the principals of the scholarly research.

# 5. RESULTS

## 5.1. Overview of tourists background demographic and travel characteristics

The nationalities of tourists who participated in this survey are diverse, representing 22 different countries (Table 1). The United Kingdom stands out as a predominant country, accounting for 14,7% of the total tourists, followed by France and Italy, with 11,8% and 9,8% respectively. Even though the European counties' nationalities hold the main position in the numbers, tourists from Asia (China, Japan, South Korea), North America (USA) and New Zealand are presented as well.

**Table 1.** Responders by nationality (N = 103).

| Variables | Categories | N | % |
|---|---|---|---|
| **Nationality** | United Kingdom | 15 | 14,7 |
| | France | 12 | 11,8 |
| | Italy | 10 | 9,8 |
| | Spain | 9 | 8,8 |
| | Germany | 8 | 7,8 |
| | Ireland | 6 | 5,9 |
| | China | 5 | 4,9 |
| | Finland | 5 | 4,9 |
| | Poland | 4 | 3,9 |
| | USA | 4 | 3,9 |
| | Austria | 3 | 2,9 |
| | Netherlands | 3 | 2,9 |
| | Japan | 3 | 2,9 |
| | South Korea | 3 | 2,9 |
| | Israel | 2 | 2,0 |
| | Switzerland | 2 | 2,0 |
| | Turkey | 2 | 2,0 |
| | Ukraine | 2 | 2,0 |
| | Bulgaria | 1 | 1,0 |
| | Latvia | 1 | 1,0 |
| | New Zealand | 1 | 1,0 |
| | Slovenia | 1 | 1,0 |

Referring to Table 2, there are more females (55,4%) than males who took part in the survey (41,6%). 3% of the respondents preferred not to specify their gender. The tourists from all age groups are presented, with the highest numbers in the ages of 35-44 (40,8%) and 25-34 (20,4%). Furthermore, the educational background of tourists is predominantly

high, with 48% holding a college or university degree and 37,3% with a post-graduate degree.

A significant number of tourists in this study travel with their spouse or partner, followed by those travelling with family (partner and children), accounting for 43,7% and 28,2% respectively. Most of the tourists stay for five days or more (83,2%), booking their trips independently (53,7%) and relying on internet searches (60,4%), personal recommendations from friends or family (50,5%) and social media (60,4%) as their primary sources of information.

**Table 2.** Demographic and travel characteristics of the respondents (N = 103).

| Variables | Categories | N | % | Variables | Categories | N | % |
|---|---|---|---|---|---|---|---|
| **Gender** | Female | 55 | 55,4 | **First time travel** | Yes | 85 | 83,3 |
| | Male | 42 | 41,6 | | No | 17 | 16,7 |
| | Not specified | 5 | 3,0 | | | | |
| **Age group** | 18-24 | 12 | 11,6 | **Prebooking time** | One year or more | 18 | 17,8 |
| | 25-34 | 21 | 20,4 | | Half a year | 39 | 38,6 |
| | 35-44 | 41 | 40,8 | | Couple of months | 24 | 23,8 |
| | 45-54 | 24 | 23,3 | | | | |
| | 55-64 | 4 | 3,9 | | Month or less | 20 | 19,8 |
| **Education level** | Secondary or high school | 15 | 14,7 | **Travel party*** | Spouse\Partner | 45 | 43,7 |
| | | | | | Family with children | 29 | 28,2 |
| | College or university degree (e.g. BA) | 49 | 48,0 | | Friends | 21 | 20,4 |
| | | | | | Work colleagues | 1 | 1,0 |
| | Pot-graduate degree (e.g. Masters, Phd) | 38 | 37,3 | | Alone | 8 | 7,8 |
| | | | | | Other | 2 | 1,9 |
| **Duration of the stay** | 1-2 days | 0 | 0,0 | **Sources of information*** | Internet Search | 61 | 60,4 |
| | 3-4 days | 17 | 16,8 | | Personal recommendations | 51 | 50,5 |
| | 5 days or more | 84 | 83,2 | | Social media | 61 | 60,4 |
| | | | | | Online travel blogs | 27 | 26,7 |
| **Booking way*** | Independently | 55 | 53,7 | | Airline websites | 7 | 6,9 |
| | Travel agent | 7 | 6,8 | | Advertisements in home county | 10 | 9,9 |
| | Tour Operator | 21 | 20,4 | | | | |
| | Mixed | 24 | 23,3 | | Previous visit to Lapland | 15 | 14,9 |
| | Other | 2 | 1,9 | | Other | 3 | 3,0 |

*Multiple responses were possible.

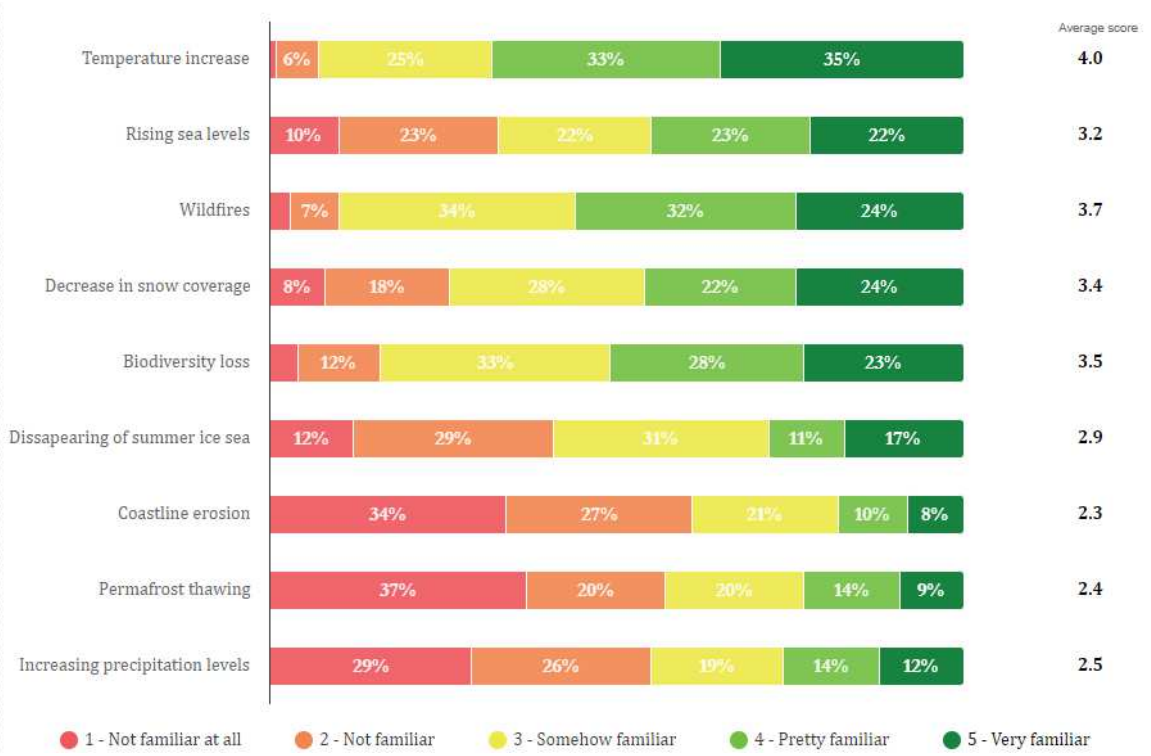
For most of the tourists it was the first time travelling to Rovaniemi, accounting for 83,3%. The prebooking time of the trip varied, with the highest percentage of tourists booking the trip half a year in advance (38,6%), following by booking couple of months before (23,8%).

