Universität Zürich[UZH]

Geographisches Institut

Governing Climate Change Adaptation in the Swiss Alps – a Case Study in Val Lumnezia

GEO 511 Master's Thesis

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Preface

First and foremost, I would like to thank all the interviewees who were kind enough to share their valuable knowledge and experiences with me. I want to extend my thanks to my supervisor, Dr. oec. publ. Dipl.-Geogr. Marco Pütz, for his support and guidance throughout this project. I am grateful for his expertise and input that helped me structure the research and writing process. Through him, I learned that the most difficult part of academic writing is finding the courage to be satisfied with your product.

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Abstract

Alpine winter tourism is highly vulnerable to the effects of climate change due to its systemic dependency on stable climatic conditions to ensure sufficient snow cover. Climate change adaptation describes the strategic human response to actual or expected climatic impacts aimed at reducing vulnerabilities and capitalising on potential opportunities. As many Alpine tourism destinations find themselves at a crossroads regarding the future orientation of their offerings, climate change adaptation and future tourism development have become highly critical issues that require coordinated governance across all administrative levels. This thesis uses the case of Lumnezia, a Swiss destination heavily anchored in ski tourism, to investigate the current state of climate change adaptation governance in tourism. The case selection focuses on Lumnezia due to its pronounced reliance on winter tourism and its exposure to climate change impacts characteristic of medium-altitude Alpine regions. Utilising a multi-level governance lens alongside theoretical frameworks on policy mainstreaming and the adaptation implementation gap, this study examines the underlying dynamics and structural influences that shape local policy translation. The empirical research draws on semi-structured interviews with eleven experts and a qualitative content analysis of relevant policy documents and local tourism strategies. The findings reveal that while climate change considerations are integrated into national and cantonal policies, their local translation remains limited, as incomplete mainstreaming and institutional barriers restrict the extent to which explicit adaptation enters local governance arenas. The research identifies specific instances in which local intermediary actors can partially bridge this implementation gap by integrating adaptation objectives into regional projects and developmental perspectives. However, local institutional fragmentation, socio-economic path dependencies, and the dominant political positions of winter infrastructure stakeholders heavily shape the trajectory of the tourism sector. Consequently, adaptation in Lumnezia is currently limited to incremental measures that reinforce existing ski-tourism-focused pathways, potentially leading to maladaptive trajectories and increasing long-term vulnerability to a changing climate.

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List of Abbreviations

NRP Neue Regionalpolitik

BAFU Bundesamt für Umwelt; Swiss national environment office

AWT Amt für Wirtschaft und Tourismus; Grisons cantonal office of economy and tourism

SECO State Secretariat for Economic Affairs

MLG Multi-Level Governance

STAG Surselva Tourismus AG

IMAG Infra Mundaun AG

MTO Mountain Transport Organisation

IPCC Intergovernmental Panel on Climate Change

QCA Qualitative Content Analysis

1 Introduction

Climate change is one of the 21st century's overarching challenges. As of today, the global average temperature is already significantly higher than it was during the pre-industrial era, and further global warming is expected in the decades to come. Because the earth is a connected system and change does not happen in isolation, climate change influences natural and social systems, with its consequences adversely impacting food production, health and various other aspects of human life (United Nations, 2025). To reduce and manage the effects of climate change, climate change literature distinguishes between two separate but codependent approaches: mitigation and adaptation (IPCC, 2023; Massey & Huitema, 2016). While mitigation focuses on limiting perturbations to the carbon cycle and thereby reducing the extent of climate change and global warming (Huitema et al., 2016), adaptation can be understood as an adjustment to climate and its actual or projected effects to reduce harm and benefit from opportunities caused by climate change (IPCC, 2023). Accordingly, the Intergovernmental Panel on Climate Change (IPCC) highlights that "the magnitude and rate of climate change and associated risks depend strongly on near-term mitigation and adaptation efforts" (IPCC, 2023, p. 14). Adaptation is therefore an unavoidable component of climate policy and is a central approach for dealing with climate change in the future. This reliance on adaptation to manage future climate change effects emphasises the need for prompt, effective adaptation across all affected sectors.

Currently, locally and sectorally diverse adaptation efforts and measures are in place, but their implementation often depends on the capacity and quality of governance and decision-making processes (IPCC, 2023). This master's thesis aims to analyse the structures shaping adaptation governance in the tourism sector in Switzerland, using the case of Lumnezia.

1.1 Problem Statement

Alpine winter tourism is particularly vulnerable to the effects of climate change, as reduced snow-security, rising temperatures, and changing precipitation patterns increasingly challenge established tourism models, especially in regions that are economically strongly dependent on winter tourism (Abegg et al., 2007). For many mountain regions, tourism is a central economic sector (Derungs et al., 2019; Graubünden Tourismus, 2024) and is closely connected to local and regional employment, value creation and cultural identity. As climatic conditions become less predictable, tourism actors are increasingly pressured to develop specific adaptation strategies and measures that maintain the economic viability of destinations while simultaneously responding to the expected effects of climate

change. This pronounced vulnerability underscores the critical need to investigate how adaptation is governed within this highly exposed segment of the tourism sector.

At the same time, adaptation governance in tourism is highly complex. Adaptation often requires long-term planning, substantial financial investments and coordination across actors and levels (Matasci et al., 2014). In tourism, development is shaped by individual actors, private businesses, infrastructure providers, municipalities, cantonal institutions, and national funding programs, each pursuing varying objectives. These dynamics, combined with the often strong embeddedness of tourism regions in economic structures and infrastructure systems, make transformative change difficult and politically contentious.

In Switzerland, these challenges are particularly pronounced. The Swiss federal multi-level governance system requires national and cantonal strategies to be translated into sectoral and local governance contexts (Bauer et al., 2012; Braunschweiger, 2022; Huitema et al., 2016). The concrete implementation of measures relies heavily on local coordination, prioritisation, and actor networks that take on the task. While adaptation has increasingly entered political discourse and is slowly diffusing across sectors and levels, it remains uneven and context-specific, relying on governance and actor constellations, economic influences, and prioritisation by key actors (Matasci et al., 2014; Widmer, 2018).

1.2 Research Gap

Climate change adaptation has become an increasingly important field of research and policy-making and has received growing attention from governance scholars. Existing research has highlighted the importance of mainstreaming, institutional coordination and multilevel governance for successful adaptation processes (Braunschweiger & Pütz, 2021; Runhaar et al., 2018; Widmer, 2018). Nevertheless, significant challenges remain regarding the implementation and prioritisation of adaptation objectives across governance levels and sectors. Limited attention has been paid to how adaptation objectives are translated into local governance contexts, where economic dependencies, unique governance structures, and sectoral interests shape the orientation of possible development.

This challenge is especially relevant in Alpine tourism regions, where climate change increasingly threatens established tourism models while adaptation must also ensure the continued economic viability of local tourism systems. Despite its vulnerability to climate change and its economic importance, tourism is underexplored in the adaptation literature compared to other economic sectors (Matasci et al., 2014). Existing studies on tourism adaptation frequently focus on technical adaptation measures or strategic policy frameworks, whereas the governance processes through which adaptation priorities are negotiated between local actors remain less explored. Furthermore, research often

focuses on singular governance perspectives or individual institutional levels, while the interactions between municipalities, tourism organisations, intermediary actors, cantonal institutions and tourism businesses receive comparatively limited attention.

This thesis addresses these gaps by analysing how climate change adaptation is translated into local tourism governance in Val Lumnezia. By integrating perspectives from actors across governance levels and sectors, the study examines how local actor constellations, institutional structures and economic dependencies shape the implementation, prioritisation and orientation of adaptation processes in a tourism system that remains strongly connected to winter tourism and its associated development structures.

1.3 Contribution to the Scientific Case

To deepen the understanding of climate change adaptation governance within the Swiss federal system, this thesis investigates how national and cantonal adaptation strategies are operationalised within and translated into local tourism governance. Through a multi-level governance lens and by combining perspectives from mainstreaming and policy implementation, the thesis captures the complex and often contested processes through which adaptation objectives are interpreted, negotiated and implemented in the context of Alpine tourism.

Using the case of Lumnezia, an Alpine municipality with strong ties to ski tourism, the thesis contributes to a broader understanding of how environmental objectives interact with economic interests, institutional arrangements and existing tourism development pathways. Particular attention is paid to the role of intermediary actors, local governance constellations and external funding instruments in shaping adaptation priorities and implementation processes.

Methodologically, the thesis combines document analysis, a scientific literature review, and qualitative research through semi-structured expert interviews with actors across different governance levels and sectors. This approach was chosen to ensure both sufficient breadth and analytical depth in understanding the complex governance dynamics at play in adaptation governance. While document analysis posed the necessary theoretical and institutional background, the interviews allowed for an in-depth understanding of actor perspectives. Through this multilevel perspective, the study provides insights into the governance dynamics, institutional limitations and economic dependencies that influence local responses to climate change in tourism regions. In doing so, the thesis contributes to a more nuanced understanding of how adaptation governance is shaped not only by formal policy objectives, but also by local actor networks, sectoral priorities and existing regional development structures. This is crucial for assessing the use and effectiveness

of mainstreaming strategies and the emergence of barriers which contribute to the policy implementation gap.

Based on these thematic foci, the thesis addresses the following research questions:

1. How is climate change adaptation integrated into local tourism governance in Val Lumnezia, and how do local actor constellations influence its interpretation and prioritisation?
2. How do governance structures, policy frameworks, and intermediary actors influence the coordination and implementation of climate change adaptation in tourism?
3. In what ways do actor dynamics, economic dependencies, and institutional arrangements shape adaptation priorities and development pathways in the tourism sector?

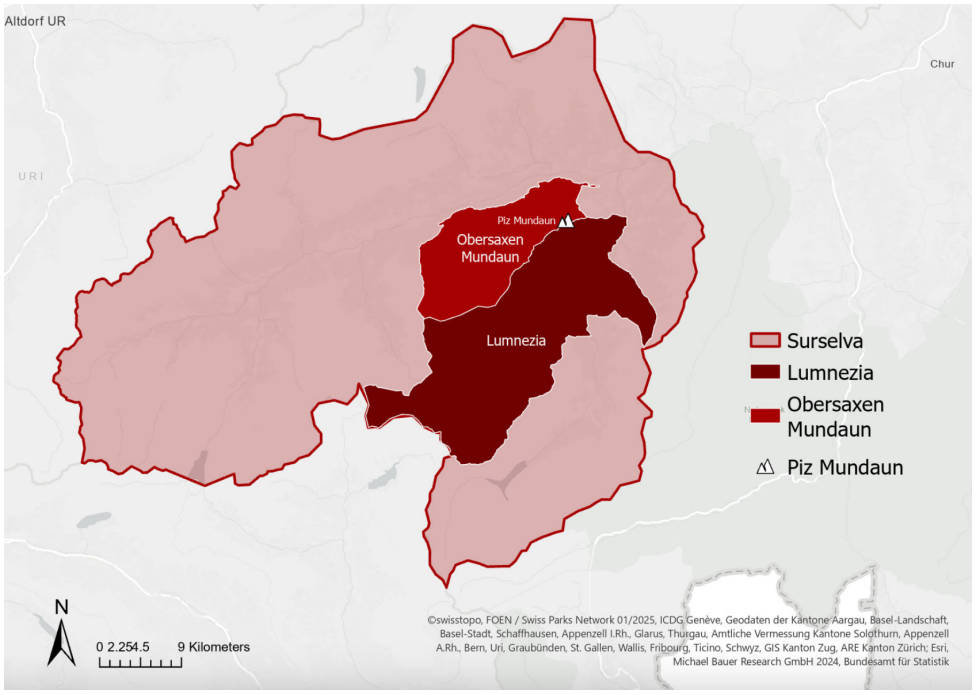
To answer these research questions, the thesis first introduces the local context of climate change and tourism governance in the study region. This is followed by the presentation of the theoretical framework used to analyse the case study. Chapter 4 outlines the methodological approach and the methods applied throughout the research process. In Chapter 5, the empirical findings, primarily based on the conducted interviews, are presented in a thematic structure. Finally, Chapter 6 discusses these findings, situates them within the broader academic literature, answers the research questions, and reflects on the thesis's limitations. The thesis concludes with a final chapter that sums up the main findings and provides an outlook on potential future research.

2 Tourism and Governance in the Study Region

This thesis reviews projects and dynamics in the Surselva region of the Swiss canton of Grisons. The region is situated in the western part of the canton and lies in southern central Switzerland (see Figure 2a). The research focus lies on the municipality of Lumnezia and the area around the Piz Mundaun (see Figure 2b). The municipality is located in the Val Lumnezia and is characterised by an Alpine landscape. The Val Lumnezia valley extends from the regional centre of Ilanz towards the Greina Plateau and is characterised by a predominantly mountainous landscape with settlements situated between approximately 800 and 1600 metres above sea level (Lumnezia, 2026). Together with the neighbouring municipality of Obersaxen-Mundaun, Lumnezia forms an important regional tourism destination, centred around the ski resort Obersaxen-Mundaun-Lumnezia. The ski resort extends from Piz Mundaun at the valley entrance across the subsequent peaks of Hitzeggerkopf, Stein, and Piz Sezner. The ridge between these peaks serves as the geographical boundary separating Val Lumnezia from the Obersaxen high plateau (see Figure 2b), marking the municipal border between the two municipalities, and connecting them through mountain transport infrastructure.



(a) National context of the Surselva region within Switzerland.



(b) Regional overview map of the Surselva region and the municipalities Lumnezia and Obersaxen Mundaun relevant for the case study.

Figure 2: Overview Maps of the Study Region: (a) Geographic Localisation of the Surselva District within the Canton of Graubünden and Switzerland, and (b) Detailed Delineation of the Municipal Boundaries of Lumnezia and Obersaxen Mundaun around Piz Mundaun.

In many Alpine regions, such as the Val Lumnezia, winter tourism constitutes an important economic pillar, shaping local development, infrastructure, and employment (Derungs et al., 2019). At the same time, the winter tourism sector is highly sensitive to climate change, as it depends heavily on stable snow conditions and cold temperatures. Declining snow reliability and shorter winter seasons, therefore, increase the pressure on tourism-dependent regions and create a growing need for adaptation (Abegg et al., 2007). Adaptation to climate change in Switzerland is embedded in a multi-level governance system (Braunschweiger, 2022). While the national level defines overarching strategies and provides funding frameworks, cantonal and local actors play a key role in implementation. In this context, the municipality of Lumnezia is directly involved in tourism development and spatial planning and interacts with regional tourism organisations and private actors such as MTOs. Against this background, this chapter provides an overview of the climatic, economic, and institutional context of the study region. It examines how climate change affects Alpine tourism, outlines the governance structures shaping adaptation, and situates Lumnezia within these multi-level dynamics.

2.1 Climate Change Impacts on Switzerland and the Alps

The CH2025 Climate Scenarios, developed by MeteoSwiss and ETH Zurich, represent the most recent synthesis of climate change projections for Switzerland. The report highlights significant changes in temperature, precipitation patterns, and snow reliability, with particularly pronounced impacts in Alpine regions such as the Alps in Grisons. In the face of these projected effects of climate change, the CH2025 report highlights the importance of mitigation, as just a minimal increase in average temperature already has wide-ranging consequences. Switzerland is in an exposed position regarding climate change, as warming in Switzerland has been more than twice the global average as of 2024 (MeteoSwiss & ETH Zürich, 2025). This temperature increase leads to diverse local effects. The report highlights four main climate-related changes in Switzerland: more extreme heat, drier summers, more frequent and intense precipitation, and less snow, combined with a rising zero-degree line (MeteoSwiss & ETH Zürich, 2025, p. 4). These developments are particularly pronounced in Alpine regions and have significant implications for climate-sensitive sectors such as tourism (Marty et al., 2017).

Especially the reduction in snow reliability is highly relevant for Alpine winter tourism. The zero-degree line has already risen by several hundred meters in comparison to the reference period, and although precipitation is increasing in winter, it is increasingly falling as rain instead of snow. This development significantly shortens the duration of snow cover, especially at low and medium elevations (MeteoSwiss & ETH Zürich, 2025). As these trends are projected to continue and intensify, the pressure on winter

tourism systems is expected to increase further. The CH2025 report therefore concludes that both strong mitigation efforts and risk-based adaptation measures are necessary to reduce negative impacts. These national trends are also evident at the regional scale in the study region. The case study focuses on the municipality of Lumnezia, located in the Val Lumnezia valley within the Surselva region of the canton of Graubünden. In this region, temperatures are projected to increase by 2.9°C to 3.7°C relative to pre-industrial averages by 2060, as shown in the projected data for Disentis, a municipality at an altitude similar to that of Lumnezia (see Figure 3). The projection is based on the scenario that the goal of limiting global warming to 2 degrees Celsius will not be reached and human emissions will only stabilise after 2050 (BAFU, n.d.).

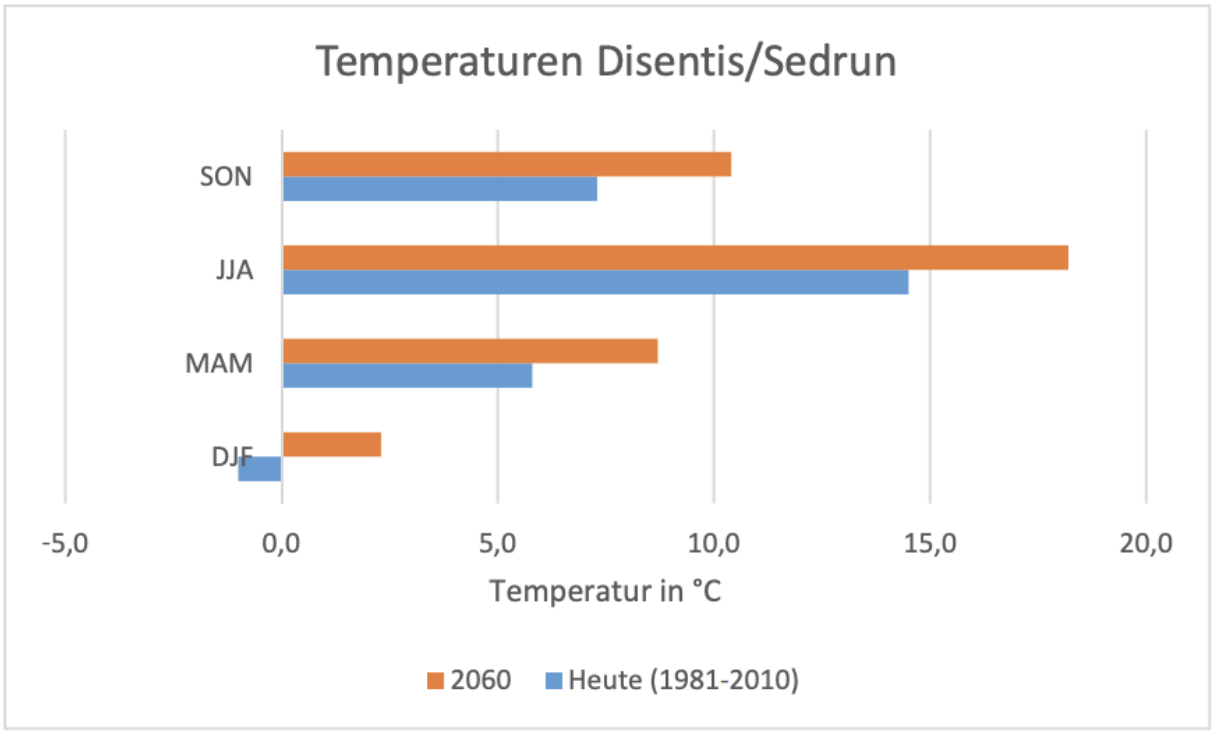


Figure 3: Projected Temperature Developments in Disentis in the Surselva Region (BAFU, n.d.)

Although expected warming is relatively similar across seasons, the projected increase in temperature has different effects on local conditions. In winter, this climatic development is expected to reduce the number of fresh snow days by 52 per cent at elevations between 800 and 1500 meters, as the zero-degree line increases by 500 to 660 meters (BAFU, n.d.). For the ski area Obersaxen–Mundaun–Lumnezia, which ranges from 1244 to 2270 meters above sea level ("Panoramakarte", 2022), these changes pose a significant risk to the operation, as destinations require snow cover over 30 centimetres for 100 days during the season to be deemed snow-secure (BAFU, n.d., p. 34). In response to the expected regional climatic developments, and as part of the first stage of the national adaptation

strategy and the related action plan, the pilot project "Klima Toolbox Surselva" was conducted in 2015 by the Federal Office for the Environment (BAFU) and managed by seecon gmbh. In collaboration with regional actors and supported financially by national, cantonal, and regional institutions, the project analysed climate-related risks, opportunities, and adaptation needs in Surselva. Its findings indicate that in six of the eight analysed impact areas, risks outweigh potential opportunities, underlining the need for adaptation measures (BAFU, n.d.).