## 5.2. Tourists climate change awareness and Rovaniemi's attractiveness under different climate change scenarios

The following results provide data on tourists tourists' awareness of climate change issues and perceived attractiveness of Lapland as a travel destination under varying climate conditions.

The results indicate a varied level of awareness among toutists regarding different aspects of climate change. Ranging from 1 as not familiar at all to 5 very familiar (Chart 1) tourists indicated their awareness about different climate-related issues. The results show that tourists have the highest familiarity for temperature increase with an average of 4.0. Majority of the respondents (68%) ranked it as 4 and 5 on the scale.

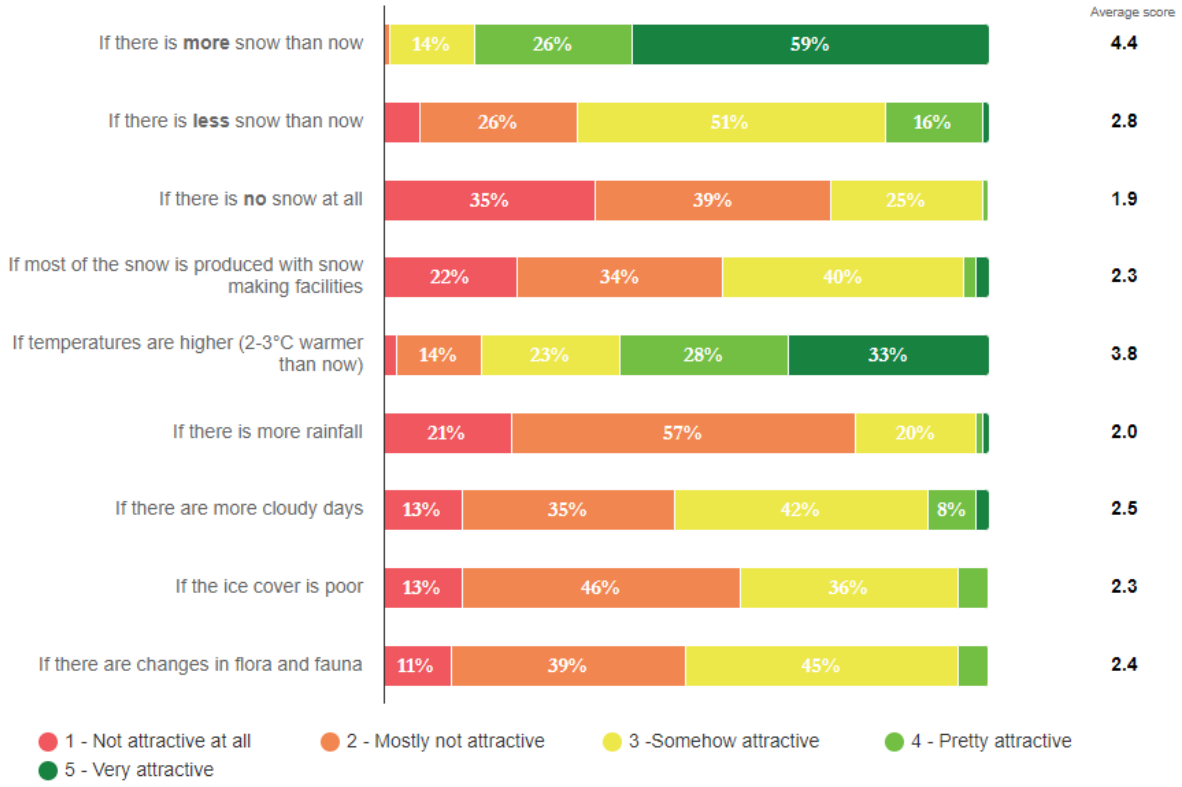
**Chart 1.** Respondents familiarity with climate-related issues (N = 103).



Following closely are issues related to rising sea levels (3.2), wildfires (3.7), decrease in snow coverage (3.4) and biodiversity loss (3.5). A notable percentage of respondents rate their familiarity at 3 and 4, accounting for 45%, 68%, 50% and 61% respectively. The lowest scores are presented in increasing precipitation levels (2.5) permafrost thawing (2.4) and coastline erosion (2.3). A significant number of tourists is not familiar with those problems, most of the responses being 1 or 2.

The second chart (Chart 2) presents the perceived attractiveness of Lapland as a travel destination under varying climate conditions, rated on a scale from 1 (not attractive at all) to 5 (very attractive).

**Chart 2.** Rovaniemi's attractiveness under different climate change scenarios (N = 103).




The scenario with more snow than currently observed received the highest attractiveness rating 4.4, with 59% of respondents finding it very attractive. Conversely, scenario with less snow than now (2.8), is perceived as not attractive for 51% of respondents. If the most of the snow is being produced by snowmaking facilities (2.3), 40% of tourists find it somewhat attractive. The lowest ranking was indicated in the scenario of no snow at all (1.9), where 74% of respondents rate it between not attractive at all and somewhat

attractive. Higher temperatures (3.8), on the other hand, were indicated as very and pretty attractive scenario for tourists (61%).

The less favourable conditions were also perceived in more cloudy days (2.5), poor ice cover (2.3) and changes in flora and fauna (2.4). The majority rated these factors as somehow or mostly not attractive. The increase of rainfall is shown to be one the least favorable factor, with 78% of respondents ranking it 1 and 2, which represent mostly and not attractive at all.

### 5.3. Dual perspectives on climate change impacts: quantitative and qualitative insights from Rovaniemi tourists

In the following section of the survey both quantitative and qualitative data were collected to understand the tourists' experiences with climate change in Rovaniemi and their perception of Rovaniemi as a last chance destination. Numeric trends and the nuanced personal experiences and perceptions of climate change provided more comprehended results, giving broader insights into the topic.

**Table 3.** Tourists perceptions of climate change experience and the last-chance tourism phenomenon in Rovaniemi (N = 103).

| Variables | Categories | N | % | Variables | Categories | N | % |
|---|---|---|---|---|---|---|---|
| **Experience of climate change during the stay** | Yes | 44 | 42,7 | **Consideration of Rovaniemi as a last chance destination** | Yes | 39 | 37,9 |
| | No | 14 | 13,6 | | No | 19 | 18,4 |
| | I don’t know | 45 | 43,7 | | I don’t know | 45 | 43,7 |

According to Table 3, 42,7% of tourists reported experiencing signs of climate change during their stay, 13,6% did not notice any signs, and 43,7% were unsure. Many respondents report unusual temperature changes, reduced snowfall, with some noting specific incidents of warm weather in typically cold months.

“*The temperature was changing very fast from low to high”.*

*“There were sharp temperature drops in a short period of time ( from -20 to -2)”.*

*“I have read in the news, that the weather is changing very often, with storng winds coming from time to time, that is not common for this area”.*

*“When we arrived a lot of the snow on roads and trees had melted, locals had said how unseasonably warm it had been with rain and clouds. Few days into holiday it did snow and made the whole place look more magical”.*

In regards of consideration of Rovaniemi as a last chance destination, the data reveals 37,9% of tourists view Rovaniemi as a 'last-chance' destination due to climate change impacts, 18,4% not considering it as such, and another 43,7% unsure about this characterization.

After being ask to explain why tourists consider \ not consider Rovaniemi as a last chance destination, a sense of concern regarding the future of winter tourism in Rovaniemi has been identified. Responses vary: some tourists show resilience, indicating a willingness to visit regardless of snow conditions:

“*For me I would likely travel to Lapland every season despite the weather. I like cold in the winter, so travelling here with no snow would be weird and probably depressing because of how dark it is. However, it will still be here despite there being no snow, its not as if it will disappear like a sinking city”.*

Others  believe that the lack of snow will detract from the destination's image.

*“We really don’t know what might happen to the whole Arctic region in several decades and how it will change, but those changes seem inevitable, because of anthropological influences. So maybe now is really the last years when we can feel the whole ‘’winter magic” here in Lapland”.*

*“I consider it as a last chance attraction due to climate change. The change in weather conditions will affect the snow coverage and the activities that most tourists are coming for. Also the traditional living of the area focuses around cold, snow and nature. When these things start to change, people might feel less interested in the authenticity of the area”.*

A few respondents question the immediacy of climate change effects or the 'last chance' concept itself. This group perceive that the changes will not be drastic enough to affect their short-term travel plans or that other destinations face more urgent climate threats.

*“I don't think it will happen so soon. I will have enough time to enjoy the snow”.*

*“Does not look like climate change consequences will be too drastic. Going from -25 to -23 doesn't sounds line it will change much. I consider islands threatened by sea rises and lower latitudes where going from -1 to 2 would change from snow to no snow higher on my list of "last chance" destinations”.*

*“In spite of the fact that I realize the impact of global warming on Lapland, I believe that it will remain a tourist destination for those seeking winter activities as the rest of the world will suffer from heatwave in summer”.*

Some of the respondents have also indicated that they are not familiar with the concept of the ‘last chance’ tourism or show the rejection of the concept itself, believing that the tourism industry will adapt to the changes.

*“I don't understand what it means”.*

*“I don’t like the language around “last chance”. Climate change is terrible but Lapland and we will adopt”.*

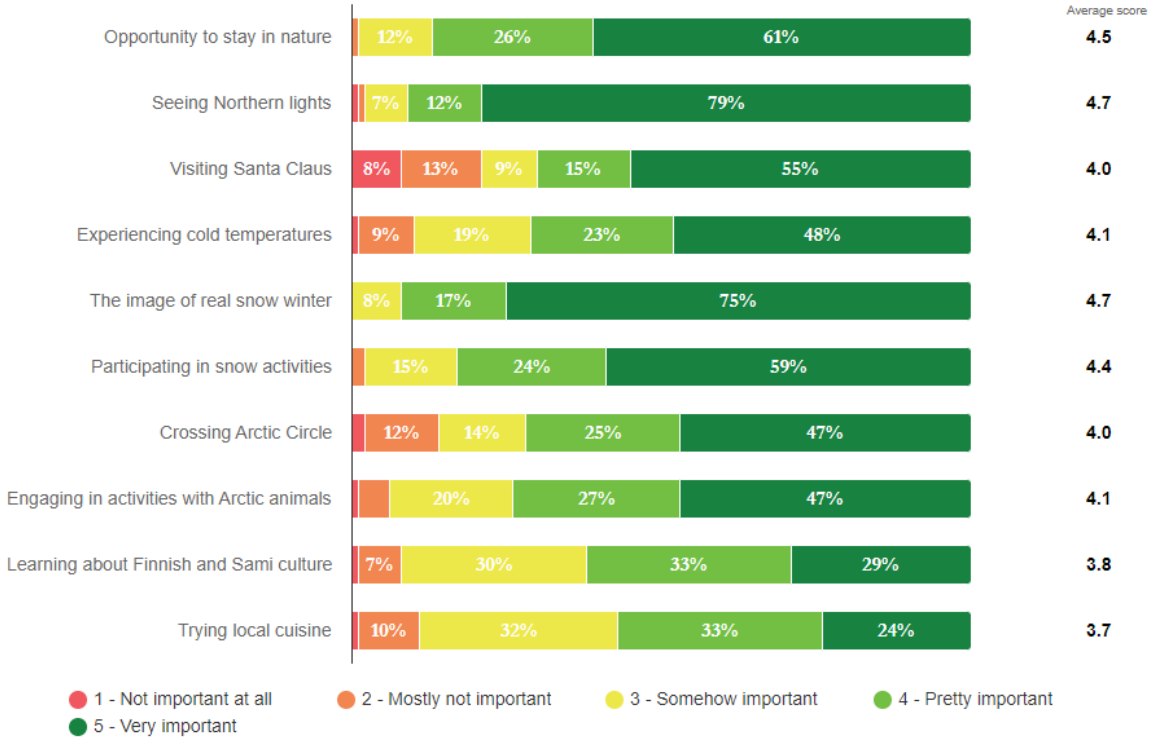
The data reflects the complexity of tourists perceptions. The majority of them have either noticed signs of climate change or are uncertain. The qualitative data provides insights into shared concerns about Rovaniemi's future as a winter destination, coupled with diverse views on the urgency of climate change discussion.

### 5.4. Tourist preferences of snow-dependent and alternative activities

The Chart 3 indicated the importance of various factors when choosing Lapland as a travel destination, with the results highlighting well defined preferences among visitors. The ranking question was introduced to the respondents, with the answers varing from 1 (not important at all) to 5 (very important).

The most valued experience, with the highest average score of 4.7 was the chance to see the Northern lights, where 79% of respondents considering its very important factor. Equally crucial for tourists was the image of snowy winter (4.7), with 75% of respondents showing the strong desire to experience winter atmosphere of Lapland.