2.2 Tourism in the Study Region

Against the background of the projected climate change impacts outlined above, tourism emerges as a particularly affected sector in the study region. According to the sectoral analysis in the *Klima Toolbox Surselva*, tourism is one of the areas in which risks outweigh potential opportunities (BAFU, n.d., p. 18). Like many Alpine tourism regions, Lumnezia focuses a large share of its tourism activities on ski-based winter tourism (Bausch & Gartner, 2020; IMAG, 2026). The economic importance of tourism in the region and in the canton is substantial, accounting for 26.5 per cent of cantonal value creation and 31.9 per cent of regional employment in activities directly or indirectly related to the sector (Graubünden Tourismus, 2024). Being described as "the motor for tourism in Grisons", Alpine snow sports and the associated mountain transport operators (MTOs) are expected to be severely affected by climate change (Abegg et al., 2013), posing not only a challenge for businesses, but also for the livelihoods of people engaged in the sector.

This systemic dependency on stable climatic conditions, most importantly reliable snow cover, makes Alpine ski tourism across the region acutely vulnerable (Abegg et al., 2013; BAFU, n.d.). Although the *Klima Toolbox Surselva* projects that the ski resort Obersaxen–Mundaun–Lumnezia will remain overall operable until 2060 (BAFU, n.d.), rising temperatures, the upward shift of the zero-degree line, and decreasing solid precipitation are expected to increasingly constrain operations and decrease predictability for ski resort operators, especially at lower elevations and in exposed areas (Gonseth, 2013).

To understand how these broad climatic pressures manifest locally, it is necessary to examine the destination's specific structural landscape. The municipality of Lumnezia is located in the Val Lumnezia valley in the canton of Graubünden and forms part of the Surselva region. It consists of 13 formerly independent municipalities that merged in 2013. The municipality is directly connected to the ski resort Obersaxen–Mundaun–Lumnezia through lift infrastructure in Vella and is deeply involved in local and regional tourism networks. According to the municipality's website, Lumnezia has approximately 2100 inhabitants, and 67 per cent of housing in Lumnezia is in the form of second homes (Lumnezia, 2026). Most of these second homes are not rented out and are exclusively

used by their owners, creating a very stable, repeat-visit-based clientele that is, in most cases, rigidly tied to the region's ski-based tourist offering (Graubünden Tourismus, 2024).

Consequently, local efforts to adapt to climate change in Lumnezia have focused heavily on protecting this established infrastructure and clientele. Planned and implemented tourism projects appear to either aim to compensate for reduced snow reliability primarily through artificial snowmaking or to diversify tourism offerings and grow the summer tourism part of the destination. Under suitable temperature conditions, artificial snowmaking enables ski resorts to continue operating even in the absence of natural snowfall. However, in lower-lying areas such as Obersaxen–Mundaun–Lumnezia, a sufficient snow cover for skiing operation cannot be guaranteed during the economically crucial Christmas period, during which around 20 per cent of winter revenue is generated (Abegg et al., 2013).

This seasonal shortfall increases the pressure to compensate for potential revenue losses in winter. Illustrating the scale of this challenge, Dr. Philipp Lütolf estimates that for every missing winter guest, between 1.3 and 4.2 additional visitors are required outside the winter season. To ensure similar future economic viability, comparable offerings must therefore be developed for the summer season (Bluewin news, 2024). This economic pressure has already stimulated diversification efforts in the region. In addition to investments in snowmaking infrastructure, the municipality has expanded cross-country bike and hiking infrastructure and cultural offerings, and is actively planning further developments (STAG, 2026a).

2.3 Governance Structures and Policy Instruments for Climate Change Adaptation

At the start of 2013, the amended Federal Act on the Reduction of CO_2 Emissions (CO_2 Act) came into force. It formulates the reduction of greenhouse gas emissions as the primary objective of climate protection, while also highlighting adaptation as a complementary approach to addressing climate change. Cantons are legally required to report regularly on their adaptation efforts to the BAFU (ANU, 2015a). With the 2023 passing of the Federal Act on Climate and Innovation (Klima- und Innovationsgesetz), adaptation was formally anchored as a national priority. This act explicitly tasks both the Confederation and the cantons with safeguarding society and infrastructure from climate risks (UVEK, 2023). While the legislation legally reinforces the cantons' duty to act, it leaves the concrete operationalisation of adaptation largely to their discretion.

In practice, climate change adaptation in Switzerland is primarily translated through its integration into existing sectoral policies rather than through a dedicated, stand-alone policy framework (Braunschweiger, 2022). On the national strategic level, this process

is structured through the action plan "Adaptation to Climate Change in Switzerland", which builds on the original 2012 strategy. This action plan defines key goals, challenges, and fields of action across multiple sectors, tasking the respective federal offices with prioritising adaptation within their sectoral domains (BAFU, 2020).

Within the tourism domain, adaptation is integrated directly into the national tourism strategy, where climate change is identified as one of the five primary challenges facing the industry. Contributing to sustainable development has consequently been introduced as an explicit additional goal for federal tourism policy (Eidgenossenschaft, 2023). In this context, the rise of the snowline is recognised as an intersectoral challenge with severe economic implications for winter sports (BAFU, 2020). To counter this, the federal action plan highlights the critical importance of diversifying the tourism offer. Through dedicated funding programs such as "Innotour" and the "Neue Regionalpolitik" (NRP), the State Secretariat for Economic Affairs (SECO) actively supports the development of summer, year-round, and resilient winter products, while platforms like the "Tourismus Forum Schweiz" facilitate dialogue among the involved cross-sectoral actors (BAFU, 2020).

As the framework moves down the multi-level governance pipeline, these broad national objectives are further specified and translated into cantonal strategies. Even without a statutory obligation to do so, multiple cantons have independently formulated adaptation strategies. Building on the national framework and incorporating localised climate scenarios, the canton of Grisons developed its own climate change adaptation strategy in 2015 to bridge the gap between federal goals and cantonal realities. The cantonal strategy defines seven main areas of practice, explicitly highlighting in its fifth domain that "the tourism industry, which focuses on winter sports and needs to increasingly tap into summer opportunities, should be encouraged to adapt" (ANU, 2015b, p. 5).

In Grisons, the implementation of these strategic imperatives relies on several administrative actors with sector-specific responsibilities. The Office for Nature and Environment (ANU) is tasked with the overall development and coordination of cantonal climate change adaptation and mitigation strategies. Conversely, the Office for Economy and Tourism (AWT) handles tourism policy and regional economic development; it administers the critical funding instruments, such as the NRP, defines funding guidelines, and establishes priorities for sector-specific project support. The canton of Grisons has established an intermediary position for regional development and has installed regional developers in all 11 regions since 2021. These regional developers are tasked with supporting municipalities and regions in initiating, coordinating, and implementing NRP goals and economic development projects. They are contact people for the economy, politics, and the general population (AWT, 2022).

Ultimately, the concrete operationalisation of cantonal funding priorities and strategic goals falls upon the municipal level, which serves as the final intermediary in Swiss multi-level governance. In smaller alpine municipalities, adaptation objectives are rarely formulated in dedicated strategies, but are instead absorbed directly into local sectoral policies and land-use decisions (Probst & Hohmann, 2019). Because tourist services are predominantly provided within public spaces, the regulation density and subsequent municipal involvement are structurally higher in Alpine tourism economies than in other sectors (Derungs et al., 2019). This public influence is further intensified in ski areas, where local municipalities frequently co-fund, own, or hold significant stakes in the transport infrastructure (Troxler et al., 2024).

This municipal intermediary role is clearly exemplified in the case of Val Lumnezia, where the local administration actively steers tourism development through spatial planning mandates and direct financial participation. As one of the six main municipal partners forming Surselva Tourismus AG (STAG), the regional destination management organisation (DMO), Lumnezia is embedded within a coordinated regional structure. While STAG manages marketing and regional branding, Lumnezia remains financially responsible for local infrastructure projects, contributing to a collective annual investment of CHF 2.36 million by the STAG municipalities to drive tourism development (STAG, 2026b). These investments also showcase the municipality's commitment to creating and sustaining additional winter tourism offerings. Examples are the local winter hiking trails and the skating rink in Lumnezia.

Over the last few years, Lumnezia's public investments have increasingly targeted summer and year-round diversification projects, such as the Nino Schurter bike trail and infrastructure optimisation around the Davos Munts swimming pond (STAG, 2026a). Furthermore, through its involvement in Infra Mundaun AG, the municipality has joined forces with Obersaxen Mundaun and the Bergbahnen Obersaxen to develop the tourist offer around Piz Mundaun (see map Figure 2b). Through these substantial financial investments, the three actors plan to modernise existing winter sport infrastructure while creating new summer offerings, such as bike and hiking trails, to diversify the regional portfolio. The projects are planned for the timespan between 2026 and 2030 and are projected to cost 24.75 million Swiss francs (STAG, 2026a). Additionally, IMAG plans to invest an additional 17 million Swiss francs after 2030 to further expand the snowmaking infrastructure throughout the ski resort and to construct a reservoir to ensure a reliable water supply (STAG, 2026a).

On 16 April and 14 June, the voters in the municipalities Obersaxen-Mundaun and Lumnezia agreed to allocate the required funds for the realisation of the first project stage, with an approval rate of 58.8 % in Lumnezia, showing popular support for the municipal-

ity's infrastructure and tourism approach. This approach presents a shift in governance: so far, investments in artificial snowmaking infrastructure have been made by the MTO, but in the future, only 20 per cent of the costs will be carried by it (Gemeinde Obersaxen Mundaun, 2026). This case showcases heightened municipal involvement in the development of infrastructure projects and in adaptation efforts to climate change, as well as public consent for the chosen approach.

3 Theoretical Background

The case of climate change adaptation in the tourism sector in Lumnezia is multi-faceted and complex. It is not only an environmental, but also a governance issue as it involves various actors across different institutional levels and sectors. As climate change adaptation emerged as a distinct policy field in the European Union during the late 2000s (Massey & Huitema, 2016), its integration into public policy has increasingly shaped how climate change is governed. The concept of climate change governance provides a basis for understanding how adaptation governance is shaped by interactions among public authorities, private actors, and sectoral interests. Climate change governance can be described as a process of political steering in which state institutions and civil society actors shape and influence the definition, design, and implementation of climate change adaptation measures. This influence can occur through both institutionalised and informal participation processes (Knieling & Rossnagel, 2015) in (Tapia-Dean, 2023). Especially in economic sectors, adaptation often competes with existing routines and dominant rationales, making it more difficult to integrate adaptation into planning procedures and policies (Biesbroek, 2021; Uittenbroek, 2016).

To evaluate adaptation within the tourism sector and establish a clear analytical framework for interpreting interview results, this thesis defines climate change adaptation as any adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects that moderates harm or exploits beneficial opportunities (Anderson & Gough, 2021). Following the implementation-oriented perspective of Baack et al. (2024) and the institutional policy analysis of Dupuis and Knoepfel (2013), adaptation is understood primarily in terms of its intended function of responding to climate-related risks and vulnerabilities, rather than through the discursive framing employed by the actors involved. Consequently, measures do not need to be explicitly labelled as "climate change adaptation" to be considered relevant for this analysis.

In this thesis, a distinction is made between transformative and incremental adaptation. While both approaches aim to reduce vulnerability, they differ substantially in their objectives and scale. Incremental adaptation refers to adjustments made within a system to maintain its core function and existing objectives under changing climatic conditions. It scales up or refines existing practices without fundamentally altering the baseline socio-ecological system or business model. Transformative adaptation, on the other hand, refers to deliberate actions aimed at changing a system's fundamental attributes. Rather than sustaining a system, transformative adaptation reshapes it, implying a systemic shift in institutional arrangements, power dynamics, economic dependencies, and cultural values. Evaluating where a specific measure falls on this spectrum requires an equally comprehensive understanding of what constitutes system vulnerability.

Due to tourism's economic character and its dependence on environmental and socio-economic conditions, vulnerability is therefore understood broadly and encompasses social, ecological, and economic dimensions. This allows the analysis to capture adaptation measures that seek to maintain the functioning and viability of tourism systems under changing climatic conditions. At the same time, this definition does not assume that all adaptation efforts are necessarily effective or sustainable in the long term. Questions regarding the effectiveness, sustainability, and potential maladaptive consequences of adaptation measures (IPCC, 2023) are therefore treated as empirical issues and discussed separately in chapter 6.

Despite the growing integration of climate change adaptation into public policy and governance, a gap persists between adaptation needs and the effective implementation of measures. While this gap is often more pronounced in developing countries, it is also evident in OECD countries (Berrang-Ford et al., 2011; Runhaar et al., 2018) in (Braunschweiger, 2022). The gap is often referred to as the "adaptation implementation gap". It reflects the mismatch between the level of adaptation required to address current and projected climate risks and the measures that are actually implemented (Braunschweiger, 2022). The gap underscores the challenges of translating political strategies and policy frameworks into concrete action. In the case of Alpine winter tourism, where environmental, economic, and political interests are closely intertwined (Debela, 2020; Troxler et al., 2024), it is essential to analyse local governance dynamics to understand how adaptation is incorporated into planning and implementation processes.

This chapter introduces three complementary theoretical approaches to analyse climate change adaptation in Lumnezia: multi-level governance (MLG), mainstreaming, and the policy implementation gap. While climate change governance provides the conceptual framework for observation, these concepts enable a comprehensive analysis of how adaptation is embedded within governance systems and translated into practice. Thereby, MLG provides a framework for analysing how governance and decision-making are distributed and shared across national, cantonal, and municipal levels, and how these interactions shape adaptation outcomes. Building on this, mainstreaming is used to understand how climate change adaptation is embedded in sectoral policies and practices. Instead of treating adaptation as an isolated issue, it explains how it is influenced by sector-specific priorities and integrated into institutional structures. The third concept, the policy implementation gap, concerns the discrepancy between concrete, formal strategies and policies and their lack of practical implementation. It helps identify barriers and constraints that occur when higher-level strategies are implemented by local actors. By combining these three concepts, this thesis aims to capture the structural conditions and practical dynamics that shape climate change adaptation in the Alpine tourism sector in Lumnezia.

3.1 Multi-Level Governance in Swiss Federalism

As Braunschweiger (2022) puts it, climate change adaptation governance is both a multi-level and a multi-sectoral challenge. The diverse local effects of climate change create unique adaptation needs embedded in local conditions and socio-economic systems. Consequently, a nationally or even supranationally dictated approach to adaptation would most likely fail to produce adaptation measures that account for all local characteristics and challenges. This shifts responsibility to the regional and local levels, where actors are expected to recognise the most important climate change adaptation needs, create strategies, and implement measures to tackle those challenges locally (Galarraga et al., 2011; Keskitalo, 2010) in (Braunschweiger, 2022). In exchange, national actors are expected to facilitate this local process through knowledge dispersion, financial funding and political prioritisation of the issue. These responsibilities are often defined and planned in national adaptation strategies through which nation states formulate their approach to climate change adaptation (Bauer et al., 2012; Biesbroek et al., 2010; Lewis & Smith, 2024).

Because adaptation is not an isolated political process confined to a single level and context, various non-governmental actors, such as individuals and businesses, are also involved. Climate change adaptation governance therefore involves political actors at the supranational, national, regional, and local levels, as well as non-governmental actors, such as destination management organisations (DMOs), transport companies, and gastronomy workers. This complex entanglement of multi-level and multi-sector actors enables the MLG framework to serve as the main lens for analysing adaptation governance in the case of Lumnezia. Coined by Hooghe and Marks (2002), the MLG framework was created to describe the shift away from a nation-state centred governance understanding towards a decision-making and governance arrangement involving "a multiplicity of interdependent public and private actors operating at multiple territorial or political levels in which decision-making power is dispersed along the vertical and horizontal interactions of actors" (Ishtiaque et al., 2021, p. 2). It was originally developed and used in the context of studies on the European Union to analyse power shifts among EU states. This perspective is valuable, as it offers the opportunity to analyse power distribution beyond the nation-state, both vertically to lower political levels and horizontally to non-state actors (Bache & Flinders, 2004). The emphasis on the shift in power and decision-making, both supranationally and to other actors, as well as at the regional and local levels, is particularly relevant in the case of Switzerland, which is characterised by a highly decentralised federal governance system. There is a clear vertical division of adaptation governance, with the federal level primarily providing strategic direction and funding instruments, whereas the cantonal and, especially, the municipal level take on the task of designing and implement-

ing adaptation strategies that respond to local challenges of climate change. Through the international characteristics of MLG, power and decision-making are also shifted to superordinate levels, where international treaties and associations take on the tasks of regulating climate change adaptation and formulating strategy (Cole, 2011). While international dialogue and cooperation in a complex governance landscape are important for achieving global adaptation and mitigation success, substantial adaptation progress must be achieved at the local level, where local actors must take a central role in implementing climate change adaptation projects (Termeer et al., 2011).

The term "actor" is used throughout this thesis to describe individuals, organisations and institutions that actively participate in or influence governance, planning and implementation processes related to climate change adaptation and tourism development. This thesis focuses on the MLG inside the Swiss federal system to analyse how actors and dynamics in Switzerland influence and govern climate change adaptation in Lumnezia. Vertically, the MLG lens allows for the analysis of how national and cantonal strategies are translated into local action and how responsibilities and resources are distributed across governance levels. Horizontally, it enables the examination of interactions between public and private actors, including tourism organisations, transport companies and local businesses, which are directly involved in shaping the adaptation process. The involvement of multiple actors and governance levels can lead to coordination challenges, unclear distributions of responsibility and potentially conflicting interests, which may hinder the effective implementation of adaptation strategies. The MLG framework, therefore, provides a central analytical lens for this thesis to understand how governance structures, actor constellations and coordination processes influence climate change adaptation in the tourism sector of Lumnezia.

3.1.1 The Role of the Municipal Level within Multi-Level Governance

For this thesis, the importance of the municipal level within the MLG in Swiss climate change adaptation is particularly interesting and relevant. In the Swiss MLG, municipalities have high autonomy in which they only have to fulfil the minimal requirements stipulated by federal and cantonal law (Braun, 2010). Due to their geographical and personal proximity to the tourism sector and the partial political involvement of municipalities in tourism endeavours, municipalities are very directly confronted with the effects of climate change and related adaptation processes. As the level closest to local communities, the municipal level plays a crucial role in adaptation (Rogers et al., 2023). Through local knowledge of spatially-specific climate change impacts, municipalities are often best positioned to identify context-specific risks and develop appropriate adaptation responses (Lebershausen, 2018; Termeer et al., 2011).

In Switzerland, this central role is further pronounced by the strong municipal autonomy in areas such as spatial planning, infrastructure development and local economic policies (Debela, 2020). In sectors such as tourism, where actor constellations and local conditions are highly relevant, this central role in governing and implementing adaptation is ever-so-important for municipalities. At the same time, municipalities face serious challenges in fulfilling this central role. Limited financial and administrative capacities, dependence on cantonal and federal support, and the need to balance economic and environmental interests can limit the development and implementation of effective adaptation strategies (Rogers et al., 2023). These challenges are especially evident in tourism-focused regions, where local economies depend on climate-sensitive activities (BAFU, n.d.; Matasci et al., 2014).

In Alpine tourism destinations, municipalities are often directly involved in tourism development either through planning and financing of infrastructure or through close cooperation with private actors such as mountain transport organisations (MTOs; Ger.: *Bergbahnunternehmen*) (Bassi et al., 2026). This puts municipalities in a dual role, as not only regulators but also active stakeholders in climate change adaptation for the tourism sector. This dual role can complicate decision-making processes and lead to tensions between long-term adaptation goals and short-term economic profit. Understanding how climate change adaptation is negotiated, framed, and implemented in practice at the municipal level in Lumnezia will be particularly relevant to this thesis. While an MLG lens allows us to analyse the structure of authority distribution, it does not specify how goals and policies diffuse across levels. To deepen understanding of this process, mainstreaming is introduced.