**Chart 3.** The importance of different factors while choosing Lapland as a destination (N = 103).

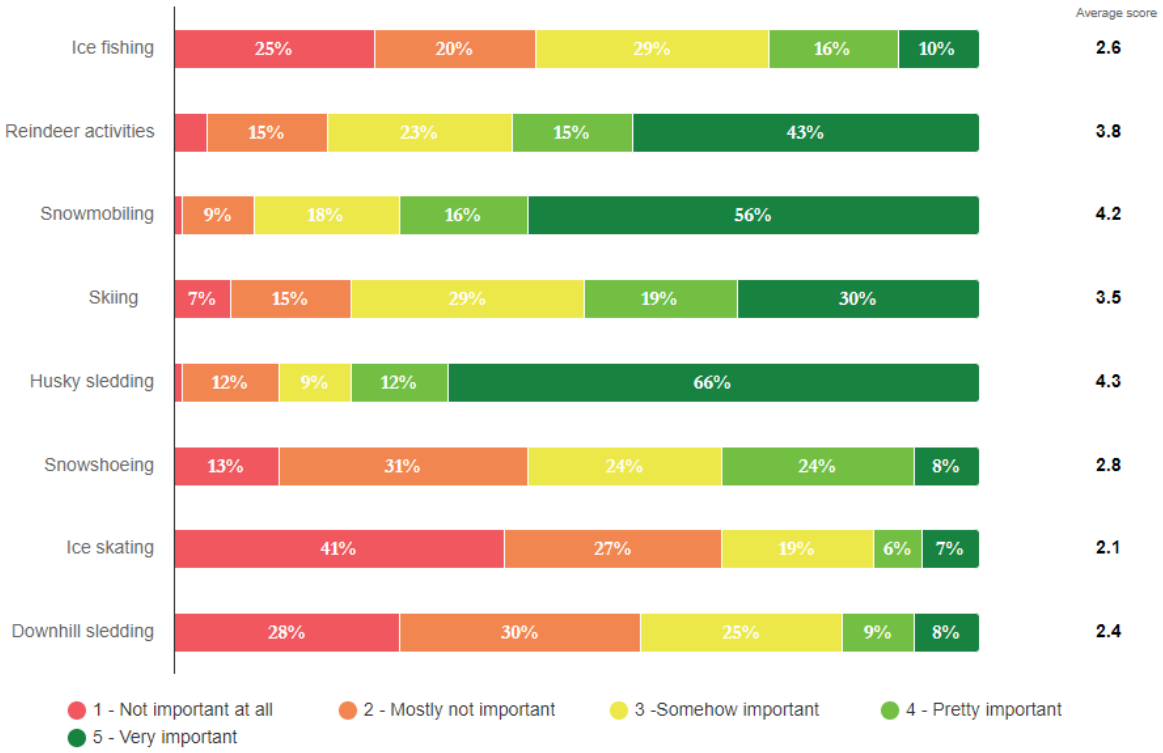



The opportunity to stay in nature and participating in snow activities also received high scores, 4.5 and 4.4 respectively, showing the importance for tourists to engage with the natural environment and snow activities. Visiting Santa Claus and crossing the Arctic Circle, while still scoring a solid 4.0, were not as critical to the overall experience as the more nature-immersive activities.

On the lowest average scores were factors related to learning about Finnish and Sami culture and trying local cuisine. They were considered as less crucial, accounting for 3,8 and 3,7 respectively, presenting to be more supplementary to the main nature-centric attractions.

Looking closely into the snow related activities that tourists found important while choosing Lapland as a destination, the results are varying (Chart 3). Tourists were presented with different snow activities and asked to rank them from 1 as not important to participate at all to 5 as very important to participate in.

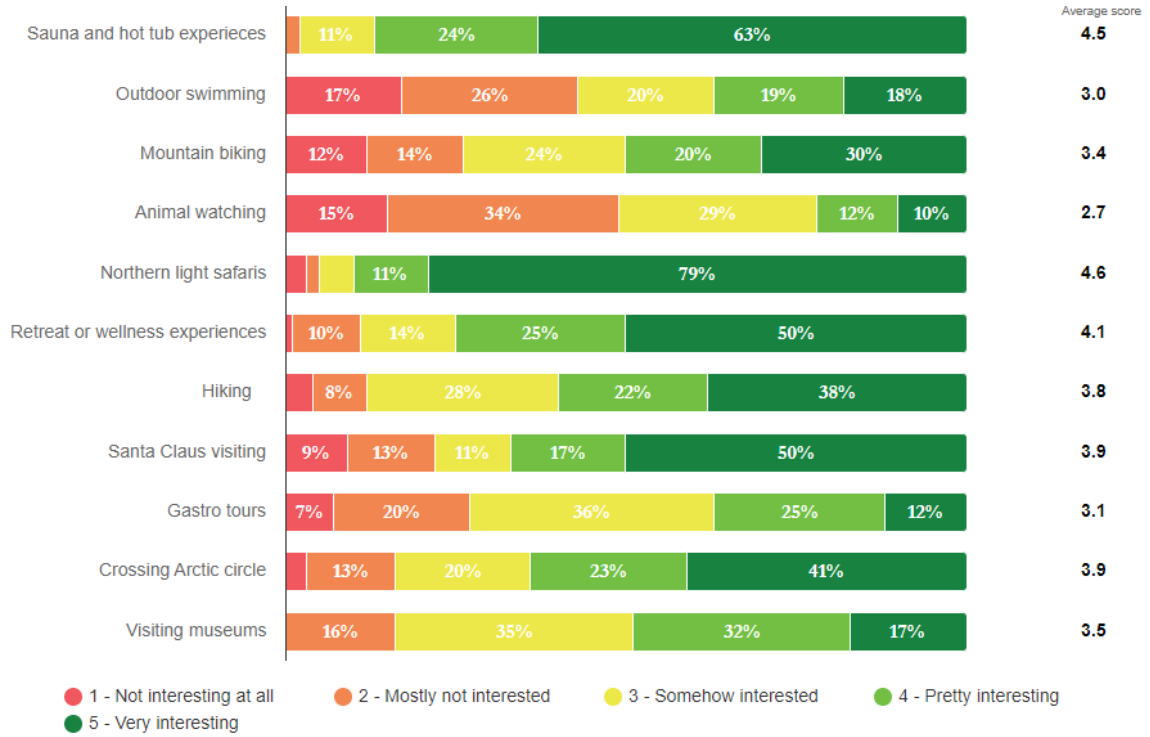
**Chart 4.** The importance of participating in different snow-related activities (N = 103).




Husky sledding appeared to be the most important activity, with a notable average of 4.3. It hold the highest position in the ranking, where 66% of the respondents considered it very important activity to participate in. Snowmobiling was followed closely behind, accounting for an average of 4.2, with 56% ranking it with score of a 5. Reindeer activities (3.8) and skiing (3.5) are considered as pretty popular, however, not crucial.

On the other hand, activities like snowshoeing (2.8) and ice fishing (2.6) received relatively low interesent, with reposndents evenly varing. The lowest importance were ranked to the activities of downhill sledding (2.4) ice skating (2.1). These activities appear to be not important at all to 28% and 41% of the respondents respectively, while being somehow important to the rest.

**Chart 5.** Respondents preference to non-snow-related activities (N = 103).




Other view of winter activities in Lapland are presented with no snow related activities, that may serve as a good alternative to snow dependent experiences. Tourists were asked to rate the interest in various activities from 1 (not interesting at all) to 5 (very interesting).

Among the options, the standout choice was seeing the Northern lights, with a average score of 4.6, where 79% of the respondents indicated this activity as very interesting. Similarly, sauna and hot tub experiences (4.5) and retreat and wellness activities (4.1) had the great interest among most of the respondents.

Similar results to Chart 3 were seen in visiting Santa Claus (3.9) and crossing the Arctic Circle (3.9) activities. While they still hold a considerable interest, they are not listed among the top attractions. Activities like hiking (3.8), vsiting museums (3.5), mountain biking (3.5) and gastro tours (3.1) have been considered somewhat or pretty interested by most of the respondents. On the lower interest side, animal watching and outdoor swimming are less favored, with scores of 2.7 and 3.0 respectively.

**Table 4**. Respondents Attraction to Non-Snow Activities and Artificial Snow Experiences with Revisitation Intentions (N=103).

| Variables | Categories | N | % | Variables | Categories | N | % |
|---|---|---|---|---|---|---|---|
| **Attractiveness of no snow related activities** | Yes | 67 | 65,7 | **Attractiveness of activities with artificial snow** | Yes | 36 | 35,3 |
| | No | 5 | 4,9 | | No | 18 | 17,6 |
| | I am not sure | 30 | 29,4 | | I am not sure | 48 | 47,1 |
| **Revisiting intentions** | Yes | 49 | 47,6 | | | | |
| | No | 3 | 2,9 | | | | |
| | I am not sure | 51 | 49,5 | | | | |

The one choice questions related to the attractiveness of different activities in scenarios of no snow varied. Great part (65,7%) of respondents indicated that no snow alternatives are alone attractive enough to revisit Lapland again, while 29,4% stayed unsure. Different pattern were shown in considerations towards artificial snow usage in snow activities. Tourists showed more unceratinly regarding this option (47,1%). However, in the end of the survey, the level of people who indicated ‘no’ in option to revisit Rovaniemi was particularly low (2,9%) indicating the interest in Rovaniemi as a destination and its future prosects.

# 6. DISCUSSION

## 6.1 Demographic and travel patterns of tourists in Rovaniemi

Understanding the demographics and travel characteristics of respondents travelling to Rovaniemi is important. It provides the crucial information about their preferences and behaviors and how it influence their travel decision making and experiences (Pearce, 2011). This section will analyse the background information about the respondents, covering their nationality, genger, age, education, travel party, information sources and trip planning.

According to the data, the majority of the respondents are coming from European counties, with the biggest groups from United Kingdom, France and Italy. Representatives from other parts of the world are also present, showing the diversity of tourists market in Rovaniemi. This factor is important for the destination marketers, who can adjust promotional strategies to different cultural expectations and preferences (McKercher & Cros, 2002). The study by McKercher and Chow (2001), show that nationality can also influence travel behaviour, choice of destination, spending habits, and the type of activities preferred.

The higher percentage of female respondents (55,4%) compared to male have answered the survey. The genger distribution aligns with up with the findings of Pearce (2005), who indicate that woman is showing leadership in decision-making process for leisure travel. The age group of the majority of the respondents is between 35 and 44 years old, followed by those who are 25 to 34. The results shows the groups of young tourists who are willing to travel and have a disposable means of income (Lehto, O'Leary, & Morrison, 2004). Out of these groups, tourists predominantly travel with their partners or families, highlighting the family or couples-oriented nature of the travel market in Rovaniemi. Based on that data, the tourism promotion strategies can be designed to fit the travel groups and their preferences (Decrop & Snelders, 2005).

The average education of the respondents is on the level of college or university degrees, with some proportion having post-graduate qualifications. The education level of visitors, who took part in the survey is high, that indicates that they are likely well informed consumers who are valuing the quality of their travels (Richards, 2003).

Most of the tourist have stayed in Rovaniemi for five days or longer and booked their trips independently. In the decision making process they were highly reliant on internet searches, personal recommendations, and social media. This shows a clear trend in independent traveling, where tourists look for personalized experiences and rely on the information from their social network (Xiang & Gretzel, 2010). The trustin digital platforms are showing that Rovaniemi as a destination should maintain the online presence in different social media or internet sources to influence potential visitors at the decision-making stage.

Overall, the data revels a demographic profile of well educated tourists visiting Rovaniemi, who are coming from different counties around the world, travelling in their middle ages with partners or families. Tourists are highly reliant on digital information and have a preferences for longer stays. These data provides important insights for marketing strategies that can adjust to tourists preferences with different demographic and travel characteristic. By doing that, Rovaniemi can ensure that the tourism offerings are well-suited to the needs of the visitors.

### 6.2 Tourists consideration of climate change in travel decision making

The results from the study show different perspectives on tourists awareness of climate related issues and how these factors influence tourists perceptions of Rovaniemi's attractiveness. This section will be discussing the results in the context of the research question (RQ1): To what extent do tourists consider climate change as a factor in their travel decision-making process when choosing Finnish Lapland as a destination?

Tourists awareness of climate related issues varied, with the most familiar issue among majority of respondents being temperature increase. Weber (2010) suggests that direct experience or visibility of climate impacts can sinfinifanly shape public perception. This explains the respondents' acknowledgment of the particular phenomenon, where the direct experience of it is rising the awareness (Weber & Stern, 2011). On the other hand, the familiarity with less visible issues, such as permafrost thawing or coastline erosion is considerably lower. These results show that tourists travel decisions are most likely to be influenced by the type of climate change they have more information or previous direct

experience with. The difference in climate related issues awareness is affecting the way tourists perceive the full picture of climate issues in Rovaniemi.

Attractiveness of Rovaniemi under different climate change scenarios play an important role in understanding tourists decision-making. The high sensitivity can be seen in the changes related to the snow coverage. Tourists perceive increased snowfall as very attractive, showing that the image of real winter is crucial in their perceptions towards Rovaniemi. This also alings with the previous studies, suggesting that snow reliability significantly influences destination choice for winter sports and activities (Demiroglu & Dannevig, 2019; Scott, McBoyle, & Mills, 2003).

The scenarios predicting reduced snowfall or implementations of artificial snowmaking are perceive as less favourable. This indicates concerns about the ways of maintaining the winter experiences in times of climate change (Scott, McBoyle, & Mills, 2003; Scott, Gössling, & Hall, 2012). The adaptation strategies, such as increasg the variety of tourism offering are needed to avoid the decrease in tourists arrivals.

Results on tourists experiences with climate change in Rovaniemi provide interesting perspectives on the study. Around 43% of the respondents have witnessed climate change during their stay in Rovaniemi, indicating sudden temperature changes, reduced snow cover and strong winds. The visibility of these changes can potentially influece tourists future travel decisions to destinations like Rovaniemi (Gössling et al., 2012).

Interestringly, while a significant number of tourists acknowledge these changes, there is a difference in travel behaviors. Some express a strong willingness to revisit Rovaniemi regarding of climate changes, possibly experiencing place attachment or attraction to cultural side of the place (Stedman, 2002). Others show uncertainty towards the future of Rovaniemi without its snowy appearance or believe that climate change is not an urgent concern in the Arctic, and will remain unchanged compared to more southern destinations.