3.2 Climate Change Adaptation Mainstreaming

Climate change and its impacts take various forms and affect sectors differently; consequently, adaptation measures and policies come in diverse forms and designs. The issues raised by climate change affect sectors such as tourism, energy production, water management, natural hazard protection and agriculture. The involved and affected actors may develop context-specific individual adaptation strategies, and the extent and time frame of these measures are highly context-dependent. This cross-sectoral and multi-level embeddedness makes climate change adaptation governance particularly difficult to coordinate. In an MLG context, the dispersion of goals and mandates can be seen as an overarching governance challenge aimed at bridging the adaptation implementation gap (see section 3.3. In response to these coordination challenges within MLG structures, mainstreaming has emerged as a key governance approach. To facilitate transformative change and introduce adaptation into all governmental sectors and existing policies and

projects, several European countries, including Switzerland, have chosen a mainstreaming approach (Bauer et al., 2012; Biesbroek et al., 2010; Braunschweiger & Pütz, 2021; Widmer, 2018).

Climate change adaptation mainstreaming is closely related to environmental policy integration (EPI) and climate policy integration (CPI) (Adelle & Russel, 2013; Biesbroek, 2021; Runhaar et al., 2014). Mainstreaming is driven by the need to change predominant patterns across multiple governance levels (Wamsler, 2014; La Trobe & Davis, 2005; Picciotto, 2002; Persson, 2004) in Wamsler and Pauleit (2016). While the definition of mainstreaming in academic and policy literature varies (Brouwer et al., 2013), it is generally understood as the integration of adaptation-specific goals into existing policies and governance practices. Definitions often differ regarding the extent of horizontal and vertical integration of adaptation goals as well as the degree to which adaptation objectives must be prioritised. Braunschweiger and Pütz (2021) point out that a lack of prioritisation in the definition of mainstreaming may represent an important conceptual weakness. This issue will be revisited in section 5.4.

Within the scope of this thesis, mainstreaming is understood as the horizontal and vertical integration of adaptation goals into existing policies and governance practices, regardless of whether these goals are explicitly prioritised or result in concrete adaptation measures. This definition allows the application of the mainstreaming strategies framework developed by Wamsler and Pauleit (2016) to identify and analyse different forms of mainstreaming in the context of tourism governance in Lumnezia. Even where adaptation is not prioritised, the integration of adaptation considerations into governance processes remains analytically relevant, as it enables the identification of how adaptation enters decision-making processes and which factors support or hinder its implementation (Braunschweiger, 2022).

Distinguishing between mainstreaming efforts and their concrete outcomes further allows an assessment of whether specific mainstreaming strategies successfully translate adaptation objectives into outputs and implementation processes. This distinction is particularly relevant for policy-makers, as mainstreaming is often promoted as a means of using existing governance structures, resources, and policy synergies more efficiently. Accordingly, the EU White Paper on Climate Change Adaptation identifies mainstreaming as a key mechanism for strengthening adaptation governance and resilience (European Commission, 2009). This approach has subsequently influenced adaptation governance efforts across various European countries (Bauer et al., 2012; Biesbroek et al., 2010; Widmer, 2018).

However, mainstreaming is not a singular process. Different strategies can be employed

to integrate adaptation considerations into governance systems, and these strategies differ substantially in their mechanisms, actors and potential outcomes. Under the working definition of mainstreaming for this case, both horizontal and vertical mainstreaming will be relevant for analysing how adaptation enters local governance. Horizontal mainstreaming concerns the integration of adaptation objectives across sectors and organisations operating at the same governance level, whereas vertical mainstreaming refers to the diffusion of adaptation objectives across governance levels from national strategies to regional and local implementation processes. Analysing both dimensions is particularly relevant in federal governance systems such as Switzerland, where adaptation responsibilities are distributed across multiple actors and administrative levels. The two dimensions are closely interconnected. Limited horizontal mainstreaming may reduce the extent to which adaptation objectives are integrated into sectoral policies and funding instruments, thereby affecting their diffusion across governance levels. Likewise, weaknesses in vertical mainstreaming may constrain the local implementation of adaptation objectives, even where horizontal integration has been achieved at higher governance levels.

In Alpine winter tourism, local, regional, and national interests often interact with goals from both government and non-government actors. Therefore, analysing the mainstreaming of adaptation goals can provide valuable insights into what factors influence the formulation and implementation of local adaptation strategies. In Switzerland, the degree of mainstreaming varies considerably across sectors and appears to be strongest where adaptation objectives are coherent with existing sectoral goals and priorities (Widmer, 2018). Conversely, mainstreaming becomes more challenging where adaptation goals compete with sector-specific economic or political interests.

In the case of Alpine tourism in Lumnezia, it is therefore necessary to move beyond the national perspective and examine how adaptation goals are interpreted, negotiated, and mainstreamed into the tourism sector at the regional and local levels, where implementation occurs. To address these scales and enable a more systematic analysis of mainstreaming practices beyond the national level, the adaptation strategies framework Wamsler and Pauleit (2016) is applied. The framework defines six categories of mainstreaming, encompassing both procedural elements and policy outputs, thereby enabling a structured analysis of how climate change adaptation is integrated into governance processes. By providing clearly defined categories of strategic activities, it facilitates the identification of concrete mainstreaming practices across different projects and governance levels. In the case of tourism in Lumnezia, analysing mainstreaming is not only useful for assessing whether adaptation objectives are integrated into governance processes, but also for understanding how these objectives are transformed, prioritised and negotiated as they move across sectors and governance levels. While the first three strategies of the frame-

work shown in Table 1 refer to forms of mainstreaming that can occur within individual administrative levels, strategies four to six explicitly incorporate vertical integration and interactions between governmental and non-governmental actors

Table 1: Mainstreaming Strategies Framework (Braunschweiger & Pütz, 2021; Wamsler & Pauleit, 2016).

Type	Description
1) Add-on mainstreaming	The establishment of specific on-the-ground projects or programmes that are not an integral part of the implementing body's sector work but directly target adaptation or related aspects.
2) Programmatic mainstreaming	The modification of the implementing body's sector work by integrating aspects related to adaptation into on-the-ground operations, projects or programmes.
3) Managerial mainstreaming	The modification of managerial and working structures, including internal formal and informal norms and job descriptions, the configuration of sections or departments, as well as personnel and financial assets, to better address and institutionalise aspects related to adaptation.
4) Intra- and inter-organisational mainstreaming	The promotion of collaboration and networking with other departments, individual sections, or stakeholders (i.e., other governmental and non-governmental organisations, educational and research bodies, and the general public) to generate shared understanding and knowledge, develop competence, and steer collective issues of adaptation.
5) Regulatory mainstreaming	The modification of formal and informal planning procedures, including planning strategies and frameworks, regulations, policies and legislation, and related instruments that lead to the integration of adaptation.
6) Directed mainstreaming	Higher level support to redirect the focus to aspects related to mainstreaming adaptation, providing topic-specific funding, promoting new projects, supporting staff education, or directing responsibilities, e.g.

This thesis bases its use of the mainstreaming strategy framework by Wamsler and Pauleit

(2016) on the work by Braunschweiger and Pütz (2021), who used the framework in a similar context to assess how adaptation projects employed concrete mainstreaming strategies and analyse how these strategies influence project outcomes. They identified the main success factors and barriers to examine how the use of mainstreaming strategies, or the lack thereof, can positively or negatively affect the outcomes of adaptation projects. The main advantage of the framework for this case is its applicability to the mainstreaming of different issues across all administrative levels (Braunschweiger & Pütz, 2021). According to the authors of the framework, it can be applied to both overall adaptation and only specific aspects of it (Wamsler & Pauleit, 2016). The framework allows analysis of mainstreaming practices at all political levels and in specific cases. It is therefore useful for understanding the horizontal and vertical integration of climate change adaptation goals. It provides a basis for assessing mainstreaming processes in Lumnezia and understanding how they shape local adaptation efforts.

Existing research highlights that mainstreaming and strategies employed are highly context- and project-dependent and often uneven due to institutional structures, sectoral interests and competing policy objectives. Strategies that work in one case might prove less productive in another context. (Braunschweiger & Pütz, 2021; Runhaar et al., 2018). This context-dependency is particularly relevant for tourism in Lumnezia, where multi-level governance arrangements and conflicting economic and environmental priorities might complicate adaptation processes. Analysing how mainstreaming strategies are employed in this context enables a better understanding of how higher-level adaptation goals are translated into local practices and of the factors that shape successful or constrained adaptation. Identifying the limits and potentials of mainstreaming can help analyse the adaptation implementation gap and find ways to bridge it (Braunschweiger & Pütz, 2021).

3.3 Policy Implementation and the Adaptation Implementation Gap

Although the IPCC highlights that, in general, preemptive adaptation is comparatively less resource-intensive than reactive adaptation and compensation, it is often politically not perceived as attractive and is not translated into sufficient outputs (Dupuis & Knoepfel, 2013; IPCC, 2023). The policy implementation gap contributes to this lack of concrete adaptation efforts. Understanding what the policy implementation gap is and being able to combine relevant findings from policy implementation research with mainstreaming and the multi-level governance mechanisms that shape policies will be crucial for identifying a potential adaptation implementation gap in Swiss Alpine tourism.

Policy implementation research investigates how implementation deficits arise and seeks to explain why certain policies fail or succeed in producing their intended outcomes (Braun-

schweiger, 2022; Knoepfel et al., 2011). Policy implementation can thereby be understood as the "set of processes after the programming phase that are aimed at the concrete realisation of the objectives of a public policy" (Knoepfel et al., 2011). In their seminal study of an economic development project in Oakland, Pressman and Wildavsky (1974) identified a gap between policies formulated at the national level and their actual outputs at the regional and local levels. They show that governance-related factors such as complex actor interactions, multiple decision points in the approval process, and the lack of clear cooperative linkages across administrative levels contribute to the emergence of this gap. Consequently, policy implementation cannot be understood as a linear process. Rather, the translation of political goals into practice is shaped by actor constellations, institutional settings, and contextual factors (Knoepfel et al., 2011; McLaughlin, 1987; Pressman & Wildavsky, 1974). This discrepancy between policy formulation and concrete outcomes is commonly referred to as the policy implementation gap.

The policy implementation gap is particularly relevant in the context of climate change adaptation, which is inherently prone to implementation deficits due to long time horizons, complex actor constellations, diffuse responsibilities, and high levels of uncertainty (Dupuis & Knoepfel, 2013; Wolf, 2011). In this sense, the policy implementation gap contributes directly to the adaptation implementation gap, which consists of the discrepancy between the recognised need for adaptation and its actual realisation in practice. Importantly, the implementation of climate change adaptation policies is shaped not only by institutional and governance factors but also by how policies are framed. Measures explicitly labelled as adaptation often face lower prioritisation, weaker institutional anchoring, and stronger resistance, whereas adaptation embedded within existing sectoral policies is more likely to be implemented (Dupuis & Knoepfel, 2013). These dynamics are further reinforced by governance challenges associated with policy implementation. In particular, the combination of uncertainty and unclear or contested responsibilities reduces the likelihood that adaptation policies are consistently translated into concrete action.

3.3.1 Barriers to Adaptation

One strand of literature on the policy implementation gap focuses on barriers to adaptation (Biesbroek et al., 2011, 2013; Braunschweiger, 2022; Eisenack et al., 2014; Matasci et al., 2014; Moser & Ekstrom, 2010). In its fifth assessment report, the IPCC characterises adaptation barriers as "constraints that make it harder to plan and implement human adaptation actions" (IPCC, 2023, p. 78). Similarly, Biesbroek et al. (2011, p. 186) defined them as "conditions and factors that actors experience as impeding, diverting, or blocking the process of developing and implementing climate change adaptation strate-

gies". This definition is also used for this thesis. Barriers to adaptation are diverse and highly context-specific (Matasci et al., 2014). To structure the complex issue of barriers, Biesbroek et al. (2011) grouped 67 barriers identified from literature on adaptation into seven thematic clusters, visible in Table 2

Table 2: Barriers to Climate Change Adaptation Based on Biesbroek et al. (2011)

Barrier	**Description**
Conflicting timescales	Long-term effects of climate change are difficult to relate to the short-term dynamics of political decision-making and societal change. Therefore, climate change adaptation competes with other political issues for already limited attention. Other issues are often perceived as more pressing, having more certain impacts or more visible short-term results than adaptation.
Substantive, strategic and institutional uncertainty	There are three relevant types of uncertainty in the handling of climate change adaptation. Substantive uncertainties about the quality and reliability of climate change data, which is used for decision-making. Strategic uncertainties and a lack of understanding about the strategies and motivations of other actors in the adaptation process. Institutional uncertainties are caused by the differing institutional backgrounds of the actors involved in decision-making processes.
Institutional crowdedness and institutional voids	Barriers related to the institutional environment. A lack of institutions that enable or stimulate climate change adaptation is referred to as an institutional void. A lack of institutionalised adaptation positions or legal frameworks may complicate efforts through a lack of communication or policy instruments for adaptation. Institutional crowdedness refers to the opposite, where many institutions are involved in governing adaptation, which leads to uncertainty about goals, prioritisation and the responsibility for adaptation.
Resources	A lack of resources can be a main barrier for adaptation. Not only human and financial, but also technical, informational, and natural resources can directly impede adaptation if there is a lack thereof.

Barrier	Description
Fragmentation	A lack of coordination and communication among the various actors across sectors and levels complicates decision-making and access to knowledge, and responsibilities are divided unclearly across actors
Motives and willingness to act	Psychological factors, such as values, ethical beliefs, attitudes, and norms, influence individuals' willingness and motivation to participate in climate change adaptation. Recent extreme events can be effective in bridging this barrier and lead to adaptive behaviour, while a lack of leadership and policy entrepreneurship may be motivational barriers.
Lack of awareness and communication	To raise public awareness about the impacts of climate change and the need to start adapting, communication is essential. Insufficient communication between society, policy, and science contributes to low awareness, scepticism, or even denial of climate change and the need for adaptation

They surveyed climate change adaptation experts to rank the importance of these barriers, and the results showed that barriers across all seven clusters were rated as moderate or high in climate change adaptation. Conflicting timescales were generally considered the most important cluster of barriers to adaptation, while resources were seen as the least limiting barrier cluster in their survey (Biesbroek et al., 2011). On average, local respondents perceived barriers more strongly than national/international respondents, who scored them lower. This difference is specifically pronounced between local and national policymakers, where local policymakers scored "the lack of central government involvement (...), lack of laws and regulations to enforce the development of adaptation strategies (...), lack of coordination between governments (...) and no safeguarding for future policymaking" (Biesbroek et al., 2011) significantly higher than their national counterparts.

These findings highlight that barriers are perceived differently across governance levels and actor groups, underlining the importance of context-specific analysis (Eisenack et al., 2014). Identifying and clustering barriers is an important step to overcome them, as it allows decision-makers to better allocate resources and create strategies that help overcome these barriers (Moser & Ekstrom, 2010). However, some scholars criticise the barriers approach for implicitly assuming that policy change will occur once barriers are

removed, thereby underestimating the complexity of political and institutional processes (Biesbroek et al., 2015; Wellstead et al., 2018) in (Braunschweiger, 2022). Therefore, this thesis uses the concept of barriers, in combination with broader policy implementation and mainstreaming frameworks, to analyse how structural, institutional, and sector-specific factors shape climate change adaptation in the multi-level governance context of Alpine tourism.

4 Methods

To analyse how governmental and non-governmental actors understand, govern and implement climate change adaptation in Alpine tourism in Lumnezia, this thesis applies a qualitative research approach. Through semi-structured expert interviews with actors from private and governmental backgrounds at the local, cantonal, and national levels, insights into governance dynamics and the key factors shaping climate change adaptation were collected. Expert interviews were chosen because the research focuses on institutional perspectives, governance processes and decision-making structures that are difficult to capture through quantitative approaches. The interview findings were complemented by analyses of academic literature and official documents related to climate change adaptation and tourism governance in Switzerland.

4.1 Research Design and Site Selection

The study area was chosen for two main reasons. First, due to its strong orientation towards winter tourism and its medium-altitude characteristics, the destination is increasingly confronted with the impacts of climate change on its dominant tourism regime. This vulnerability, combined with an active destination management organisation and significant municipal involvement in tourism development, made Lumnezia a suitable case for analysing the interactions and governance dynamics between public and private actors within a climate-sensitive economic sector.

The second reason relates to my personal background and familiarity with the region. While this personal connection potentially increases the risk of bias and preconceptions, it also facilitates access to the region and to important actors while supporting communication and contextual understanding of local dynamics and characteristics. Due to the dominant position of ski tourism within the region and the limited scope of this thesis, the research primarily focused on major local actors connected to this tourism segment. Contrasting local perspectives with those of cantonal and national actors involved in the steering, coordination, and governance of climate adaptation appeared valuable for gaining a more comprehensive understanding of adaptation processes across governance scales.

One tourism-related element that was not considered in detail within this thesis is the annual open-air festival in Degen. As a short-duration event with limited opportunities for physical expansion (Lumnezia, 2026) and a comparatively established operational structure, it does not appear to play a major role in local climate adaptation debates or future tourism development discussions. This is also reflected in its absence from both municipal and STAG development strategies and planning documents.

4.2 Data Collection

4.2.1 Document Analysis

The empirical analysis combined document analysis with qualitative semi-structured expert interviews in order to triangulate findings and contextualise local adaptation processes within broader institutional and policy frameworks. Following Bowen (2009), document analysis, understood as a "systematic procedure for reviewing or evaluating documents", was used as an initial analytical step to gain orientation and develop a broader understanding of the institutional and structural conditions shaping climate change adaptation in Switzerland. Through document analysis and internet-based research, relevant actors, institutions and governance frameworks were identified, providing a first basis for the selection of potential interviewees.

The analysed material included official documents such as federal and cantonal climate adaptation strategies, laws, reports, and consultation documents, as well as unofficial material such as presentations, publications, communication outputs, and journalistic sources related to local tourism actors and regional development. These documents helped characterise the governance structures, local conditions and policy developments shaping adaptation processes on the ground, while also informing the development of the interview guide and the formulation of interview questions. The use of diverse document types further enabled a more comprehensive understanding of the case and supported cross-verification of findings by converging information from multiple sources, thereby increasing the trustworthiness of the analysis (Bowen, 2009).

4.2.2 Interviews

In qualitative research, interviews are considered a way for researchers to understand the thought processes and rationales that shape people's perspectives and decisions (Stuckey, 2013). As a qualitative means of data collection, semi-structured interviews with eleven experts were conducted for this thesis. While the number of interviewees is partially dictated by the Geographic Institute of the University of Zurich (GIUZ) to set a scope for master's theses, it is also worth noting that after eleven interviews, fewer new themes were emerging, which led to a perceived saturation regarding the number of interviews.

Expert interviews are particularly suitable in organisational and political research, and their use goes beyond explorative approaches (Meuser & Nagel, 2009). The experts were selected to illustrate how adaptation strategies that concern an economic sector especially vulnerable to climate change were translated, and how governance structures influence the implementation of adaptation-related projects. According to Kaiser (2021, p. 41), experts stand out in comparison to laypeople due to their special knowledge, which can be un-

derstood as "socially institutionalised expertise" (Translation by author). Their expert knowledge is therefore connected to a function or a professional role. Due to their participation in the interviews, the terms "expert" and "interviewee" are used interchangeably in this thesis.

The experts to be interviewed were selected based on their positions in climate change adaptation within the scope of this thesis. Based on the research questions and literature research, the most important positions were identified, and a shortlist of possibly relevant experts was drafted. Those potential interviewees were then contacted via email and asked to participate, while informing them of the topic and the scope of the interview. The interview guide was distributed to them ahead of the interviews to give them time for preparation. The interviewees were given the choice between a remote and an in-person interview. In one case, no date could be found with an expert, and the interview was conducted in written form through email. As listed in Table 3, eleven interviews were conducted with experts from the national, cantonal, regional, and local levels (A more detailed table on the interviewees can be found in the Appendix. See Table 6). The interviews were conducted over the span of four months and lasted between 34 and 70 minutes each. The design of the interviews was guided by Helfferich (2009) and Kaiser (2021) and Gläser and Laudel (2009).

The interviews were conducted in a semi-structured manner, using a predefined questionnaire that defined entry points based on the analysis dimensions derived from the research question and subquestions. Those dimensions of analysis consisted of: governance, regional development, collaboration & participation, finance & knowledge, policy/project implementation, future plans/time horizons and the 18 interview questions were formulated and divided to support these dimensions of analysis (Kaiser, 2021). To make optimal use of the experts' knowledge (Gläser & Laudel, 2009), the questions were formulated in a relatively open manner, allowing the participants to answer them in a way that suited their experiences and perspectives. This encouraged interviewees to provide concrete examples and discuss their experiences with adaptation in tourism. The aim was thereby to gain insight into governance processes and actor perspectives grounded in practical experiences and locally embedded adaptation realities (For the full questionnaire, see section 7.2). All interviews were conducted in German or Swiss German, as these were the languages the experts felt most comfortable communicating in. In the results chapter, quotes are presented in their original language, along with the author's English translation. Minor linguistic adjustments were made where necessary to improve readability. Translations were partially conducted with the help of DeepL, with regular checks by the author to ensure that the content and arguments of the translated quotes matched the original statements from the interviewees.