There is also a significant part of the respondens that view Lapland as a last chance tourism destination. They want to capture Lapland as a winter wonderland before it is changed by the climate impacts. This concept can increase tourists arrivals to the

destination, however can also bring concerns to long-term destination sustainability (Dawson et al., 2011).

The discussion answers the research question (RQ1) of this thesis, by showing that climate change impacts are significantly affecting tourists perceptions of the destination's attractiveness and shape their future travel decisions. Tourist are particularly sensitive to visible climate change impacts, like increasing temperature and redused snowfall that therefore impact the destination's appeal and decision making. Moreover, tourists are demonstrating varying responses, from experiencing a place attachment to viewing Lapland as a ‘last chance’ destination that showing the complexity of tourists travel planning and expectations under the climate change scenarios.

### 6.3 Enhancing Rovaniemi's attractiveness through non-snow-related attractions

Based on the results from the previous section, snow plays a crucial part in maintaining Rovaniemi as a winter tourism destination and is an important factor for tourist decision making. However, the following discussion will analyse the potential of non-snow-related attractions under the vulnerability of tourism due to climate change by answering the research question (RQ2): Can promoting alternative non-snow-related attractions mitigate the influence of climate change on destination attractiveness in Rovaniemi?

The traditional snow activities are gasping the interest of many tourists coming to Rovaniemi. Respondents of the survey particularly high ranked the importance in husky sledding and snowmobiling during their trips (see Chart 4, p. 45). However, the feasibility and implementation of these activities may decline with changing climate conditions. The diversification methods on tourism offerings should be prioritized by promoting alternative activities to tourists. Tervo-Kankare et al. (2018), discuss that promoting a wider range of no snow dependent activities can benefit the destination traditionally reliant on snow.

The results of the survey indicated that some non-snow-related attractions are particularly interesting to tourists. Such appeal was shown to the Northern lights and nature-based activities such as sauna and wellness experiences, that reveals potential alternatives to traditional snow-based tourism. The high interest in the Northern lights (averaging a score of 4.6 in attractiveness) can serve as a key tourists attraction in Rovaniemi, balancing the

seasonality of tourism and compensating climatic limitations (Hall & Saarinen, 2010). The preference in sauna and wellness experiences, following Northern lights experiences in the skale ranking, shows the high potential to holistic holiday experiences that is growing globally (Smith & Puczko, 2014). Given attractions, that are not dependent on snow conditions have a strong potential in attracting tourists in times of changing environmental conditions (Gössling et al., 2015).

Attractions associated with Santa Claus can also serve as an alternative to snow activities. The findings from the survey show that visiting Santa Clausa and crossing the Arctic Circle are important for respondents, however, surprisingly, not the most critical factors influencing tourists' decisions to visit Lapland. This is somewhat unexpected, with Rovaniemi global branding associated with the "Official Hometown of Santa Claus" and it’s location near the Arctic Circle. The lower importance of these factors can be assigned with visitors changing expectations or broadening of interests (Cooper & Hall, 2008). However, Santa Claus visiting and crossing Arctic Circle are still holding an significant value for the respondents, sharing the triumph with natural and immersive experiences.

Overall, the results of the study show that while snow remains to hold a central position to the tourists, the alternative non-snow-related attractions have a potential to mitigate the impacts of climate change. Activities, like Northern lights watching, wellness exxperieces and Santa Claus related attractions could decrease the risk from tourism industry, in the future. The fact that significant number of respondents (65,7%) find non-snow-related activities alone attractive enough to visit Lapland again show that non-snow attractions ought to be strategically developed and promoted for Rovaniemi's tourism future.

# 7. SUMMARY

## 7.1 Theoretical implications

The results of the study contribute and expand the knowledge of tourist perceptions, tourism adaptation strategies risk perceptions in times of climate change. First of all, the study contribute to the research done in the field of climate change perceptions, particularly in the vulnerable or climate reliant tourist destinations. This research is focusing on tourists perceptions of climate change impacts in the remote and highly climate dependent Arctic destination - Rovaniemi. Findings of this study expand the works that have studied tourists perceptions of climate change in more general contexts (e.g. Braun, Soskin, & Tong, 1999; Hall & Higham, 2005; Hsu & Mair, 2010a; Scott, Gössling, & Hall, 2012; Gössling & Peeters, 2015). Results from this research also show that understanding localized perceptions are important and can be used for destination-specific adaptation strategies.

Findings also broad the behavioral theories such as the Theory of Planned Behavior (TPB) and the Value-Belief-Norm (VBN). By studying the connection between direct experiences and climate change influencing decision making, the research gives insights on tourists psychological drivers behind destination choices (Ajzen, 1991; Stern, 2000). These theories can be further developed by analysing environmental perceptions in order to build a greater framework for understanding tourist behavior in response to climate change.

Moreover, the results show that the visible climate impacts, such as changes in snow reliability, are influencing tourists destination choices and shape their preferences. This aligns with the study done by Demiroglu and Dannevig (2019a), who dicussed how snow reliability influence the skiing destination attractivenes. However, their research was mainly focused on how snow coverage is having a direct impact on skiing activities, while the present study expands the thought by suggesting that tourists are not only concerned about the practical implementation of the activities, but also about the asthetics that snow brings to the winter landscape. The snowy winter image is considered to be the crucial part in the destination attractiveness in Rovaniemi, and its change can influence the appeal. The present research provide the broader look on the how visible climate change effects influence tourirts perceptions.

The study also covers the risk perception, that goes beyond health or political instability (Floyd et al., 2004). This research expand the understanding of how tourists perceive and respond to environmental challenges, making the risk perception models more complex and applicable. Particularly concentrating on the climate change this study provides insights valuable for future research on environmental risk perceptions.

Overall, the findings of this Master thesis extend the knowledge of tourists perceptions in Arctic destinations and discuss the importance of local perceptions in developing adaptation strategies. The study also brings new insights to risk perceptions in tourism.

### 7.2 Practical implications

The results of the study can be implemented for practical needs and videly used by tourism marketers, operators and stakeholders in Rovaniemi. Adapting the tourism industry to the climate change can be supported by developing marketing and educational strategies together with diversifying the tourism offerings beyond snow-dependent activities.

Based on the respondents interest in alternative no snow related activities, tourism operators are recommended to broad their product offerings. This can include developing Northern Lights experiences, wellness and Santa Claus related activities, which can attract tourists even in the absence of traditional snow activities (Smith & Puczko, 2014). This strategy can balance the tourism seasonality in Rovaniemi, stabilise incomes and reduce economic risks associated with seasonal variations in snowfall (Tervo-Kankare et al., 2018).

At the same time, the destination marketers should reflect changing environmental conditions in their communication and promotional strategies. The range of activities that are not reliant on snow should be highlighted, emphasing the attractiveness and uniqueness of them. The sustainability and preservation efforts can also be presented, offering tourists environmentally friendly travel options (Font & McCabe, 2017).

Destinations could also pay attention to improving climate change education for tourists. This can include developing interpretive trails, informational displays or posters in popular tourists locations that educate visitors on how climate changes affecting the region. Initiatives like this can increase tourists awareness of climate change impact and deepen

their appreciation of the destination. This can potentially influence their travel behaviours and decision makings (Moscardo, 2008).

The findings of this study offer Rovaniemi's tourism stakeholders practical strategies, that can help to adapt destination to climate change. Diversifying and actively promoting tourism offerings beyond snow can enchance Rovaniemi attractiveness. Education tourists can also serve as fundament to enrich visitors experience and encourage responsible travel choices. These approaches can help stabilize the local tourism economy and secure the future of Rovaniemi as a desirable destination.

### 7.3 Limitations of the study

This thesis provides the valuable insights into the tourists perceptions of climate change impacts in Rovaniemi Finland. However, there are limitations in the study that must be acknowledged to prevent generalising of the findings.

First of all, the number of the respondents for this study is relatively low, that may not fully represent the diverse range of tourists visiting Rovaniemi. What is more, the results of the study have mainly covered the tourists coming from European countries, limiting the understanding of tourists perceptions from other regions. People from non-Western countries can have a different perspectives and awareness levels of climate change (Reisinger & Mavondo, 2005) affecting the findings of the study significantly.

Additionally, while this thesis is focusing on winter months and perceptions related to snow and winter activities, it does not represent the picture of climate change impacts experienced in other seasons. Tourists visiting Rovaniemi in summer nights may have a different perspectives on climate change impacts, that could provide more insights in different seasons (Gössling et al., 2012).

The methologolical approach of the study is also bringing certain limitations. The survey conducted may not represent the true throughts of the respondents, as they may give only the socially acceptable answers (Nancarrow & Brace, 2000). The survey is also not showing the enough depth of the finding, as it would be in the qualitative approaches. The

interviews or focus groups could provide a wider picture on cognitive, emotional, and contextual factors influencing perceptions of climate change (Patton, 2002).

The study is also not considering other factors that may influence tourists decisions. This include economic conditions, personal reasons, geopolitical events that can affect travel decision-making (Hall, 2005). What is more, the study concentrates only on a small period of time, which may not capture how perceptions are changed as new information about climate appears. This is associated with the fact that perceptions are dynamic and are highly influenced by recent experiences and media reports (Lorenzoni & Pidgeon, 2006).

The recognition of limitations of this Master thesis is important in balanced understanding of the findings. The study has a small and regionally limited sample size, that is particularly focused on in the winter season. The quantitative methodology and ceratin limitation in other factors also impact the study, and need to be taken into account to avoid generalizing the results.

### 7.4 Suggestions for future research

Suggestions for future research would include conducting the studies with wider demographic groups. Respondents from non-European countries could provide the valuable insights on cultural and regional characteristics in climate change perceptions (Reisinger & Mavondo, 2005). This can therefore help to develop more effective adaptation strategies in tourism management.

Future research should also consider studying tourirsts perceptions in diffferent seasons, analayisng how they are affected by climate change all year-round (Scott et al., 2012). To broader the view on changing perceptions, the longitudinal studies can also be implemented. This will give the opportunity to track how perceptions of climate change are evolving as adaptation strategies are implemented (Gössling et al., 2012).

Qualitative methods can also give new perspectives to the future research. Interviews or focus groups can detect the deep features of tourists perceptions that can be often not seen in the quantitative surveys. What is more, the research on how global climate events and

media coverage are affecting tourists perceptions is needed. These factors can significantly affect the travel behaviour and decision making (Lorenzoni & Pidgeon, 2006). By acknowledging this, the destination can be better prepared on how to respond to sudden shifts in tourist perceptions caused by global climate crises.

Future research should conduct studies with more diverse demographic groups throughout different seasons and integrate qualitative methods. This would overcome these limitations of this study and provide more comprehensive understanding of how climate change impacts tourist behaviors and destination choices.

### 7.5 Conclusion

This Master thesis explored tourists perceptions of climate change impacts in Rovaniemi, Lapland. By analysing tourists awareness of climate change and how it is influencing their decision-making, the study showed what role perceptions have in shaping attractiveness and demand of Arctic winter destination.

The findings of the study show different levels of climate change awareness among tourists. While significant number of respondents find visible climate change impacts familiar, this awareness often did not translate into significant changes in travel behaviors. Despite climatic variations, tourists show a clear resistance to climate change impacts. Most tourists still chose Rovaniemi as their destination, highlighting a gap between climate change awareness and its actual influence on decision-making.

Despite the challenges that climate change presents to Rovaniemi's winter landscapes, many tourists continue to find the destination attractive. While the image of snowy winter plays a crucial role in tourists decision making, tourists showed flexibility in adapting their preferences in response to climate change. The alternative non-snow-related offerings like Christmas themed Santa Claus activities, wellness experiences and Northern Lights are gasping the interest of visitors. Many respondens found alternative attractions that did not rely on traditional winter landscapes attractive enough to visit Rovaniemi again. This adaptability shows a potential in diversifying tourism offerings and developing Rovaniemi as a future destination affected by the climate change.

For future suggestions, longitudinal studies are recommended to analyse tourists' perceptions and behaviors over time. This would help to better understand how awareness and perceptions of climate change evolve and how they impact tourism demand. Future research is suggested to explore the effectiveness of adaptation strategies adopted by tourism stakeholders and how they impact tourist perceptions. Lastly, tourist perceptions should be taken into consideration while developing sustainable tourism practices, that would ensure the longevity of destinations like Rovaniemi.

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APPENDIX 1. Survey

**TOURISTS' PERCEPTIONS OF CLIMATE CHANGE IMPACT**

**IN ROVANIEMI, FINLAND**

Dear Respondents,

This survey is part of a Master's Thesis conducted by Valeriia Makeionok under the supervision of Professor Outi Rantala from the University of Lapland, Finland.

This Thesis aims to explore tourists' perceptions of climate change in Rovaniemi, Lapland during the winter season. Through an examination of tourist perceptions, the study seeks to understand how visitors perceive and understand the impact of climate change on the tourism industry in the region.

Please note that participation in this survey is entirely voluntary, with an opportunity to withdraw your answers at any point by contacting Valeriia Makeionok and/or Outi Rantala.

The survey does not collect any personal identification information. Data collection and analysis are conducted according to The Finnish National Board on Research Integrity's (TENK) guidelines.

It will take approximately 5-7 minutes to fill out the survey.

For more information, please do not hesitate to contact:

Valeriia Makeionok
vmakeion@ulapland.fi

Thank you so much for your co-operation.