Table 3: Overview of Conducted Expert Interviews

Scale	**Abbr.**	**Expert's Institution**	**Format**	**Duration**
National Level NGOs	1	National Private Environment Agency	Remote	1h 1m
	2	National Mountain Development Association	Remote	56m
	3	Environmental NGO focused on Mountain Regions	Remote	1h 08m
Canton Grisons	4	Cantonal Office for Environment	Remote	1h 00m
	5	Cantonal Office for Economy and Tourism	Remote	54m
Region Surselva	6	Regional Development Agency	Remote	52m
	7	Regional Tourism Association	In person	1h 10 m
Local actors	8	Municipal Authority	Written interview	–
	9	Regional Winter Tourism Infrastructure Operator	Remote	45m
	10	Local Ski School	In person	34m
Scholar	11	Federal Environmental Research Institute	Remote	50m

With the consent of all interviewed experts, the interview audios were recorded and used for analysis. The interviewees were informed about how their statements would be used in the thesis and had the opportunity to make certain statements "off the record". During these statements, the audio recording was paused and resumed only when the interviewees agreed. Due to the relatively small and interconnected governance settings in Lumnezia and the Surselva region, and the close relations among actors in the adaptation space, particular attention was paid to the anonymisation of interviewees and the abstraction of institutional affiliations where necessary. The audio files were reviewed and copied afterwards to avoid corruption or loss and prepare them for the coding process.

4.3 Data Analysis

To analyse the interview material, this thesis applied qualitative content analysis (QCA) according to Mayring (2000). QCA is a widely used, recognised and comparatively straightforward analytical method (Bohm & Sundqvist, 2025). It is suitable for diverse forms of qualitative data, including interview transcripts and documents, and can be adapted to inductive, deductive and abductive analytical approaches (Bohm & Sundqvist, 2025). QCA was considered particularly suitable because the research focuses on identifying recurring governance dynamics, interpretations and institutional patterns across different actor groups and governance levels.

To develop the coding scheme, initial deductive categories were defined based on the research's thematic foci, the interview questionnaire, and theoretical background on climate change adaptation, as well as Swiss adaptation frameworks and instruments. As the analysis progressed, the coding scheme was systematically adapted in response to both theoretical considerations and empirical findings. While deductively derived categories provided an initial analytical structure, the scheme was continuously revised and refined in light of new codes, themes, or patterns that emerged inductively from the interview data. Whenever material was encountered that did not adequately fit into existing codes, the coding scheme was expanded, reorganised, or thematically re-focused to better capture relevant concepts, with particular attention given to the prominence of mainstreaming as a central analytical theme. The complete coding scheme can be found in the appendix (see section 7.2).

Instead of producing full verbatim transcripts prior to analysis, the interviews were analysed through a repeated listening and coding process, in which thematic entities were identified and added to the evolving scheme. Unlike single-case-oriented interviews, expert interviews do not require full transcription, and transcribing the full audio is not the norm (Meuser & Nagel, 2009). During the review of the audio recordings, relevant content was summarised and assigned to coding categories, which were continuously refined

and adapted throughout the analysis process. Selective transcription was subsequently applied to interview excerpts considered analytically relevant for illustrating recurring themes, governance dynamics, and exemplary perspectives emerging from the qualitative content analysis. These quotations were then integrated into the coding structure and later used in the results chapter to support and contextualise the analytical findings. This iterative approach ensured that the coding scheme remained closely aligned with both the research focus and the collected empirical material. The combination of deductive and inductive coding further enabled the integration of theoretical concepts and findings from the literature while simultaneously remaining open to new perspectives and locally articulated adaptation realities emerging from the empirical material.

This coding refinement process enabled a more precise grouping of the central issues and themes discussed throughout the interviews (Bohm & Sundqvist, 2025). For coding, a manual approach was chosen, and all coding steps were documented and saved in a single document to ensure a clear overview of the process. The resulting categories were subsequently abstracted into broader analytical themes, which served as the foundation for the structure of the results and discussion chapters. The four main themes identified through the analysis were: the mainstreaming of adaptation into local governance; local actor networks; economic and institutional conditions shaping adaptation; and the framing and prioritisation of adaptation.

The themes and patterns identified from the interview material were subsequently compared with the findings from the document analysis to identify recurring perceptions, institutional dynamics, and governance patterns across governance levels and actor groups. This triangulation of multiple data sources enhanced the validity and robustness of the findings by enabling cross-verification of emerging insights. The process also enabled a comparison between formal policy objectives and locally articulated perspectives and practices while situating the findings within a broader institutional and political context. To enhance transparency and illustrate the empirical grounding of the analysis, selected interview excerpts were included as exemplary quotations in the results chapter to support and contextualise the thematic categories derived from the qualitative content analysis.

4.4 Methodological Reflections

4.4.1 Positionality

In this section, I reflect critically on my position and how it may have influenced my research process. As a ski instructor in Lumnezia during the last four winter seasons, I have a personal connection to the region and to the economic structures based on skiing tourism. This position and familiarity with the region and some of the destination's

central actors facilitated access to interviewees, possibly fostering trust, allowing them to speak more openly about topics for which they assumed I would understand their position due to my background. At the same time, this personal connection to skiing in Lumnezia influenced my understanding of local dynamics and shaped the perspective I brought into this research.

While my background facilitated contextual understanding and trust-building, it is important to acknowledge that my own experiences and economic involvement in the regional tourism system may also have influenced my assumptions and interpretations. My academic background was especially relevant for the case design and the analytical focus on socio-spatial interactions, adaptation processes, and governance structures. This background influenced both what I considered relevant during data collection and how I interpreted governance and adaptation concepts within the scope of this thesis. In combination with my personal connection to the region and to skiing, this also contributed to a strong focus on ski tourism as the central subject of the adaptation analysis. Concepts such as sustainable adaptation and maladaptation are normatively loaded and can be interpreted differently. Consequently, I tried to keep an open mind to the interviewees' perspectives and lived realities throughout the analytical process. For the interviews, my Swiss German background enabled me to understand the interviewees and conduct them in their first or second language. I understand that not only the interviewer's positionality but also the interviewed experts' is relevant. Interviewed experts may frame their experiences, institutional roles and perceptions of adaptation strategically and place emphasis on aspects of the topic that are particularly relevant to their professional or organisational context. To address this, I attempted to triangulate perspectives across different governance levels and actor groups and contextualised interview findings through document analysis and comparison with existing literature.

4.4.2 Research Process

While my personal access to the topic and key actors was beneficial, I initially had reservations about whether some actors would be willing to participate in interviews on adaptation and environmental issues. This stemmed from a perceived lack of expertise among local tourism actors regarding climate adaptation. Despite some interviewees expressing initial uncertainty about their knowledge, all ultimately offered relevant, context-specific insights. During the interviews, participants occasionally voiced strong opinions shaped by perceived economic vulnerability or their own perspectives on climate change and its governance. This sometimes diverted discussions beyond adaptation in tourism to broader themes such as mitigation or nature conservation, a tendency influenced by the open design of the questionnaire. Such dynamics reflect both the flexible interview approach and

the complex entanglement of adaptation and tourism within wider political and societal debates (see section 5.4).

After I had initially drafted a shortlist of potential interviewees based on the most important actor constellations and institutional positions identified through document and literature research, this list was continuously adapted throughout the research process. Additional recommendations and insights provided by interviewees regarding important actors or particularly knowledgeable individuals proved highly valuable for identifying and including relevant actors in the interview process. One challenge during the research was finding a representative of the municipality of Lumnezia who considered themselves sufficiently knowledgeable and had the temporal resources necessary to participate in an interview (see section 5.1.3). In the end, this challenge was addressed through a written interview format, which enabled the interviewee to answer the questions individually and within their own time schedule. While a written interview obviously differs from a spoken interview in terms of interaction and spontaneity, I considered it more important to include this central perspective than to maintain complete consistency in the interview format. The written answers were worded more formally and were understood as formal communications rather than spontaneous statements, but their content was nevertheless considered a contribution to the thematic analysis of the interviews.

Before this research process, I had only limited interviewing experience. However, the iterative nature of conducting eleven interviews over a period of four months enabled me to continuously reflect on and refine my interviewing approach. In combination with the increasingly profound contextual knowledge I gathered throughout the research process, this allowed me to feel progressively more confident and secure while conducting interviews. The sometimes longer breaks between interviews were used for coding and preliminary data analysis. Repeatedly listening to the interviews made me more aware of interview dynamics and details that had initially escaped my attention during the conversations themselves. Consequently, I was able to pay closer attention to these aspects in subsequent interviews and make small adjustments to my interviewing behaviour and questioning techniques.

5 Results

This chapter presents the results of this research and illustrates how governance arrangements, actor constellations, and institutional conditions shape climate change adaptation in the tourism sector of Val Lumnezia. Building on the regional and local context (see section 2), the findings from expert interviews with actors connected to tourism development, governance, and climate adaptation are used to examine how adaptation strategies and policy frameworks from higher political levels are interpreted, negotiated, and translated into local tourism development practices.

Particular attention is given to the role of local governance structures, actor dynamics, and economic dependencies in shaping adaptation priorities and implementation processes. The interviews provide insight into how adaptation considerations enter tourism development and how different actors justify, coordinate, and prioritise adaptation measures within the regional context. The results chapter is structured thematically around four central dimensions: the mainstreaming of adaptation policy into local governance, local actor networks and coordination, the framing and prioritisation of adaptation, and the economic and institutional conditions shaping adaptation processes.

The findings indicate that adaptation processes in Lumnezia are strongly shaped by local actor constellations and institutional capacities. Several interviewees emphasised the importance of motivated individuals in key positions and the lack of an institutionalised intermediary role to advance adaptation and tourism development initiatives. While many actors share similar general understandings of climate change adaptation in tourism, they prioritise and implement adaptation measures differently, based on their individual motivations and their sectoral position. Some interviewees view municipal involvement in tourism development critically. Through the interviews, second-home owners were identified as influential actors due to their political and economic position. Furthermore, the large number of national and cantonal strategies and policy frameworks reflects the increasing mainstreaming of these efforts at higher political levels. At the same time, interviewees highlighted that the complexity and abundance of these frameworks, combined with limited local capacity, can complicate access to relevant information and pose challenges for local actors seeking to implement adaptation-related projects. In this context, funding through instruments such as NRP was considered crucial for local tourism development, thereby indirectly shaping the ways in which adaptation becomes feasible.

5.1 Mainstreaming of Adaptation Policy into Local Governance

The adaptation implementation gap has been identified as a key challenge in climate change governance (Braunschweiger, 2022). At the federal level in Switzerland, efforts

have increasingly focused on developing climate adaptation strategies and mainstreaming climate objectives into sectoral policies (Widmer, 2018). As a result, a large number of policy documents, strategies, and frameworks have emerged in recent years, and climate change adaptation has received growing attention among national and cantonal actors. Despite these developments, the vertical integration of adaptation objectives into regional and local contexts remains limited, resulting in limited implementation of comprehensive adaptation measures across governance levels and sectors. Under the principle of subsidiarity in the Swiss political system, implementation responsibilities are often shifted to municipalities, regional actors, and private stakeholders. However, interviewees highlighted that limited institutional capacities, unclear responsibilities, and difficulties in accessing relevant information can constrain local adaptation efforts and complicate the translation of higher-level adaptation objectives into concrete local practices.

5.1.1 Vertical Governance

Vertical governance regarding adaptation in Lumnezia is mainly carried out on the three administrative levels. The interviewees highlighted the differences in how these levels govern adaptation and how they interact with each other. These multi-level governance dynamics explicitly shape how adaptation is translated and understood, ultimately shaping adaptation on the local level. This subchapter covers the influence of actors on the national, cantonal, and local levels, while also taking non-government actors into account.

National Level At the national level, the BAFU and SECO are the two offices with the greatest impact on climate change adaptation in Switzerland (1, 2, 4). The clear division of sectoral responsibilities leads to fragmented governance of adaptation processes, in which the BAFU focuses on environmental aspects and supports adaptation measures through adapt+, while SECO supports tourism projects through Innotour or NRP funding (1, 2). In economic sectors such as tourism, where environmental considerations are highly relevant, governance and responsibility conflicts can arise (1).

> "Da kommt sofort die Zuständigkeitsfrage, die Governance Frage. Wenn das BAFU jetzt sagt: Klimawandelanpassung im Tourismus wäre dieses und jenes, dann kommt sofort das SECO und sagt: "He, was fällt euch ein??"
>
> *"That immediately raises the question of responsibility, the question of governance. If the BAFU were to say now: 'Climate change adaptation in tourism means this and that', then SECO would immediately jump in and say, "What on earth are you thinking? That's our area of responsibility??"* (1)

This illustrates how adaptation is embedded in sometimes competing political mandates and how sectoral division can hinder the integration of a comprehensive adaptation ap-

proach across sectors (5). The two main institutions on the federal level work on a more general and abstract level than cantonal and local actors (1). While BAFU and SECO produce a significant number of outputs, such as strategies and recommendations, most actors have no or very limited direct contact with the national level (1, 7, 8, 9, 10).

> "Mitem Bund selber hemmer am wenigste Kontaktpünkt."
>
> *'We have the fewest points of contact with the federal government itself.'(7)*

However, many local tourist actors are represented on the cantonal and national level through organisations that voice their opinions (2, 4, 9, 10).

> "Mitem Kanton hemmer kei Ustuusch, det macht das de kantonali [Tourismussegmentverband] für eus (...) s Gliiche au bide Schwiiz, de Schwiizer Verband [Tourismussegmentverband] setzt sich ii bi Kanton und Bund für eus"
>
> *"We don't have any direct contact with the canton; the cantonal [tourism segment association] handles that for us (...) The same applies at the national level: the Swiss association, [tourism segment association], lobbies the cantons and the federal government on our behalf" (10)*

This shows that while concrete local interests might not receive recognition on the national level, sectoral interests of tourist actors can be brought to political attention through umbrella organisations. Vertical governance and political participation often happen through intermediary organisations rather than direct state-local interaction.

Cantonal Level The same division of adaptation responsibilities between sectoral offices can also be observed at the cantonal level in Graubünden, where the ANU and the AWT both hold partial responsibility for climate change adaptation, as well as for the steering and funding of adaptation-related measures (4, 5). While the responsibilities of the two offices are formally distinct, interviewees described project-specific exchange and collaboration between them. This cooperation can contribute to the integration of environmental and climate adaptation considerations into tourism projects and development strategies. However, the sectoral priorities of the respective offices generally remain dominant (4, 5). The implementation of a concrete action plan was pushed by the ANU up until 2022, which focused on:

> "Massnahme, womer bereits die gsetzlich Grundlag gha het. Das heisst z.B. Gebäudeprogramm (...) die klimaneutrali Landwirtschaft"
>
> *"Measures, for which the legal basis already exists. This includes, for example, the Building Programme (...) and climate-neutral agriculture" (4)*

This clear division of certain responsibilities can also be seen on the side of the AWT:

> "Wenn mir euses Umsetzigsprogramm schriibed und seged mer fördered Infrastruktur. Denn segemer isches ned eusi Pflicht no vorzschriibe weli Minergie Standards das Gebäude muess entspreche (...) Mir fokussiered eus uf die Ziel wo eusi Politik het."
>
> *"When we draw up our implementation programme and say we want to promote infrastructure. Then we say that it's not our responsibility to specify which Minergie standards the building must meet (...) We're focusing on the objectives set out in our policy." (5)*

In the context of economy and tourism, the AWT's position is described as "a support agency" (5, own translation) for development. This illustrates how climate adaptation objectives may be incorporated into tourism development only selectively, while sector-specific policy goals continue to shape the main orientation of funding and implementation processes. As an intermediary governance level between the federal institutions formulating laws and strategies and the municipalities where concrete implementation takes place, cantonal actors attempt to translate national adaptation priorities into regional policy frameworks and implementation structures (4). Through soft adaptation instruments such as strategies, funding programmes, and direct exchange with tourism actors, cantonal offices seek to encourage municipalities and private actors to integrate adaptation-related considerations into local development processes (4, 5). In the case of Alpine winter tourism, this is particularly visible in their mountain transport strategy, which is the basis for decisions on which organisations can and will be financially supported by the canton (5) (AWT, 2023). The AWT attempts to raise awareness among tourism actors and communicate political and strategic priorities through direct contact and cantonal working groups (5, 7).

> "Oder es (Projekt) chunnt au vom Kanton, det isches s Amt für Wirtschaft und Tourismus wo eigentlich üs betrifft wo gwüssi Schwepünkt wett setze us de Tourismusstrategie und entweder suecht de Kanton aktiv oder es entstaht us Initiative vo Graubünde Ferie oder Partnerorganisatione."
>
> *"Or it (a project) might come from the canton; it's the Office for Economic Affairs and Tourism that actually concerns us, as they want to set certain priorities based on the tourism strategy, and either the canton takes the initiative, or it arises from an initiative by Graubünden Ferien or partner organisations." (7)*

At the same time, cantonal actors described their influence as institutionally limited. The AWT's position was described as a development program for economic actors, which is

strongly influenced by the NRP programmes that define the foci for support (1, 5). It was emphasised that cantonal offices are constrained both by the CO_2 Act, which provides relatively clear implementation guidelines, and by the strong autonomy of municipalities within the Swiss governance system (4). Due to limited political legitimacy and administrative capacity, cantonal actors often lack the ability to directly steer local implementation processes. Local tourism actors also expressed scepticism towards stronger cantonal involvement in tourism development, particularly when it concerns intervention in locally initiated projects (2, 4, 10).

> "Wenn sich denn Kanton und Staat afangt imische in suscht Projekt denn findis immer bitz schwierig will denn de Niid zwüsched de Regione zimli schnell fürechunnt. Ich denke das isch au wichtig für de Wettbewerb dass das privat bliibt."
>
> *"If the canton and the state start getting involved in such projects, it always gets a bit tricky because envy between the regions can flare up quite quickly. I think it's also important for competition that it remains in private hands." (10)*

In response to these institutional limitations, cantonal actors often rely on collaborative and network-based governance approaches. Within initiatives such as the Wirtschaftsforum Graubünden, different sectoral offices contribute topic-specific expertise to joint projects, such as the development of reports on climate-neutral tourism (4).

> "letztlich simmer vo jedere Ebene prägt (...) wemmer Projekt hend wo Schnittstelle hend mit andere Sektoralpolitike und andere Dienststelle im Kanton suechemer det de Ustuusch"
>
> *"Ultimately, we are influenced by every level (...) whenever we have projects that overlap with other sectoral policies and other departments within the canton, we seek to exchange ideas" (5)*

Local Level On the local level, the interaction between municipalities, regional organisations, developers, and tourism actors shapes the way adaptation-related considerations enter project planning and tourism development processes (1, 2, 5, 7). In Lumnezia, the municipality has so far not developed a dedicated climate adaptation strategy (see section 2.3), although local actors remain in contact with several cantonal offices regarding tourism development and adaptation-related projects (8). Interviewees suggested that this limited formalisation of adaptation governance may partly be linked to the absence of legal obligations requiring municipalities to develop adaptation strategies, in contrast to neighbouring countries such as Germany (1, 11). At the same time, several actors high-

lighted that municipalities often face institutional and administrative capacity constraints. In smaller Alpine municipalities, where political representatives frequently work in non-professional or part-time roles, the development of comprehensive strategies and adaptation measures can pose significant challenges due to limited expertise and resources (2, 3, 5, 6). In this context, regional developers were repeatedly identified as important intermediary actors between local governance structures and cantonal, national, and academic initiatives (1, 4, 5, 6, 7). Interviewees on both the cantonal and local levels emphasised the importance of these positions in supporting local actors, facilitating communication across governance levels, helping actors with funding applications, and fostering project development within the region (4, 5, 7, 9).

> "regional isch da d [regional developer], tuet eigentlich alles au vorbereite und ufgleise dass bim aprojektiere vode Aträg alles passt, sie het det e wichtig Funktion für die Aträg ireiche dass die passed aber nachher au bide Abrechnig" (5)
>
> *"Regionally, it's the [regional developer] who actually takes care of all the preparatory work and makes sure that everything fits together during the project development phase; they play a key role for the client in ensuring that everything fits, but also when it comes to the final settling of accounts" (5)*
>
> "mer hend d Regionalentwickler als Mittler zwüsched de Ebene vode Gmeinde und em Kanton. Also es isch wie bewusst e Zwüscheebeni womer installiert. Die übernemed Ufnahme, die informiered, vernetzed, Projekt begleitet, betreuet (...) i die aktiv Rolle gönd mir vom Kanton ned"
>
> *"We have regional developers acting as intermediaries between the local authorities and the canton. So it's as if an intermediate level has been deliberately established. They take on the role of providing information, facilitating networking, supporting and overseeing projects (...) the canton doesn't take this active role" (5).*

Influence of Non-Government Actors Although Alpine winter tourism is an economic sector characterised by comparatively strong municipal involvement, interviewees emphasised that the responsibility for advancing adaptation measures largely remains with private tourism actors (2, 3, 5, 7). In many Alpine tourism destinations, MTOs and destination management organisations (DMOs) were identified as the actors with the greatest financial and organisational capacities to promote and implement adaptation-related projects (1, 2, 5). As a result, the involvement of tourism actors in municipal decision-making processes, and vice versa, is particularly pronounced within Alpine tourism governance structures (2, 5, 6, 7, 8, 9, 11). Interviewees highlighted that the

strong economic importance of mountain railways within regional tourism systems also translates into significant political influence.

> "Generell chamer sege d Bergbahne (...) hend für de Kanton doch e hohi Bedütig, also generell halt für de Tourismus oder letztlich d Bergbahne als Atriiber vom ganze Tourismus, segs Winter no vil extremer und im Summer au sehr wichtig. (...) dur das hemmer gsamthaft gseh sicher e Bedütig- oder e Wirkigschraft gegenüber de Politik"
>
> *"Generally speaking, you could say that the mountain transport organisations (...) are of great importance to the canton – in general, for tourism, or ultimately because the mountain transport organisations are a driving force behind the whole tourism sector; this is even more pronounced in winter and is also very important in summer. (...) because of this, we certainly have a significant or real influence on policy" (9).*

This influential position of MTOs was also emphasised by cantonal actors who describe the MTOs as "backbone of the whole destination" (5, own translation). Due to their dominant position within regional tourism economies and their dependence on winter tourism, interviewees described MTOs as potentially highly motivated to pursue adaptation-related investments and development strategies (5). At the same time, several actors suggested that the close integration of municipalities and tourism actors within local governance structures may contribute to adaptation pathways that sustain tourism models with potentially negative environmental and economic impacts. These worries were linked to the fact that municipalities can use public funds to finance projects that would not be profitable otherwise (2, 3, 5, 9). Destination management organisations, in particular, were described as increasingly important actors in the coordination and prioritisation of adaptation measures, as they benefit from more diversified and future-oriented tourism offerings within the region (1, 2, 6). However, interviewees also highlighted that adaptation processes are constrained by limited expertise and strong dependence on external knowledge provided by climate specialists, engineers, and planners. Several local actors noted that there are insufficient qualified experts within the region to meet the growing demand for adaptation planning, particularly when multiple tourism destinations attempt to develop strategies and projects simultaneously (7, 9).

5.1.2 Strategies

Strategies are a key component of climate change adaptation governance and structure the approaches chosen on respective governance levels. This subchapter focuses on how these strategies influence climate change adaptation in tourism and how they are perceived by actors.

Interviewees on the national and cantonal levels consistently highlighted that Switzerland possesses a broad range of climate-related strategies, policy frameworks, and funding instruments relevant to climate change adaptation in tourism (1, 2, 4). Existing national and cantonal strategies were generally perceived as providing sufficient conceptual guidance and strategic orientation for adaptation processes. In particular, actors referred to federal climate strategies, sectoral tourism strategies, and funding instruments such as adapt+ and the NRP as important foundations for future adaptation efforts. On the cantonal level, interviewees pointed out that through the establishment of the funding and support programme Green Deal Graubünden, which is based on the cantonal climate strategy, substantial progress in the political prioritisation of climate change adaptation and mitigation in the canton was achieved (4).

> "Die gsetzliche Grundlage sind da (...) es git die ganze Strategie, es git jetzt au en huufe Förderprogramm wie adapt+ wo jetzt letscht jahr lanciert worde isch. Also uf siite Uvek, siite BAFU da gits ganz en huufe Materialiegrundlage."
>
> *"The legal framework is in place (...) there's a whole strategy, and there are now also a lot of funding schemes such as adapt+, which was launched last year. So, from the Department of the Environment, Transport, Energy and Communications (Uvek) and the Federal Office for the Environment (BAFU), there's a load of supporting material." (2)*

At the same time, interviewees repeatedly emphasised that the existence of strategies and policy documents alone does not guarantee their successful implementation. Especially on the cantonal and regional levels, actors described the operationalisation of strategic goals as a major challenge. Adaptation was perceived as particularly difficult to implement due to its cross-sectoral character and the resulting overlaps between political responsibilities, sectoral interests, and existing policy objectives (1, 4, 5, 6, 9).

> "d frag isch, wie bringt mer d strategie zum laufe? Und ich glaub, das isch bi jedere Strategie s problem aber jetzt bi klimastrategie isches ned eifacher sondern eher wills so übergriifend isch sogar no schwieriger."
>
> *"The question is, how do we put the strategy into practice? And I think that's a problem with any strategy, but with climate strategy it's not any easier – in fact, because it's so wide-ranging, it's even more difficult." (5)*

Several interviewees further noted that the large number of strategies and sectoral policy frameworks may themselves complicate implementation processes and reduce their accessibility for local actors (1, 2, 5). While cantonal and national actors often described the strategic foundations for adaptation as largely sufficient, they highlighted that the

translation of these objectives into concrete projects and local implementation processes remains slow and inconsistent (1, 2).

> "Konzeptionell auf der obersten Ebene, Bund, oder auch auf der kantonalen Ebene ist ja, wenn man so will, alles da. (...) der Impact wird in der Regel in den Regionen, in den Städten, Gemeinden und Betrieben generiert (...) es fehlt an Projekten. Es gäbe genug Möglichkeiten, es gäbe Geld, es gäbe Fördermittel."
>
> *"Conceptually, at the highest level – the federal level – or even at the cantonal level, everything is in place, so to speak. (...) The impact is generally generated in the regions, in the towns, municipalities and businesses (...), but there is a lack of projects. Theoretically, there are plenty of opportunities, there is money, and there is funding available." (1)*

The interviews suggest that awareness and relevance of national adaptation strategies decrease significantly towards the local level. While regional coordination actors such as DMOs and regional developers generally maintain a broad overview of relevant policy frameworks and strategic priorities, many local tourism actors remain only marginally engaged with national and cantonal adaptation strategies outside of their direct operational relevance (1, 2, 5, 6, 7, 8, 9, 10).

> "Nach unten sind dann die Strategien des Bundes immer weniger präsent. (...) In den Destinationen da kennen dann einige wenige Personen vielleicht noch die Anpassungsstrategie vom Bund, viele aber nicht und die sagen: Das ist auch irrelevant für mein Tagesgeschäft."
>
> *"Further down the line, the federal government's strategies become less and less prominent. (...) In the destinations themselves, a few people may still be aware of the federal government's adaptation strategy, but many are not, and they say: That's irrelevant for my day-to-day business." (1)*

Rather than being directly guided by formal adaptation strategies, local tourism actors often appear to orient themselves towards broader development goals such as diversification, year-round tourism, and economic stabilisation. In this context, adaptation-related objectives enter local tourism development more indirectly through funding structures, market pressures, and regional coordination processes than through the direct implementation of strategic policy documents.

> "Als [tourism organisation] hemmer d Vermarktig im Fokus und mer hend de Fokus, dass mer de Summer usbaued. Weg dem veränderet die Klima toolbox ned wirklich eppis."

> *"As [tourism organisation], our focus is on marketing, and our priority is to expand our summer offering. In that respect, the Climate Toolbox doesn't really change anything." (7)*

In response to the decreasing visibility of strategies on the local level, intermediary actors such as regional developers and DMOs take on an important translation and coordination role between governance levels (5, 6, 7). Through networking activities, project support, and direct exchange with municipalities and tourism actors, these organisations contribute to the integration of strategic priorities into regional tourism development processes.

In the Surselva region, organisations such as STAG and the regional development office were described as particularly important actors in promoting diversification strategies and integrating sustainability-related considerations into tourism development. Due to their knowledge and collaboration with the regional tourist actors, they have the chance to actively shape regional adaptation goals and development plans (7, 8, 9)

Perception of Strategies Interviewees across governance levels generally perceived the existing national and cantonal climate adaptation strategies, tourism strategies, and funding instruments as useful foundations for climate change adaptation in the tourism sector (1, 2, 4, 5, 7). Actors on the national and cantonal levels highlighted that Switzerland possesses a broad range of strategic frameworks and support instruments that provide guidance and financial support for adaptation-related measures. Although interviewees acknowledged that environmental and climate-related objectives are still not fully integrated into economic development strategies and tourism funding programmes, this was not primarily perceived as a failure of economic actors or institutions. Instead, interviewees linked these limitations to the sectoral division of responsibilities between environmental and economic offices, which continue to shape the development of strategies and support programmes (1, 2, 4). At the same time, several actors emphasised that climate-related considerations have gained increasing importance within tourism and economic strategies over recent years and are expected to become more strongly integrated into future strategic cycles. Several actors mentioned that slight complementary legal guidelines on climate change adaptation and its local governance could help create a more homogenous and widespread focus on the issue across sectors and levels (1, 3, 7, 11) While higher governance levels generally expressed confidence in the strategic direction of current adaptation and tourism policies, the perceived relevance and visibility of these strategies decreased significantly towards the regional and local levels. Cantonal actors highlighted their role in adapting national strategies to regional contexts and integrating them into cantonal tourism and development policies. Regional coordination actors such as STAG also expressed positive attitudes towards the strategic focus on sustainability

and tourism diversification and emphasised the importance of continuing implementation efforts through concrete investments and long-term commitment.

> "Ich seg, was jetzt ufgleist isch, ich glaub die Strategie laufed i die richtig Richtig. D schwiizer Tourismusstrategie, de Nachhaltigkeitsteil, Diversifizierig im Tourismus, de Kanton Graubünde het d Diversifizierig im Tourismus dine (...) jetzt gahts ums umsetze und das heisst letztendlich investiere (...) dass mer immer am Ball bliibt."
>
> *"Based on what I can see that has been set in motion. I think the strategy is heading in the right direction. The Swiss tourism strategy, the sustainability aspect, diversifying tourism – the canton of Graubünden has incorporated this diversification into its tourism plans (...) now it's a question of putting it into practice, and that ultimately means investing (...) so that we stay on the ball." (7)*

On the local level, however, actors often showed a more reserved attitude regarding the relevance of formal climate adaptation strategies and the need to develop additional local strategies. Rather than emphasising strategic planning itself, local actors focused more strongly on practical tourism development and operational challenges. The municipality of Lumnezia, for example, had not yet considered the development of a dedicated adaptation strategy and instead highlighted its existing exchange with cantonal offices regarding tourism-related topics and development projects.

> "Wir stehen da mit den verschiedenen Ämtern des Kantons in Kontakt. Ob jetzt eine Strategie bezüglich des Klimawandels entstehen soll, sind noch keine Überlegungen getroffen worden."
>
> *"We are in contact with the various cantonal authorities. No decision has yet been made as to whether a climate change strategy should be developed." (8)*

This reserved attitude towards additional strategy development was also reflected by cantonal actors, who questioned whether the creation of further strategic documents necessarily improves local implementation capacities. Particularly in smaller municipalities with limited administrative resources, interviewees described the coordination and operationalisation of cross-sectoral issues such as climate adaptation as highly challenging and highlighted the difficulty of accessing important knowledge.

> "Als Gmeind e Strategie entwickle isch sicher sinnvoll, aber letztlich hend sie da au e Tourismusstrategie (...) wie vil Strategie wemmer no? E Strategie mache isch guet, aber wie bring ich sie id Umsetzig und wie verchnüpf ich d Strategie mit de andere?"

"Developing a strategy as a municipality certainly makes sense, but ultimately you also have a tourism strategy (...). How many strategies do we need? It's good to have a strategy, but how do I put it into practice and how do I link it to the others?" (5)

"es isch au d Schwierigkeit dass teilwiis eifach ned ganz alli Informatione hesch wo denn vilicht Ziit bruched bis alles hesch (...) Und das isch au das wo denn vilicht de ganzi Prozess id Längi zieht wo denn d Bevölkerig au s Gfühl het da müessted meh Informatione da sii."

"The difficulty is that sometimes you just don't have all the information straight away, and it might take a while before you've got everything (...) And that's also what perhaps drags the whole process out, which makes people feel that there should be more information available." (9)

Several interviewees therefore identified implementation rather than strategic formulation as the central challenge of adaptation governance (1, 2, 4). Although strategic frameworks and funding opportunities were widely perceived as available, the translation of strategic objectives into concrete projects and long-term implementation processes often remained limited. Interviewees on the national and cantonal levels noted that pilot projects developed within the framework of the national adaptation strategy frequently struggled to develop into long-term initiatives once initial funding periods ended. This was partly attributed to limited local ownership, insufficient resources, and the lack of clear responsibility among local actors to continue adaptation efforts independently (1, 2, 4). At the same time, it was highlighted that successful long-term adaptation processes, such as in the city of Sion, where a pilot program developed into a continuous project that is still in place, often rely on strongly motivated individuals and bottom-up initiative (1, 2). Finally, several interviewees highlighted the importance of promoting good practices and successful examples among local tourism actors and municipalities. Rather than only relying on formal strategies, successful tourism adaptation governance was described as a combination of informal exchange, regional coordination and the dissemination of examples that actors perceive as economically and politically realistic (1, 2, 3, 6, 11). However, responsibilities for distributing this knowledge and good practices were often perceived as unclear (2).

5.1.3 Municipal Role

As mentioned in section 3.1.1, municipalities have a key role in the governance and implementation of adaptation. This subchapter covers the municipal involvement in tourism and the capacity for adaptation that municipalities have.

Involvement in Tourism In Alpine winter tourism destinations, municipalities often play an active role in tourism governance and at times participate financially in tourism-related enterprises and infrastructure projects (Derungs et al., 2019). Interviewees across governance levels highlighted that this close involvement of local authorities in tourism development is a common characteristic of Alpine tourism regions and reflects the strong economic and structural importance of tourism for municipalities and regional economies (1, 2, 3, 5). At the same time, several actors described this position as potentially ambiguous, as municipalities may support or co-finance tourism enterprises that operate at a deficit or remain strongly dependent on public support (1, 2, 5). Despite these tensions, municipal involvement in tourism development was largely justified through the economic importance of tourism for local employment, regional value creation, and infrastructure development (7, 8, 9). Tourism is not perceived solely as an economic sector but also as a politically relevant field due to its importance for regional development and municipal prosperity.

> "Der Skitourismus spielt eine wesentliche Rolle für die Gemeinde. Wir haben von Vella mittels Skilift Zugang im Skigebiet Obersaxen Mundaun Lumnezia. Damit verbunden sind Arbeitsplätze und Wertschöpfung für unsere Gemeinde und für alle Leistungserbringer im Tal."
>
> *"Ski tourism plays a vital role for the municipality. From Vella, we have access to the Obersaxen Mundaun Lumnezia ski area via a ski lift. This generates jobs and economic activity for our municipality and for all service providers in the valley." (8)*

Several interviewees further argued that municipal involvement may create opportunities to shape tourism development more actively and to integrate social, environmental, and economic sustainability considerations into local development processes (5, 6, 7). Due to their central position within local governance structures, municipalities also hold a key role in contributing to identifying regional challenges, coordinating actors, and initiating development processes. However, actors on the national and cantonal levels also highlighted that municipalities often face substantial limitations regarding financial resources, administrative capacity, and technical expertise, which may constrain their ability to actively steer adaptation and tourism development processes (1, 2, 4, 5). In Lumnezia, this close institutional involvement of municipalities in tourism governance becomes particularly visible through the municipality's participation in regional tourism organisations and infrastructure development structures. Together with other municipalities in the Surselva region and the MTOs Brigels and Obersaxen Mundaun, Lumnezia acts as a constituting body of the destination management organisation STAG and contributes financially to the organisation through tourism taxes (7, 8). In return, STAG is responsible for the

coordination and marketing of the regional tourism offer. This close collaboration creates an administrative and political entanglement

> "D Gmeind het Ifluss uf eusi Tätigkeite, einersiits über d Leistigsvertretig, anderersiits het jedi Gmeind ein Vertreter im Verwaltigsrat (...) Eusi Büros sind au ide Gmeinde und füehred denn Tätigkeite eng mit de Verwaltig dure abervor allem au mit de touristische Infrastruktur und so isch das permanent, das isch eis Geflecht"
>
> *"The municipality has an influence on our activities, on the one hand through the service representatives, and on the other hand because each municipality has a representative on the board of directors (...) Our offices are also located in the municipalities, and we carry out our activities in close cooperation with the local authorities, but above all (the municipality has influence) with the tourism infrastructure, and so this is an ongoing process; it's a network." (7)*

Beyond this formal involvement, the municipality also participates in Infra Mundaun AG, a joint organisation involving the municipalities of Lumnezia and Obersaxen Mundaun as well as the MTO. According to interviewees, the organisation aims to coordinate, finance, and develop tourism infrastructure projects related to ski slopes, artificial snowmaking, and summer tourism offerings within the shared tourism area (7).

> "Die Gemeinde ist stark in der lokalen Tourismusentwicklung miteinbezogen. Wir sind mit den Gemeinden Obersaxen Mundaun, Brigels, Ilanz/Glion als Träger der Surselva Tourismus stark in der Entwicklung miteinbezogen. Wir haben gemeinsam ein touristisches Gesamtkonzept beschlossen. Zusätzlich streben wir eine Erweiterung der touristischen Entwicklung der Infrastruktur (Sommer und Winter) an. Dies mit der Gemeinde Obersaxen Mundaun und den Bergbahnen Obersaxen Mundaun in der Infra Mundaun AG."
>
> *"The municipality is closely involved in local tourism development. Together with the municipalities of Obersaxen Mundaun, Brigels and Ilanz/Glion, as the organisations behind Surselva Tourism, we are closely involved in this development. Together, we have agreed on an overall tourism strategy. In addition, we are aiming to expand the tourism infrastructure (summer and winter). This is being done in collaboration with the municipality of Obersaxen Mundaun and the Obersaxen Mundaun MTO within Infra Mundaun AG." (8)*

Capacity for Adaptation Interviewees across governance levels repeatedly highlighted the difficulty of implementing adaptation-related strategies and projects on the municipal level. Limited administrative capacity, financial resources, and personnel were identified

as major constraints for both municipalities and local tourism actors (1, 2, 4, 5, 6). In particular, smaller Alpine municipalities were described as struggling to address long-term and strategic adaptation challenges alongside their everyday administrative responsibilities.

> "Kleine Gemeinden, die haben in der Regel ja sowieso schon Kapazitätsprobleme, weil die überhäuft werden mit allen möglichen Aufgaben (...) bei Unternehmen ist das das Gleiche (...) die müssen schauen, dass der Laden läuft, die können sich in der Regel nicht mit so vorausschauenden oder strategischen Fragen auseinandersetzen."
>
> *"Small local authorities generally already have capacity issues anyway because they're swamped with all sorts of tasks (...) it's the same for businesses (...) they have to make sure the business runs smoothly; they usually can't spare the time to deal with forward-looking or strategic issues." (1)*

Cantonal actors highlighted that they attempt to support municipalities and tourism actors through funding instruments, guidance, and knowledge exchange. However, several interviewees noted that cantonal offices themselves face capacity limitations and are therefore unable to directly support every municipality and local tourism actor individually (4, 5). As a result, adaptation governance on the local level often depends on indirect support structures and regional coordination mechanisms. In this context, intermunicipal and regional cooperation was described as an important mechanism to compensate for limited local capacities (1, 2, 3, 6). Joint projects with neighbouring municipalities, tourism organisations, and regional actors may reduce individual resource burdens, distribute financial risks, and facilitate the implementation of larger tourism and infrastructure projects. Several interviewees particularly emphasised the role of regional developers in supporting municipalities and local tourism actors throughout project development and implementation processes. Through their intermediary position, regional developers may help formalise planning processes, connect actors across governance levels, and provide expertise and guidance in situations where local actors lack resources or technical knowledge.