**1.What is your gender?**

- ☐ Female
- ☐ Male
- ☐ I prefer not to specify

**2. What is your age?**

- ☐ 18-24
- ☐ 25-34
- ☐ 35-44
- ☐ 45-54
- ☐ 55-64
- ☐ 65 or over

**3. What is your nationality?**

*Please write the answer in following the format: e.g. France, Italy, UK etc.*

_____

**4. What is your highest level of education?**

- ☐ Primary school
- ☐ Secondary or higher school
- ☐ College or university degree (e.g. BA)
- ☐ Post-graduate degree (e.g. Masters, PhD)

**5. Is it you first time travelling to Lapland?**

- ☐ Yes
- ☐ No

**6. How long did you stay in Lapland?**

- ☐ 1-2 days
- ☐ 3-4 days
- ☐ 5 days or more

**7. With whom are you traveling?**

*Please select all that apply.*

- ☐ Spouse\partner
- ☐ Family (spouse\partner and children)
- ☐ Friends
- ☐ Work colleagues
- ☐ Alone
- ☐ Other option, please specify:_____

**8. What sources of information have shaped your decision to come to Rovaniemi?**

- ☐ Internet search (e.g. Google)
- ☐ Personal recommendations from friends or family
- ☐ Social media (e.g. Instagram, Facebook, Youtube etc.)
- ☐ Online travel blogs
- ☐ Airline websites
- ☐ Advertisement of the destinaiton in your own country
- ☐ Previous visit to Lapland
- ☐ Other option, please specify: _____

**9. How have you booked your trip to Rovaniemi? (e.g. accommodation, flights, activities)**

- ☐ Booked independently using online booking platforms (e.g., Airbnb, Booking.com, Skyscanner.com etc.)
- ☐ Booked through a travel agent (e.g. personalized itinerary)
- ☐ Booked through a tour operator (e.g. pre-arranged packages)
- ☐ Booked certain elements (like flights or accommodations) independently, while using a travel agent for other aspects (like tours or activities)
- ☐ Other option, please specify: _____

**10. How much in advance have you started to prepare for your trip?**

- ☐ One year or more
- ☐ Half a year
- ☐ Couple of months
- ☐ Month or less

**11. How familiar are the climate change related issues listed below to you?**

*Please rate from 1 as not familiarat all to 5 as very familiar.*

| | 1 - Not familiar at all | 2 - Not familiar | 3 - Somehow familiar | 4 - Pretty familiar | 5 - Very familiar |
|---|---|---|---|---|---|
| Temperature increase | O | O | O | O | O |
| Rising sea levels | O | O | O | O | O |
| Wildfires | O | O | O | O | O |
| Decrease in snow coverage | O | O | O | O | O |
| Biodiversity loss | O | O | O | O | O |
| Dissapearing of summer ice sea | O | O | O | O | O |
| Dissapearing of summer ice sea | O | O | O | O | O |
| Permafrost thawing | O | O | O | O | O |
| Increasing precipitation levels | O | O | O | O | O |

**12. Please rate the attractiveness of Rovaniemi as a destination under following scenarious.**

*Please rate from 1 as not attractive at all to 5 as very attractive.*

| | 1 - Not attractive at all | 2 - Mostly not attractive | 3 -Somehow attractive | 4 - Pretty attractive | 5 - Very attractive |
|---|---|---|---|---|---|
| If there is more snow than now | O | O | O | O | O |
| If there is less snow than now | O | O | O | O | O |
| If there is no snow at all | O | O | O | O | O |
| If most of the snow is produced with snow making facilities | O | O | O | O | O |
| If temperatures are higher (2-3°C warmer than now) | O | O | O | O | O |
| If there is more rainfall | O | O | O | O | O |
| If there are more cloudy days | O | O | O | O | O |
| If the ice cover is poor | O | O | O | O | O |
| If there are changes in flora and fauna | O | O | O | O | O |

**13. Have you experienced any consequences of climate change during your stay in Rovaniemi?**

- ☐ Yes
- ☐ No
- ☐ I don’t know

**14. If you have answered 'yes' in a previous question, could you please specify?**

*Question is not mandatory.*

_____

**15. Do you consider Lapland as a 'last chance' tourism destination?**

- ☐ Yes
- ☐ No
- ☐ I don’t know

**16. Please explain why you consider (or do not consider) Lapland as a 'last chance' tourism destination.**

*Question is not mandatory.*

_____

**17. Please rate the importance of different factors while choosing Lapland as a destination.**

*Please rate from 1 as not important at all to 5 as very important.*

| | 1 - Not important at all | 2 - Mostly not important | 3 -Somehow important | 4 - Pretty important | 5 - Very important |
|---|---|---|---|---|---|
| Opportunity to stay in nature | O | O | O | O | O |
| Seeing Northern lights | O | O | O | O | O |
| Visiting Santa Claus | O | O | O | O | O |
| Experiencing cold temperatures | O | O | O | O | O |
| The image of real snow winter | O | O | O | O | O |
| Participating in snow activities | O | O | O | O | O |
| Crossing Arctic Circle | O | O | O | O | O |
| Engaging in | O | O | O | O | O |

| | | | | | |
|---|---|---|---|---|---|
| activities with Arctic animals | | | | | |
| Learning about Finnish and Sami culture | O | O | O | O | O |
| Trying local cuisine | O | O | O | O | O |

**18. Please rate the importance of participating in different snow-related activities.**

*Please rate from 1 as not important at all to 5 as very important.*

| | 1 - Not important at all | 2 - Mostly not important | 3 -Somehow important | 4 - Pretty important | 5 - Very important |
|---|---|---|---|---|---|
| Ice fishing | O | O | O | O | O |
| Reindeer activities | O | O | O | O | O |
| Snowmobiling | O | O | O | O | O |
| Skiing | O | O | O | O | O |
| Husky sledding | O | O | O | O | O |
| Snowshoeing | O | O | O | O | O |
| Ice skating | O | O | O | O | O |
| Downhill sledding | O | O | O | O | O |

**19. Please rate the preferred no-snow alternative activities.**

*Please rate from 1 as not interesting at all to 5 as very interesting.*

| | 1 - Not interesting at all | 2 - Mostly not interesting | 3 -Somehow interesting | 4 - Pretty interesting | 5 - Very interesting |
|---|---|---|---|---|---|
| Sauna and hot tub experiences | O | O | O | O | O |
| Outdoor swimming | O | O | O | O | O |

| | | | | | |
|---|---|---|---|---|---|
| Mountain biking | O | O | O | O | O |
| Animal watching | O | O | O | O | O |
| Northern lights watching | O | O | O | O | O |
| Retreat or wellness experiences | O | O | O | O | O |
| Hiking | O | O | O | O | O |
| Santa Claus visiting | O | O | O | O | O |
| Gastro tours | O | O | O | O | O |
| Crossing Arctic circle | O | O | O | O | O |
| Visiting museums | O | O | O | O | O |

**20. If the snow reliability in Lapland is poor, would you consider the activities listed above attractive enough to choose Lapland as a destination?**

- ☐ Yes
- ☐ No
- ☐ I am not sure

**21. Some of the snow activities can be implemented with artificial snow. Would you find it attractive to take part in those activities? (e.g. skiing, husky, reindeer safari etc.)**

- ☐ Yes
- ☐ No
- ☐ I am not sure

**22. Are you planning to visit Lapland again?**

- ☐ Yes
- ☐ No
- ☐ I am not sure

APPENDIX 2. QR-code card for accessing the survey