> "Also s Agebot isch eigentlich immer, dass sie ab Punkt 0 chönd zu mir cho (...) und dass mer denn zeme chönd aluege, i weli Richtig. S schlimmste isch amig, wenn scho vil Ziit und au Geld investiert hesch und merksch bisch völlig i die falsch Richtig gange."
>
> *"So what I always offer is that they can come to me right from the start (...) and that we can then work out together which direction is the right one. The worst thing, in my opinion, is when you've already invested a lot of time and*

money and realise you've gone completely down the wrong path." (6)

In combination with destination management organisations such as STAG, which coordinate tourism development across municipalities and tourism actors, these regional governance structures were described as important mechanisms for compensating local capacity limitations (1, 2, 5, 6, 7, 8, 9). Their broader overview of regional tourism development priorities and actor interests may help improve coordination, reduce duplication of efforts, and support the implementation of adaptation-related projects on the local level

5.2 Local Actor Networks and Coordination of Local Adaptation

In the local actor network that shapes tourism development in Lumnezia, influence and power are not solely concentrated on the municipality of Lumnezia or a single tourism organisation. Instead, governance processes are shaped by a complex interplay of economic interests, interdependencies between political and tourism-related actors, and changing market demands within the tourism sector. To coordinate and navigate these dynamics, certain actors, such as STAG, take leading roles in coordinating regional efforts and integrating adaptation considerations into tourism development plans. Interviewees emphasised the importance of such key actors and highlighted sufficient coordination and cooperation as success factors for adaptation processes in Alpine winter destinations affected by climate change.

5.2.1 Horizontal Coordination and Cooperation

To ensure local and regional coordination and cooperation regarding tourism development, someone with sufficient influence and knowledge has to take on this task. This subchapter presents the role that DMOs take in this coordination issue and highlights how relevant actors can be included in such processes.

Role of Destination Management Organisations

DMOs play an important role in facilitating and coordinating cooperation between tourism actors and municipalities within Alpine tourism regions (1, 2, 7). Due to the fragmented structure of regional tourism systems, DMOs may serve as platforms through which the interests, concerns, and development priorities of different tourism actors can be communicated, negotiated, and coordinated across municipalities and sectors. Interviewees particularly highlighted the importance of these coordination structures in regions where tourism development depends on the cooperation between municipalities, MTOs, and tourism service providers (2, 5, 7). At the same time, several national-level interviewees noted that many DMOs do not fully exploit their coordinating potential and instead pri-

marily operate as marketing organisations focused on destination branding and promotion (2, 3).

> "Aber au die Destinatione chönnted e vil grösseri Rolle ineh. Die DMOs (. . .)wo hüt us minerer Sicht no zu stark usgrichtet sind, uf reini Marketingfuntkione. Wo wirklich au im Interesse vom Tourismus stönd wo no meh de Lead au bi settige Prozess sötted ineh"
>
> *"But the destinations themselves could also play a much bigger role. The DMOs (. . .), which, in my view, are still too heavily focused on purely marketing functions. They should genuinely act in the interests of tourism and should be more involved in the decision-making process." (2)*

In systems where tourist actors are in a particularly powerful position and enjoy high independence from other actors in the region, it might be difficult for DMOs to take on this role (1). While destination structures may provide important opportunities for regional coordination, one interviewee also expressed concerns that an overly centralised destination approach could reduce the individual character and identity of municipalities and tourism offerings within the region (3). Especially in tourism systems characterised by uneven power relations and highly specialised actors such as MTOs, DMOs may play an important role in mediating interests and coordinating infrastructure use and tourism development strategies. Interviewees highlighted that the economic logic of MTOs may differ from broader destination-level tourism interests, particularly regarding summer tourism development and diversification efforts.

> "D Bergbahne, wemmer die jetzt nur als einzelns Unternehme aluegt, isches natürlich jetzt womer de Hauptumsatz nur im Winter macht, nachher wenn en Grossteil det irgendwenn denn wegfallt muess mer als Unternehme die Lugge fülle. (. . .) Im Summer verdient d Bahn selber viellicht ned so vil, für d Destination isch sie aber wichtig."
>
> *"The MTO, if you look at it purely as a stand-alone business, naturally generates most of its turnover in winter; so if a large part of that revenue were to disappear at some point, the business would have to make up the shortfall. (. . .) In summer, the company itself might not make as much money, but it's important for the destination." (5)*

In this context, STAG was repeatedly identified as an important coordination actor for promoting diversification and strengthening summer tourism development within the Surselva region (6, 7, 8, 9). Through strategic alignment, regional marketing, and shared infrastructure planning, the organisation contributes to coordinating tourism development across municipal boundaries (see Figure 4 and to creating more integrated tourism of-

ferings within the region, while municipalities are tasked with the construction, funding, legal regulation, and development of touristic infrastructure and strategies.



Figure 4: Service Agreement between the Municipalities and STAG (STAG, 2026b)

However, interviewees also described destination governance structures as shaped by unequal power relations between actors. Due to STAG's institutional and financial dependence on the participating municipalities and MTOs, several local actors perceived the organisation's priorities as closely aligned with the interests of these dominant stakeholders (7, 10). Smaller tourism actors, such as ski schools or local tourism providers, described having limited direct influence on destination-level decision-making processes and often needing to rely on municipalities or MTOs to communicate their concerns within regional governance structures.

Including Relevant Actors

Interviewees across governance levels highlighted that the successful implementation of tourism development and adaptation projects depends strongly on the inclusion and support of relevant actors (1, 2, 3, 5, 9). Particularly in Alpine tourism regions, where projects often directly affect local populations, tourism actors, and property owners, a lack of stakeholder support may significantly delay, complicate, or even prevent implementation processes. As a result, several interviewees emphasised that adaptation

governance requires not only the communication of projects and strategies but also the active involvement of affected actors throughout planning and decision-making processes. One interviewee referred to the case of Sattel-Hochstuckli, where second-home owners were informed only at a later stage about planned changes to the tourism orientation of the destination. Their subsequent opposition created substantial resistance towards the project and highlighted the importance of involving affected actors early in the planning process and making them aware of the positive economic and environmental effects.

> "Es bringt nix, wenn mer en Entscheid fällt, aber zum Bispil d Zweitwohnigsbsitzer nachher Opposition ergriifed (...) für die chöne mitneh bruuchts entsprechendi sachli fundierti Grundlage und da helfed zum bispiel Klimamodell"
>
> *"There's no point in making a decision if, for example, second-home owners then raise objections (...) To get them on board, we need a sound, evidence-based foundation, and that's where climate models, for example, can help" (2)*

In the Surselva region, organisations such as STAG actively attempt to involve affected actors and tourism actors in development processes through committees and coordination structures that include representatives of different municipalities and tourism sectors (7). Interviewees highlighted that these governance arrangements aim to facilitate communication between actors and create broader acceptance for regional tourism projects and adaptation-related measures (6, 7, 9). On the municipal level, municipal assemblies were described as important formal mechanisms for capturing the political will of the local population and discussing development-related decisions. However, interviewees also noted that non-resident stakeholders and tourism actors operating outside municipal governance structures may face greater difficulties in accessing information or influencing decision-making processes. In response, organisations such as STAG and Infra Mundaun AG regularly present planned projects and strategic priorities publicly in order to provide opportunities for discussion and exchange with interested individuals and actor groups (7, 9). Beyond these formal participation mechanisms, interviewees also described the importance of informal governance practices and personal networks in regional tourism development. The inclusion of key actors, such as representatives of second-home owners, into planning and negotiation processes was described as an important strategy for reducing potential resistance and increasing harmonisation between actors (6, 7, 8).

5.2.2 Coordination and Communication

This subchapter examines the structural and relational dynamics of local actor networks by analysing the channels of communication and collective coordination efforts within the regional tourism governance system. Furthermore, it addresses systemic constraints by

identifying how the shortage of specialised climate adaptation expertise acts as a critical barrier to the design and implementation of local measures.

Communication Communication between political and private tourism actors on the regional and local levels is characterised by a strong reliance on direct, informal, and relational forms of exchange. Interviewees repeatedly highlighted that personal relationships, local embeddedness, and knowing the relevant contact persons constitute important advantages for accessing information, coordinating projects, and mobilising support within the region (7, 9, 10). In contrast, actors on the national and cantonal levels described communication processes as more formalised and institutionalised. Several interviewees highlighted that communication and coordination between cantonal and national actors are facilitated through thematic committees, working groups, and regular exchange formats that bring together actors responsible for similar policy areas or governance tasks (2, 3, 4, 6, 7).

> "Es git en Verein vode kantonale Klimafachlüt, de cercle climat (...) de gits sit eppe 3 Jahr (...) mit em Ziel sich unterenand abzstimme und usztuusche (...) wie söll mer mit gwüsse Theme umgah."
>
> *"There's an association of cantonal climate experts called the 'Cercle Climat' (...) which has been around for about three years (...) with the aim of coordinating and exchanging ideas (...) on how to deal with certain issues." (4)*
>
> "Alli Regionalentwickelnde treffed sich zweimal im Jahr (...) womer aktuelli Themene, divers, also was uns beschäftiget, als Region, als Regionalentwickler vo NRP, news vom Bund, news vom Kanton."
>
> *"Regional developers meet twice a year (...) to discuss current issues – a wide range of topics, in other words, things that concern us as a region and as regional developers, such as the NRP, news from the federal government, and news from the canton." (6)*

On the local and regional levels, however, communication was described as significantly more informal and issue-specific. Interviewees highlighted that coordination between tourism actors, municipalities, and tourism organisations often relies on direct contact and short communication pathways. Particularly in the context of tourism development and day-to-day operational challenges, actors described the ability to directly call or contact relevant individuals as highly important for solving problems quickly and coordinating responses efficiently (7, 9, 10). One local tourism actor, for example, described its relationship with the municipality as highly accessible and uncomplicated because municipal

representatives are familiar with their concerns and can easily be contacted for support or information when needed (10). Similar communication structures were described by representatives of the MTOs, who highlighted that operational decisions and unexpected developments often require rapid coordination with municipalities, ski schools, and STAG in order to align complementary tourism offerings and regional responses (9). In larger and more complex projects involving multiple actors, STAG was described as playing an important role in facilitating communication and maintaining coordination between actors.

> "Wenns irgendwo harzt oder ich merke, dass zwei ned mitenand gredet hend zum schnelli Verbindige mache oder die an Tisch bringe, öppe bi Konflikt, bin ich mit am Tisch, eifach zum luege, zum öle."
>
> *"If things are not flowing or I notice that two people aren't talking to each other, I'll step in to help them connect or bring them to the table; if there's a conflict, I'll sit at the table with them, just to keep an eye on things and smooth things over." (7)*

Overall, interviewees suggested that communication and coordination structures within the region strongly rely on informal networks, personal relationships, and direct exchange between actors. At the same time, the contrast between these locally embedded communication structures and the more formalised communication practices on the national and cantonal levels may complicate efforts by higher-level actors to raise awareness for adaptation-related issues and to effectively communicate strategic priorities within local tourism governance systems (1, 2, 3, 5).

Coordination Efforts Coordination efforts in Lumnezia and the Surselva region rely on both formal and informal governance structures in which key tourism actors take on important coordinating roles between municipalities, tourism organisations, and private actors. Interviewees across governance levels highlighted that the fragmented structure of Alpine tourism destinations creates a strong need for regional coordination, particularly in the context of climate change adaptation and tourism diversification (1, 2, 5, 6, 7).

> "Damits kei Verlierer git i dem ganze Spiel wärs sinnvoll, wenn sich i de Regione d Regione gmeinsam würded organisiere, dass die höcher und tiefer glegene Gebiet mitenand zemeschaffed. (...) dass mer insgesamt eher en regionale Asatz het."
>
> *"To ensure that no one loses out in the whole process, it would make sense for the regions to organise themselves collectively so that the higher and lower-lying areas can work together. (...) so that, overall, we have more of a regional*

approach." (2)

Several interviewees described regional coordination as an important mechanism for combining the different strengths and tourism offerings of municipalities within a destination and for reducing fragmented development processes. Rather than competing directly, municipalities and tourism actors were described as increasingly attempting to coordinate complementary tourism offerings and develop more integrated regional tourism landscapes (2, 7). In the Surselva region, STAG plays a particularly important role in coordinating these regional development efforts. Interviewees highlighted that the organisation increasingly attempts to strengthen summer tourism and diversification through strategic planning and coordinated infrastructure development. One example repeatedly mentioned was the establishment of a dedicated position responsible for coordinating and promoting bike tourism development within the region, which was later expanded into a broader "outdoor" product management role.

> "Mir hend sit siebe Jahr en Produktmanager Bike (...) zerst hemmer euse Masterplan gmacht für d Gmeinde, also wie euses Netz sött baut werde. Also wo weli Bikeweg setted duregah und weli bestehendi Infrastruktur mer chan nutze."
>
> *"We've had a bike product manager for seven years now (...) We've drawn up a master plan for the municipal authorities, setting out how our network should be built. In other words, where bike paths should be built and how we can make use of existing infrastructure." (7)*

This position became particularly important in coordinating municipalities and tourism actors and in facilitating the planning and implementation of regional bike infrastructure projects. At the same time, convincing municipalities to invest financial resources and administrative capacity into joint tourism projects remains challenging and requires continuous coordination and communication efforts, where continuous pressure had to be applied to make sure the municipalities kept going (7). Overall, coordination and collaboration between municipalities and tourism actors within the region were generally perceived positively by interviewees on the regional and local levels (6, 7, 8, 9). However, some actors suggested that regional coordination currently functions more effectively in the context of summer tourism development than within winter tourism structures, where municipalities and tourism actors remain more strongly tied to individual ski areas and existing infrastructure systems.

> "Ich glaub i dene Destinatione funktioniert das Zemearbeite sehr guet, das was ich mitkrieg. Destinationsübergriifend im Summer no chli meh als im Winter. Ich glaub im Winter isch mer no chli meh ad Skigebiet bunde."

> *"From what I can tell, cross-destination collaboration works really well. It's a bit more common across destinations in the summer than in the winter. I think in the winter people are still a bit more tied to their ski resorts." (6)*

Similar perceptions were voiced by representatives of one key local tourism actor, who described the cooperation between municipalities, tourism actors, and regional organisations as close and constructive.

> "als [tourism actor] simmer eifach involviert dur das, dass mer eifach en wichtige Teil devo sind und die Zemenarbeit isch sicher sehr eng und sehr guet, dass mer da zeme eppis entwickle tuet. D Ziel stimmed überii."
>
> *"As [tourism actor], we're simply involved because we're an important part of it, and the collaboration is certainly very close and very good – it's great that we're working together to develop something. We're all on the same page." (9)*

Overall, interviewees suggested that coordination structures within the Surselva region function comparatively well due to the strong economic and political interconnectedness of tourism actors and municipalities, as well as their shared involvement in regional governance structures such as STAG (6, 7, 8, 9).

Lack of Adaptation Experts and Coordinators Interviewees across governance levels repeatedly highlighted that the implementation of climate adaptation measures is constrained not only by financial and institutional limitations, but also by a lack of technical expertise and intermediary capacities on the regional and local levels (1, 2, 7, 9). In particular, infrastructure-based adaptation projects and landscape-altering measures were described as highly complex and dependent on specialised knowledge regarding spatial planning procedures, engineering requirements, and funding mechanisms. Municipalities and tourism actors often lack this expertise internally and therefore depend strongly on external planners and consultants (1, 4, 7, 9). At the same time, several interviewees highlighted that the limited availability of planners, engineers, and specialised experts within the region increasingly constitutes a bottleneck for adaptation-related development processes.

> "De Fläschehals sind Ingenieure und Planer. Es git halt ned meh Planer im Kanton. Es git au ned gnueg Kantonsagstellti wo das chönd prüefe (...) es isch sehr zäch."
>
> *"The bottleneck is the engineers and planners. There simply aren't enough planners in the canton. Nor are there enough cantonal officials to review the plans (...) it's a real struggle." (7)*

While regional developers were repeatedly described as important coordination and support actors within regional governance structures, interviewees also noted that these positions cannot fully compensate for the lack of specialised expertise. Regional developers often lack the technical knowledge and capacity required to deeply engage with the highly specific planning and adaptation challenges faced by municipalities and tourism actors (1, 6). Beyond technical expertise, interviewees also described difficulties regarding the legitimacy and acceptance of environmentally oriented actors within local tourism governance processes. National and environmental actors were perceived as struggling to raise awareness for climate adaptation issues among local tourism actors and were at times viewed critically by local actors (1, 3).

> "Die grüne Blase mit Natur/Landschaft, mit den Akteuren, die haben nach wie vor Probleme mit wirtschaftlichen Akteuren, mit den Betrieben zusammenzuarbeiten und umgekehrt."
>
> *"The green sector, with its focus on nature and the countryside, and the people involved in it, still find it difficult to work with businesses and economic actors, and vice versa." (1)*

One interviewee suggested that this may partially result from a perception of environmental actors as external actors attempting to interfere with or restrict local economic development pathways.

> "Die hend denn ned alli mit eus wele rede, will mir halt so die Verhinderer sind vo de Stadt."
>
> *"Many of them didn't want to talk to us because we're just the naysayers from the city" (3)*

In response to these challenges, several interviewees suggested that Swiss adaptation governance currently lacks an institutionalised intermediary layer responsible for coordinating adaptation efforts, facilitating communication between actors, and supporting municipalities and tourism actors in developing long-term adaptation pathways (1, 2, 11). While countries and regions such as Austria and South Tyrol have introduced dedicated regional climate adaptation coordination structures in recent years, interviewees noted that comparable institutionalised formats are largely absent in Switzerland (1, 2, 11). One interviewee argued that simply requiring municipalities to formulate climate adaptation strategies may be insufficient if municipalities simultaneously lack the resources, expertise, and long-term coordination structures necessary to implement these strategies in practice (11). Instead, interviewees highlighted the importance of dedicated intermediary actors capable of maintaining continuity, coordinating actors, and supporting adaptation implementation over longer periods of time.

"Klimaanpassung ist sehr komplex. Und da braucht es Personen, die sich langfristig um die Koordination von Massnahmen kümmern. Also die klassische Kümmerer-Rolle, die ist bei den Kleinen und Mittleren nicht installiert. Und da fehlen Kapazitäten, fehlen Ressourcen, fehlen Finanzen. Es gibt auch nicht das Format in der Schweiz, das solche Programme fördert."

"Climate adaptation is a very complex matter. And it requires people who can take charge of coordinating measures over the long term. In other words, the traditional 'facilitator' role is not in place in small and medium-sized organisations. And there is a lack of capacity, a lack of resources, and a lack of funding. Nor is there a framework in Switzerland that supports such programmes." (1)

5.3 Economic and Institutional Conditions Shaping Adaptation

The development of tourism offerings and, particularly, infrastructure-based projects often requires substantial financial investments. As a result, tourism actors frequently depend on external funding sources to realise new development initiatives. However, the criteria and conditions attached to funding opportunities directly influence which projects can be implemented and which forms of tourism development are prioritised. Interviewees highlighted that institutional frameworks, funding structures, and prevailing expectations regarding economically viable tourism development significantly shape local adaptation pathways. This is clearly visible in Figure 5, where the investments of Lumnezia are strongly centred around the development of tourism infrastructure. In particular, the strong economic orientation of tourism support programmes and the continued dependence on ski tourism were described as factors that may reinforce existing development trajectories and contribute to path dependencies within Alpine tourism destinations. Furthermore, the influential role of winter tourism actors, together with the expectations of local inhabitants and returning visitors, may further strengthen investment patterns that prioritise the continuation and stabilisation of existing tourism models.

5.3.1 Funding

Interviewees across governance levels highlighted that external funding is essential for the implementation of tourism adaptation projects. Due to the limited financial capacity of municipalities and local tourism actors, larger adaptation and development projects often depend on cantonal and federal support instruments (1, 2, 4, 5, 6, 7, 9). Funding programmes therefore do not only provide financial resources but also strongly influence which projects become politically and economically feasible in the destination. The most important funding instrument for tourism adaptation and development in the region is the Neue Regionalpolitik (NRP), which is administered by the SECO and implemented jointly

with the cantons (1, 2, 5, 6, 7, 9). While Innotour exists as an additional programme for innovative tourism projects, its focus on supra-regional and national projects with scaling potential limits its relevance for many smaller regional projects (2). Consequently, most tourism projects in the Surselva region rely primarily on NRP funding (6, 7, 9). The structural importance of NRP for new projects is emphasised by one interviewee:

> "dass mer en Teil vode chöschte so finanziert kriegt.Also für Projekt, isch NRP sehr wichtig grad für d Berggebiet zum neui Projekt chöne finanziere"
>
> *"That we can get some of the costs covered. So the NRP is very important, especially for mountain regions, in order to be able to fund new projects." (7)*

s One exception is an Innotour project in the region that aims to improve the accessibility and usability of tourism infrastructure for people with disabilities (7). The NRP programme is designed in eight-year cycles and defines thematic priorities and funding criteria for the projects it supports (2, 3). Due to its institutional embeddedness within the SECO and the cantonal office for economy and tourism (AWT), the programme mainly focuses on regional economic development, competitiveness and innovation (1, 2, 4, 5). Interviewees repeatedly criticised that climate change adaptation and environmental concerns remain only weakly integrated into these dominant tourism funding structures (1, 2, 3, 5). While climate considerations are increasingly acknowledged politically, projects are still primarily evaluated according to their expected contribution to regional value creation, competitiveness and economic growth rather than their long-term adaptive capacity. This orientation was also reflected by the cantonal office responsible for coordinating NRP implementation:

> "mir vom [cantonal office] fördered halt würklich Projekt mit eme wirtschaftliche Fokus, also Wettbewerbsfähigkeit muess gsteigeret werde, Wertschöpfig, Arbeitsplätz müend gschaffe werde"
>
> *"We, the [cantonal office] really only support projects with an economic focus, in other words, they must boost competitiveness, create added value and generate jobs" (5)*

Although actors on the cantonal and national level highlighted that climate-related considerations are expected to gain more importance in future programme cycles, the current orientation of funding programmes still strongly shapes which forms of adaptation become feasible locally (1, 2, 5). Infrastructure-heavy projects such as snowmaking systems, biking infrastructure or tourism facilities align particularly well with existing funding criteria because they can demonstrate direct economic benefits and visible regional development effects. Consequently, many adaptation measures pursued in the region focus on infrastructural expansion and tourism diversification through construction projects instead of

alternative adaptation projects with a sustainability or landscape focus (1, 6, 7, 9).

> "Der Impact kommt ja über die Projekte. In den Regionen sieht man jetzt keinen ausgeprägten Trend, dass jetzt mehr mit Klimaanpassung kommen würde oder mit Landschaft und Natur. (...) Es tröpfelt eher so"
>
> *"The impact comes through the projects, after all. In the regions, there isn't really a clear trend at the moment towards more work on climate adaptation or on landscape and nature. (...) It's more of a trickle" (1)*

Several interviewees highlighted that this infrastructural and economic focus on familiar projects might disadvantage innovative approaches, where economic viability and possible upscaling are not guaranteed (1, 3). To facilitate such projects, which seem very visionary and might not be feasible under normal conditions, interviewees voiced the necessity of sandbox settings, where these projects could be tested outside of regular structures and regulations (1, 5).

5.3.2 Role of Ski Tourism

This subchapter evaluates the central position of winter sports within the regional landscape by analysing the structural and socio-cultural dimensions of ski tourism. It first outlines how actors perceive the sector's economic importance for the local economy, before examining the traditional values and historical identities attributed to it by the local population.

Economic Importance of Ski Tourism Interviewees across governance levels repeatedly highlighted the economic importance of winter tourism and particularly Alpine ski tourism for mountainous regions and destinations such as Lumnezia (1, 2, 3, 5, 6, 7, 8, 9, 10). Winter tourism was described as a central economic pillar that generates value creation, supports employment and sustains broader regional tourism structures.

> "d Skigebiet im Winter wo wichtigi Motore sind für die ganz Destination und grad bide Skigebiet bide jetzige Situation merkemer natürlich wie mer abhängig sind vom Klima oder vom Wetter"
>
> *"In winter, ski resorts are key drivers for the entire destination, and given the current situation, we can really see just how dependent we are on the climate or the weather" (6)*
>
> "D Region da lebt vollkomme vo Skifahre und Wandere im Winter."
>
> *"The region totally depends on skiing and hiking in winter." (10)*

Although interviewees differed in their assessments of the future role Alpine ski tourism should play in long-term adaptation pathways, there was broad agreement that its current economic significance strongly shapes local tourism governance and adaptation priorities (2, 3, 5). Because many important regional actors, municipalities and tourism organisations are directly or indirectly connected to winter tourism, adaptation discussions are strongly influenced by the objective of maintaining the economic viability of ski tourism for as long as possible. At the same time, interviewees highlighted that this economic dependence also creates pressure for tourism actors to actively pursue adaptation and diversification measures. The strong structural importance of winter tourism provides ski tourism actors with considerable agency and political influence in regional development processes while simultaneously forcing them to search for strategies that ensure long-term profitability under changing climatic conditions (2, 5, 6, 7). One interviewee described this dependence as both a vulnerability and a driver for innovation:

> "meh als 30 % vode Wertschöpfig im Kanton sind im Bereich Tourismus und noch isch natürlich d Wintersaison mitem Wintertourismus zeme ganz en zentrale Baustei. Aber durch das het mer au aktivi, kreativi, innovativi Akteure."
>
> *"More than 30% of the canton's added value comes from the tourism sector, and of course, the winter season, with its winter tourism, remains a key component. But this also means we have active, creative and innovative players." (5)*

In the context of this structural and economic importance of ski tourism, many local adaptation efforts focus on measures that stabilise or prolong winter tourism operations, particularly through the expansion of artificial snowmaking infrastructure (see section 5.4.1). Local actors repeatedly framed these investments as necessary to secure the continued functioning of the regional tourism economy in the near future (9, 10). However, interviewees also expressed ambivalent views regarding infrastructure development. While one local actor argued that the expansion of snowmaking infrastructure represented the only realistic possibility for further economic growth in the ski tourism sector (10), the same interviewee simultaneously criticised highly seasonal infrastructure investments more generally:

> "alles was baut wird was mer nume 2 oder 3 Mönet im Jahr bruuche chan findi eh komplette Unsinn, egal was es isch"
>
> *"I think it's complete nonsense to build anything we only use for two or three months a year, no matter what it is" (10)*

This illustrates an important tension within local adaptation perspectives. While ski tourism remains economically central and therefore dominates adaptation considerations,

local actors simultaneously express uncertainty regarding the long-term sustainability and desirability of infrastructure-heavy development pathways.

Tradition Beyond its economic importance, interviewees also highlighted the cultural and symbolic significance of Alpine winter tourism for local populations and long-term visitors. Ski tourism is not only perceived as an economic activity but also as an important part of regional identity, local history and social life. As a result, tourism development pathways that maintain or strengthen winter tourism often receive broad local support, even in the context of climate change and growing uncertainty regarding the long-term viability of Alpine ski tourism (1, 3). Interviewees described how both local inhabitants and recurring guests maintain strong emotional attachments to ski destinations and to skiing as a practice associated with personal memories, traditions and regional identity. One interviewee explained:

> "Ich glaub das was mer het, das will mer erhalte und denn chömed die ganze emotionale Wert 'da han ich glernt skifahre, da fahred mini Chind und mini Enkelchinde' (...) und au chli s Bild dass früehner Buure im Winter bim Skilift mitgholfe hend und es isch es Ganzjahresikomme gsi. Das isch lang nüme so aber das Bild isch no sehr stark"
>
> *"I think that what people have, they want to keep, and then all that emotional value comes into play – 'that's where I learnt to ski, that's where my children and grandchildren ski' (...) and also the image of farmers helping out at the ski lift in winter back in the day, and it was a year-round source of income. That hasn't been the case for a long time, but the image is still very strong." (3)*

According to interviewees, these emotional and cultural connections can create resistance towards more transformative adaptation pathways that would fundamentally reduce the role of ski tourism in the region (1, 3). The persistence of historically rooted images and narratives surrounding winter tourism contributes to continued political and social support for investments into ski tourism infrastructure and operations (3). One interviewee, therefore, highlighted the importance of communicating factual information about climatic developments and discussing realistic future scenarios with local actors to broaden perspectives on possible development pathways (2).

5.3.3 Economic and Structural Dependency

Building upon the previously established economic position of winter sports, this subchapter outlines the structural relationships and potential dependencies that emerge from these dynamics. Specifically, it examines how various local actors are positioned relative

to the ski tourism market, followed by an overview of the destination's localised guest structure and how it may influence or enhance dependencies

Dependence of Local Actors on Winter Tourism Several interviewees expressed concern that the strong economic dependence on Alpine winter tourism may reinforce existing development pathways and limit the ability of destinations to fundamentally transform their tourism model (1, 2, 3, 5). While diversification and adaptation are broadly supported as objectives, the continued centrality of ski tourism creates strong structural incentives to maintain and further develop winter tourism infrastructure and operations. As highlighted previously (see section 5.3.2), ski tourism remains economically central for many regional actors and municipalities. The profitability of MTOs is therefore not only important for the ski sector itself but also for broader regional tourism development and local economic stability (2, 3, 5, 6, 8). Revenue generated through winter tourism is often perceived as necessary to finance future diversification and investment projects, which further reinforces the dependence on functioning ski tourism structures (5, 6, 7, 9). Interviewees highlighted that substantial investments into ski tourism infrastructure create long-term economic commitments that increase pressure to continue prioritising winter tourism. Once infrastructure such as ski lifts or artificial snowmaking systems has been financed, actors face strong incentives to maximise their use and ensure their amortisation. One interviewee described this dynamic as an "investment spiral"(3, own translation):

> "Wemmer eimal inen Skilift investiert het, denn muess mer de au ammortisiere denn muess mer nomal es Agebot für de Summer schaffe, und so wiiter"
>
> *"Once you've invested in a ski lift, you have to recoup the costs, then you have to come up with a summer offering, and so on" (3)*

Structural dependencies also affect local tourism actors that rely directly on the infrastructure and visitor flows generated by the local MTO. Smaller actors such as ski schools described themselves as highly dependent on the decisions and development strategies of larger tourism organisations and perceived their own ability to influence long-term development pathways as limited (10). One interviewee described this dependence in particularly explicit terms:

> "Mir sitzed genau im gliiche Boot wie d MTO. Wenn sie nüt tüend denn sind mir usglieferet"
>
> *"We're in exactly the same boat as the MTO. If they don't do anything, we're screwed" (10)*

Guest Structure and Visions of Tourism Development Interviewees highlighted that the viability of tourism offerings strongly depends on the demand generated by guests and on the expectations visitors have regarding the tourism profile of a destination. Consequently, the structure of guests and accommodation types directly shapes which forms of tourism development appear economically viable and desirable for local actors (1, 2, 3, 7). In Lumnezia and Obersaxen Mundaun, tourism is characterised by a high proportion of second homes mainly used for holidays, and a comparatively limited number of hotel beds (7, 8). One interviewee described this structure as follows:

> "In de Gmeinde Obersaxe Mundaun, Ilanz und Lumnezia hemmer z wenig Hotelbetter. Mer hend vil Zweitwohnige und wenig Hotelbetter."
>
> *"In the municipalities of Obersaxen, Mundaun, Ilanz and Lumnezia, we don't have enough hotel beds. We have plenty of holiday homes but not enough hotel beds." (7)*

According to interviewees, this accommodation structure significantly influences both the type of guests visiting the region and the tourism offerings that can realistically be developed. Because many guests stay in privately owned holiday homes and visit regularly over longer periods, the region generates fewer day guests than other destinations with stronger hotel infrastructure (2, 7). This was perceived as limiting the development of certain tourism offerings, particularly those targeted towards day tourism and family-oriented activities:

> "Will mer weniger Tagesgäst hend chömmer au weniger grad in Obersaxe und Lumnezia amene Gästeagebot und Familieagebot abüte."
>
> *"As we have fewer day visitors, we can also offer less in terms of accommodation and family activities in Obersaxen and Lumnezia." (7)*

Interviewees explained that the dependence on returning guests and second-home owners creates strong incentives to maintain tourism offerings that remain attractive over repeated visits and continue to justify the value of investments made into holiday homes and local infrastructure (2, 7, 9). In this context, ski tourism was repeatedly described as particularly attractive because it provides recurring seasonal demand and maintains the attractiveness of the destination for long-term visitors. One interviewee highlighted that many holiday home owners originally invested in the region specifically because of its ski tourism offer:

> "da spieled natürlich au Zweitwohnigsbsitzer e grossi Rolle will mir hend Gmeinde im Berggebiet wo bis zu 90% Zweitwohnigsbsitzer hend und die hend da es Chalet kauft und die wend natürlich... die hend das kauft damals wills

> wend go Skifahre und die wend a dem Modell festhalte wills da Kapital investiert hend"
>
> *"Of course, second-home owners play a major role here, because we have municipalities in the mountain regions where up to 90% of homeowners are second-home owners, and they've bought a chalet there and naturally... they bought it back then because they wanted to go skiing, and they're sticking to that model because they've invested capital there" (2)*

Because of their economic importance for the region, second-home owners are perceived as highly influential actors whose expectations need to be considered in tourism development and adaptation processes. Regional actors, therefore, emphasised the importance of maintaining close communication with these groups and actively involving them in regional development discussions:

> "was wichtig isch sind d Zweitwohnigsbsitzer wo am Wochenend vil da sind (...) en Teil chunnt ide Pension ufe (...) da müemer offe sii mit dene wo wend die Region sii, wohne, wo sich wend engagiere"
>
> *"What matters are the second-home owners who spend a lot of time here at the weekend (...) some of them move permanently here when they retire (...) so we need to engage with those who want to be part of the region, live here, and get involved" (7)*

One interviewee also pointed towards cases where second-home owners opposed attempts to transform tourism models away from ski tourism. The example of Sattel-Hochstuckli was mentioned as a case where insufficient involvement of second-home owners led to resistance against proposed changes in tourism orientation (2). Although this represents a single case, it can illustrate both the importance of communication and coordination with influential actors and the pressure that second-home owners can exert on local adaptation pathways.

5.4 Framing and Prioritisation of Adaptation

How adaptation is framed and understood has a direct effect on the effectiveness and the sustainability of adaptation measures. While interviewees across sectors and levels generally agreed that a diversification of the tourist offer and the creation of more year-round offerings for a destination pose useful adaptation pathways, their visions and goals for concrete adaptation measures were very diverse and conflicting at times. In particular, the role of artificial snowmaking as an adaptation measure was discussed extensively by interviewees, whose perspectives differed considerably regarding its applicability, long-term viability, and significance for the future development of Alpine tourism destinations.

These differing perspectives illustrate how adaptation is shaped not only by climatic conditions but also by competing economic interests, development visions, and understandings of sustainability. The implementation of adaptation measures is further influenced by the degree to which adaptation is prioritised within political and tourism-related agendas. Interviewees described efforts to raise awareness of climate-related challenges and to encourage and inspire local actors to prioritise adaptation measures. Competing interests and the time horizon aspect, which makes adaptation a more long-term topic, were named as the main barriers for prioritisation. At the same time, they highlighted that adaptation sometimes competes with climate mitigation for funding, political attention, and institutional support. While climate change has increasingly entered public and political discourse, many actors still perceive the prioritisation of adaptation as insufficient.

5.4.1 Understandings of Adaptation

How relevant actors in governance systems understand adaptation directly shapes the ways in which the concept is discussed and integrated. Accordingly, this subchapter introduces the prominent thematic understandings of adaptation identified among regional tourism actors. Specifically, it maps out the discourse surrounding the diversification of tourism offerings, evaluates perspectives on artificial snowmaking, and outlines the role assigned to infrastructure development within local tourism governance.

Diversifying Tourism Across governance levels and sectors, interviewees broadly agreed that adaptation to climate change in Alpine tourism requires a reduction in dependence on winter tourism and a diversification of tourism offerings throughout the year (1, 2, 3, 5, 6, 7, 8, 9, 10).

> "Ich glaube alli sind sich bewusst, wo mer asetze sötti. D Frag isch nur: bringt mers au in Bewegig und wie gaht mer mit Zielkonflikt um?"
>
> *"I think everyone is aware of where we need to focus our efforts. The only question is: will it actually get things moving, and how do we deal with conflicting objectives?" (5)*

However, despite this general consensus, interviewees differed substantially in how they understood and prioritised diversification strategies and what forms of tourism development they considered appropriate for the future of Alpine destinations. Local and regional actors particularly emphasised the importance of maintaining winter tourism operations for as long as possible while simultaneously expanding tourism infrastructure and offerings for other seasons (7, 9, 10). Diversification was therefore often framed less as a fundamental transformation of tourism systems and more as a complementary expansion

of existing tourism structures. Interviewees highlighted that actors within the region generally perceived their tourism development goals as aligned.

> "alli reded chli vom gliiche Ziel. De Tourismus i eusem Fall über beidi Täler oder die beide Gmeinde, wie gseit Obersaxe Mundaun und Lumnezia gsamthaft stärke."
>
> *"We're all talking about the same goal. In our case, that means boosting tourism across both valleys or both municipalities – as mentioned, Obersaxen-Mundaun and Lumnezia as a whole." (9)*
>
> "Zusätzlich streben wir eine Erweiterung der touristischen Entwicklung der Infrastruktur (Sommer und Winter) an. Dies mit der Gemeinde Obersaxen Mundaun und den Bergbahnen Obersaxen Mundaun in der Infra Mundaun AG an."
>
> *"In addition, we are aiming to expand the development of tourism infrastructure (summer and winter). We are doing this in collaboration with the municipality of Obersaxen Mundaun and the Obersaxen Mundaun mountain transport organisation as part of Infra Mundaun AG." (8)*

While many of these measures were rarely explicitly framed as climate change adaptation, interviewees nevertheless directly linked them to the observed and expected impacts of climate change on winter tourism (7, 8, 9, 10). In particular, the development of bike tourism and the adaptation of existing infrastructure towards summer-oriented tourism offerings were repeatedly described as important future development opportunities for the region (6, 7, 9). At the same time, interviewees at the national level expressed concerns that adaptation processes in tourism destinations may remain limited to incremental and easily implementable measures rather than leading to more fundamental changes in tourism development pathways (1, 2, 11). Furthermore, several interviewees criticised the tendency of Alpine destinations to adopt already established tourism concepts and replicate development models from other regions without sufficiently considering local characteristics and place-specific opportunities (1, 2, 3).

> "Die grösste Flüech im Tourismus sind, dass jede copy-paste macht, eine het e gueti Idee und 1000 anderi kopiereds (...) jedi Destination söll luege, was sind eusi Standortvorussetzige, wo hemmer euses USP."
>
> *"The biggest problem in tourism is that everyone just copies and pastes; one person has a good idea and 1,000 others copy it (...) Every destination should look at what its local unique characteristics are, where its USP lies." (2)*
>
> "Wenn mer seit mer baut de Summertourismus us und macht denn irgendwelchi

> Hüpfburge, Rodelbahne, Sache wo halt für eus zum Teil sehr schad isch, wills Sache sind wo halt nüt meh mitem Ort z tueh hend. Sehr ustuschbar sind. Die chan mer überall herestelle, das muess denn ned die Berge sii."
>
> *"When (they) say we're developing summer tourism and setting up bouncy castles, toboggan runs and things like that – which, to some extent, is a real shame because these are things that no longer have anything to do with the place itself. They're very interchangeable. You can set them up anywhere; it doesn't have to be in the mountains." (3)*

These differing perspectives illustrate tensions between locally embedded tourism development priorities and broader national adaptation narratives. While local and regional actors primarily focus on maintaining the economic viability of tourism through pragmatic diversification and infrastructure expansion, national actors emphasise the need for more place-specific and potentially transformative adaptation pathways.

Artificial Snowmaking The economic and structural importance of Alpine ski tourism strongly influences the adaptation pathways pursued by tourism destinations. In many Alpine regions, artificial snowmaking is used as an adaptation measure intended to compensate for decreasing natural snowfall and stabilise winter tourism operations. Across governance levels, interviewees generally agreed that artificial snowmaking may help buffer short-term climate-related impacts and maintain the profitability of ski tourism destinations for the foreseeable future. However, interviewees differed considerably in how they understood the long-term role of artificial snowmaking within regional adaptation pathways. Local actors directly involved in ski tourism operations described artificial snowmaking as essential for the continued functioning and future viability of the ski area (9, 10). From their perspective, expanding snowmaking infrastructure is necessary not only for maintaining existing operations but also for enabling further development within the winter tourism sector and providing security in the region.

> "Wir hend ja scho, wieni vorher mal gseit han, im Wintertourismus hani jetzt au ned Angst, dass das in Zuekunft nüme wird funktioniere. Wie gseit, technischi Beschneiig das muess mer erwiitere (...) also klar es isch en Wunsch dass der Summertourismus natürlich meh tuet fürs Ganze (...) der Summertourismus wettemer sicher dass de zuenimmt aber ned primär zum de Winter kompensiere, das isch ned unbedingt s Hauptthema."
>
> *"As we've said before, I'm not worried that winter tourism won't work in the future. As I said, we need to expand the technical snowmaking system (...) so, of course, it's a wish that summer tourism naturally contributes more to the whole (...) we want to ensure that summer tourism increases, but not*

primarily to compensate for the winter season; that isn't necessarily the main issue." (9)

"Ich glaub d Beschneiig isch letztlich wichtig für die gsamti Region und für de ganz Tourismus, es gaht ja denn no vil wiiter eigentlich. Es isch für alli wichtig dass mer dete die Sicherheit hend"

"I think snowmaking is ultimately important for the whole region and for tourism as a whole; it actually has much wider implications. It's important for everyone that we have that security there" (9)

"sits beschneit isch, isch d Talabfahrt da meistens die ganz Saison offe und das isch für eus absolut überlebenswichtig, mir hetted da eusi Üebigslift ohni Beschneiigs nie offe gha und denn wärs fertig gsi."

"Since we have artificial snowmaking, the valley descent is usually open all season long, and that's absolutely vital for us; we would've never been able to open our main lift without the snowmaking system, and if that weren't working, we'd be finished." (10)

"Für eus die einzig Möglichkeit dass mer als [tourist actor] grösser werded isch wemmer meh beschneiti Piste hend. Im Moment chömmer gar ned grösser werde."

"For us, the only way to grow as [tourist actor] is if we have more slopes where we can produce artificial snow. At the moment, we can't grow at all." (10)

Interviewees on the regional, cantonal, and national levels also acknowledged the importance of artificial snowmaking in maintaining winter tourism in the short term. However, these actors more frequently framed snowmaking as a transitional or temporary solution intended to prolong the economic viability of ski tourism while simultaneously generating financial resources for the diversification of tourism offerings beyond winter tourism (1, 2, 3, 4, 5, 6, 7).

"Beschneiig isch wichtig, dass die jetzt emal sehr schnell chunnt, dass mer das no chan am laufe bhalte mitem Wintertourismus. S Geld müemer mitem Wintertourismus ihole (...) vo dem her isch das jetzt e wichtigi Übergangslösig dass mer au s Geld het zum in Summer investiere."

"Snowmaking is important, and it needs to happen very quickly now so that we can keep winter tourism going. We need to recoup the money through winter tourism (...) so, from that point of view, this is an important stopgap solution that will also give us the funds to invest in the summer." (7)

"Jetzt im Zemehang mitem Klimawandel het mer sich au überleit, in weli Bergbahne derfed mir mit öffentliche Gelder no investiere. Also mached mer Strukturerhaltig eswo wos kei Sinn macht?"

"Now, in the context of climate change, we're also having to consider which mountain transport organisations we should still be investing public money in. So are we maintaining infrastructure where it makes no sense?" (5)

"Es isch tatsächlich so, dass künstlichi Beschneiig ehner e Übergangslösig isch, vor allem für die tüfer glegene Gebiet. Da wissemer eifach, das funktioniert ned langfristig."

"The fact is that artificial snowmaking is really just a stopgap solution, especially for the lower-lying areas. We simply know that it doesn't work in the long term." (2)

These differing perspectives illustrate contrasting understandings of the role of winter tourism within regional adaptation pathways. While local actors closely connected to ski tourism primarily framed artificial snowmaking as an essential component of regional economic stability, actors on the regional, cantonal, and national levels more often described it as a temporary strategy intended to support a broader transition towards more diversified tourism structures. The differing perceptions also reflect the varying degrees of economic dependence on ski tourism between actor groups. For local tourism actors whose operations are directly based on a functioning ski infrastructure, the continued viability of winter tourism remains closely connected to their economic future. In contrast, actors operating at higher governance levels more frequently emphasised the risks of maintaining long-term investments in tourism structures that may become economically and environmentally unsustainable under future climate conditions.

Focus on Infrastructure The dominant understanding of climate change adaptation in tourism within the case study region is strongly connected to the development and expansion of tourism infrastructure. Interviewees across governance levels frequently linked adaptation and future tourism development to infrastructure-centred measures intended to diversify and strengthen the tourism offer throughout the year (1, 3, 7, 8, 9, 10). When discussing adaptation pathways, interviewees primarily referred to projects such as artificial snowmaking infrastructure, biking and hiking trails, ski and cross-country infrastructure, playgrounds, or climbing facilities. Only a few interviewees additionally mentioned less infrastructure-oriented forms of diversification, such as cultural or health tourism (6, 7). This infrastructure-centred understanding of adaptation is also reflected in recent and planned tourism projects within Lumnezia and the surrounding region. Recent tourism investments by the municipality of Lumnezia focused primarily on the

enhancement and expansion of tourism infrastructure around existing tourism attractions (see Figure 5). Investments around Davos Munts aimed to improve the attractiveness of the swimming and event area through additional facilities and landscape adjustments, while investments in Vrin-Parvalsauns improved access infrastructure for hiking tourism around the Greina plateau. In contrast, the Nino Schurter Bike Trail represented the establishment of a comparatively new tourism segment focused on biking tourism.

Investitionen Tourismus	2021	2022	2023	2024	ø 2021-2024
Nino Bike Trail		39'601	322'289	9'705	
Umgebungsarbeiten Davos Munts			521'924	342'006	
Parkplatz, Toilette und Unterstand Parvalsauns, Vrin		46'523	195'843	-150'648	
Total Investitionen Tourismus	0	86'124	1'040'056	201'063	331'811

Figure 5: Municipal Tourism Investments in Lumnezia 2021-2024 (STAG, 2026a)

The planned projects of the Infra Mundaun AG similarly focus strongly on physical infrastructure development. Planned investments include the expansion of artificial snowmaking infrastructure, additional cycling infrastructure, adventure trails, a playground and a climbing tower near the middle station in Vella. Many of these projects are directly linked to existing MTO infrastructure and are intended to strengthen both winter and summer tourism offerings within the region (9).

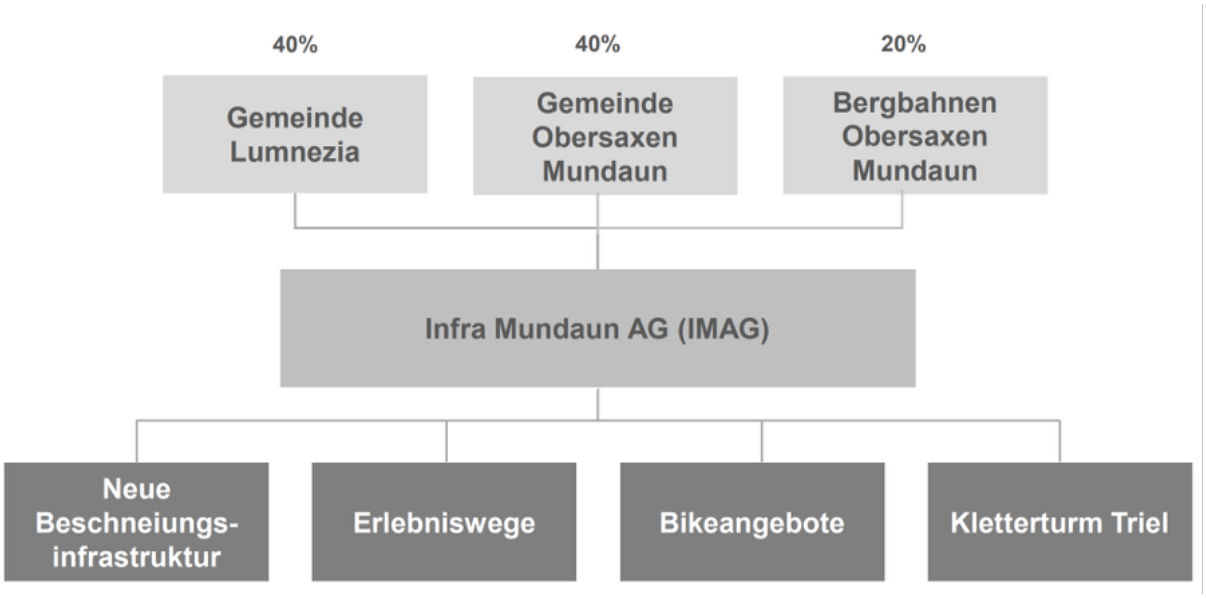


Figure 6: Investment Structure and Planned Projects of the Infra Mundaun AG (IMAG, 2026)

The financing structure of the Infra Mundaun AG (see Figure 6) further illustrates the increasing involvement of municipalities in tourism adaptation and infrastructure development. The two municipalities, Obersaxen Mundaun and Lumnezia, each contribute 40 per

cent of the funding necessary for the implementation of the projects. While investments in artificial snowmaking infrastructure were previously primarily carried by the MTO itself, the municipalities of Lumnezia and Obersaxen Mundaun now assume a substantial share of the financial responsibility through guarantees and direct participation in the project structure (Gemeinde Obersaxen Mundaun, 2026). This increasing municipal involvement highlights the strong economic importance attributed to ski tourism and tourism development within the region more generally. At the same time, infrastructure-focused tourism development was also viewed critically by several interviewees. National and environmental actors in particular questioned whether infrastructure expansion alone can create sustainable and attractive tourism offerings in the long term (1, 2, 3, 11). Concerns were raised that some destinations may increasingly rely on technical and construction-based adaptation measures without sufficiently considering local characteristics, changing visitor demands, or long-term environmental sustainability.

> "Aber anderswo sollte man halt schauen, dass man nicht übererschliesst. Wenn dann auch die Nachfrage zurückgeht, Infrastruktur steht dann herum und kostet immer noch was."
>
> *"But elsewhere, you just have to make sure you don't overdevelop. If demand then falls, the infrastructure will just sit there and still cost money." (1)*
>
> "Muss halt jede Destination selber überlegen, ob das dann wirklich reicht. Technisch beschneien und dann stellt man irgendwo einen Kletterturm hin. Aber es ist auch immer die Frage: Welche Besucher kommen da jetzt schon hin und was wollen die?"
>
> *"Each destination will just have to decide for itself whether that's really enough. To just produce artificial snow and then put up a climbing tower somewhere. But the question is always: what sort of visitors are already coming there, and what do they want?" (1)*

One interviewee contrasted possible future development pathways by describing a positive scenario in which tourism development remains closely connected to local landscape and regional identity, and a negative scenario in which destinations increasingly attempt to resist environmental change through intensified technical intervention and construction activity (3). These perspectives illustrate tensions between infrastructure-based tourism adaptation and more place-specific and environmentally embedded understandings of regional development.

5.4.2 Prioritisation

While understandings of adaptation dictate how the concept is framed, the level of prioritisation determines the speed and sequence with which it enters planning and implementation stages. This subchapter examines the core factors influencing these processes within local tourism governance. Specifically, it introduces the role of awareness, outlines the dynamics of competing for limited resources within alpine administrative systems, and explores how varying time horizons affect the prioritisation of adaptation.

Awareness Interviewees across governance levels repeatedly highlighted the difficulty of translating awareness of climate change and adaptation strategies into concrete and continuous action within tourism destinations (1, 2, 3, 4, 5, 11). While climate change and its expected impacts on tourism were generally perceived as widely known among tourism actors, interviewees emphasised that awareness alone does not necessarily lead to long-term strategic adaptation decisions or the prioritisation of adaptation measures within tourism development processes. National actors particularly stressed the importance of actively raising awareness among tourism destinations and promoting examples of successful adaptation projects and development pathways (1, 2). Platforms such as regiosuisse were described as important tools for distributing knowledge, sharing good practices, and providing information about funding opportunities and tourism development projects. However, interviewees also pointed out that the existence of information and support structures alone does not guarantee that local actors will engage with adaptation issues.

> "Dass mer gueti Bispil zeige tüend, das isch vo mir us am erfolgriichste. Die Innovative lönd sich gern lah inspiriere und die andere nit aber das chömer au ned beiflusse."
>
> *"Showing good examples is, in my view, the most effective approach. The innovative ones are open to being inspired, but we can't influence the others." (2)*

Several interviewees argued that limited adaptation momentum may be connected to a lack of immediate economic pressure and the absence of motivated individuals within local governance and tourism structures who actively push adaptation processes forward (1, 2).

> "Am Ende steht und fällt das alles damit, dass Personen vor Ort, auf der untersten Ebene im Betrieb oder Region oder Destination oder Gemeinde sagen: "Okay, jetzt müssen wir etwas machen.""
>
> *"Ultimately, it all comes down to people on the ground – at the grassroots level within a business, region, destination or local community – saying: 'OK, now*

we have to do something.'" (1)

Another interviewee similarly noted that despite broad awareness of climate change, implementation processes often remain slow due to institutional inertia and the persistence of established development patterns.

> "S Thema vom Klimawandel isch ja eigentlich bekannt (...) Trotzdem han ich immer no de Idruck, dass die Bewegig vil z langsam gaht, dass die Beharrigstendenze vil z gross sind."
>
> *"The issue of climate change is, of course, well known (...) Nevertheless, I still get the impression that progress is far too slow, and that the tendency to stick to old ways is far too strong." (2)*

Regional and local actors generally perceived awareness of climate change and its effects on tourism to be relatively high among tourism actors (6, 7, 8, 10). However, they also highlighted that adaptation often competes with other immediate operational and financial challenges, making long-term adaptation planning difficult to prioritise consistently. Particularly for smaller tourism actors and municipalities, limited time and personnel resources were described as significant barriers to maintaining continuous engagement with adaptation processes (6).

> "Jo klar limitierend isches bi mir au. Ich würd mega gern no vil meh, aber s limitierende sind d Ressource, oft au die ziitliche."
>
> *"Yeah, I'm limited too. I'd love to do a lot more, but it's the resources that hold me back – often the temporal (resources) as well." (6)*

Interviewees on the regional level also described adaptation implementation as a slow and continuous process that requires repeated coordination and persuasion efforts among local actors.

> "Woni bitz weniger zfride bin isch vode Umsetzig vode touristische Infrastruktur vom Tempo womer det hend (...) da hemmer müesse überzüge und au wemmer überzügt isch, bis es mal zumene Projekt wird..."
>
> *"What I'm less happy about is the implementation of the tourist infrastructure – the pace at which things are moving there (...) we've had to wait and wait, even when people are convinced, until it actually becomes a project..." (7)*

Competing for Limited Resources Limited capacities on the local and regional level were repeatedly identified by interviewees as an important factor influencing how actors prioritise climate change adaptation measures (1, 2, 5, 7, 9, 10). Municipalities and local tourism actors often operate with restricted personnel, financial resources, and time while

simultaneously having to manage day-to-day operational responsibilities. Particularly in municipalities organised through the Swiss militia system, political representatives frequently lack the capacity to engage deeply with long-term strategic issues such as climate change adaptation (1, 2, 5). In this context, adaptation measures and long-term strategic projects constantly compete with urgent operational tasks and short-term political or economic concerns for the limited attention and resources available. Interviewees described how adaptation is often perceived as important in principle, but difficult to prioritise consistently in everyday practice because local actors first need to ensure the functioning of daily operations and existing tourism infrastructure (1, 5, 7). This challenge appears particularly pronounced in smaller municipalities and tourism enterprises, where only a few individuals are responsible for a wide range of tasks. As a result, local actors often welcome external support and initiative, especially in projects where planning processes, coordination, or administrative work are partially taken over by cantonal actors, regional developers, or pilot programmes (1, 2, 5).

> "d Gmeinde kenned die Bundesprogramm meistens au ned. Vor allem es isch alles im Milizsystem (...) darum sind die au froh, wenn jetzt wer anders mit eme Pilotprojekt chunnt und seit "mir mached d Arbeit für sie"
>
> *"The local authorities usually don't know about the national programmes either. Above all, it's all run on inside the militia system (...) which is why they're happy when someone else comes along with a pilot project and says, 'We'll do the work for you'" (2)*

These external impulses can help adaptation measures gain temporary political and operational attention despite the limited local capacities. However, interviewees also highlighted that maintaining this attention and translating projects into long-term implementation remains difficult once operational pressures increase again. Even motivated regional actors who actively support local development processes described the challenge of keeping adaptation measures prioritised over time:

> "Wenn de Leiter halt vil z tueh het und er het ned so Freud a dene neue Bikeweg, tuet er halt öppis anders mache. Zum Bispiel im Wald oder e Strass unterhalte. Das isch immer en Kampf."
>
> *"If the foreman has a lot on his plate and isn't too keen on that new cycle path, he'll just do something else instead. Like working in the woods or maintaining a road. It's always a struggle." (7)*

Time Horizons Biesbroek et al. (2011) identified conflicting timescales as one of the key barriers in climate change adaptation governance. Interviewees repeatedly highlighted

the importance of time horizons in adaptation processes and described how differing perceptions of urgency and long implementation timelines complicate the prioritisation of adaptation measures (1, 2, 4, 6, 7, 11). Several interviewees pointed out that adaptation measures generally operate on shorter and more tangible timescales than mitigation efforts, whose effects often only become visible over decades (4, 11). In this regard, adaptation could theoretically be perceived as more attractive for local actors because concrete measures and effects are easier to observe in the short and medium term (11). However, mitigation continues to receive stronger political attention and institutional support due to the broader public awareness of climate change and the perceived urgency of preventing irreversible environmental change (4, 11). This tendency is also visible in the Green Deal funding program, where a large proportion of the funding is earmarked for supporting mitigation measures (4). Although awareness of climate change and its consequences was generally perceived as relatively high among local tourism actors (see section 5.4.2), interviewees described the expected impacts on the local level as temporally uncertain and insufficiently immediate to fundamentally alter current development pathways (1, 2, 9, 10, 11). Attention towards climate change often increases after snow-poor winters or extreme weather events, but declines again relatively quickly afterwards.

> "Die Aufmerksamkeit ist grösser, aber die ist im Tourismus auch grösser, wenn jetzt zum Beispiel gerade ein schneearmer Winter war oder wenns im Sommer riesige Hitzewellen und Wasserknappheit gibt, aber das ist auch schnell wieder vorbei."
>
> *"There's more attention being paid to it, but that's also the case in tourism when, for example, we've just had a winter with little snow or when there are massive heatwaves and water shortages in the summer – but that too is soon over." (1)*

At the same time, several interviewees described persistent hopes that technological adaptation measures such as artificial snowmaking will allow ski tourism to remain viable in the future. This continued trust in technological solutions and the uncertainty surrounding long-term climate projections contribute to relatively cautious and incremental adaptation approaches on the local level.

> "S Thema vom Klimawandel isch ja eigentlich bekannt, müesst ja hüt eigentlich jede gmerkt gha dass mer eppis muess mache, das mer ned so chan wiiterfahre. Trotzdem han ich immer no de idruck, dass die Bewegig vil z langsam gaht, dass die Beharrigstendenze vil z gross sind, dass mer zum Teil immer no lieber de Chopf in Sand steckt und seit "es isch ja guet, de nechscht schnee chunnt wieder""

"The issue of climate change is, of course, well known; surely everyone must have realised by now that we need to do something, that we can't carry on like this. Nevertheless, I still get the impression that the movement is progressing far too slowly, that the tendency to stick to the status quo is far too strong, that some people still prefer to bury their heads in the sand and say, 'It's all right, the next snowfall is on its way'" (2)

"bide Beschneiig simmer eifach, stand aktuell zumindest uf die chalte Temperature agwiese. Klar, wir als [tourist actor] glaubed natürlich a d Zuekunft vo dem. Seg das die technisch Beschneiig oder generell, es chan natürlich au Naturschnee geh. Und ja, i de Hoffnig dass das denn au i 50 Jahr no so wird sii.(...) Studie gits, vergliichbar mitem Wetterbricht, gits hunderti und die richtig finde isch schwierig"

"As of now, for snowmaking, we are dependent on the cold temperatures. Of course, as a [tourist actor], we naturally believe in the future of this. Whether that means artificial snowmaking or natural snow in general, it can, of course, also be natural snow. And yes, we hope that this will still be the case in 50 years' time. (...) There are studies, much like weather reports; there are hundreds of them, and it's difficult to find the right ones" (9)

Even when adaptation-based tourism development measures are prioritised, interviewees highlighted that implementation processes are often slow and resource-intensive. Large tourism transformation projects require extensive planning, actor coordination, funding acquisition, and bureaucratic procedures, which significantly extend project timelines (1, 2, 5, 6, 7). Because local actors operate with limited resources, long-term adaptation projects regularly compete with urgent operational challenges and other immediate political or economic concerns.

„Das sind denn jetzt es paar Projekt wo is rolle chömed und das bruucht Ziit, das bruucht Geld und denn chamer ned gliichzitig no anders."

"There are a few projects that are currently underway, and that takes time, it costs money, and you can't do anything else at the same time." (6)

Despite these challenges, some interviewees perceived local adaptation efforts as moving in a positive direction, displaying positive sentiments towards the collective local mindset.

„S Mindset zum jetzige Ziitpunkt stimmt und das wird sich wiiterentwickle so wie sich au s Klima wiiterentwicklet."

"The mindset is right for the moment, and it will continue to evolve just as the climate continues to evolve." (6)

6 Discussion

In this section, the empirical results are discussed, synthesised, and situated within the existing literature. Where suitable, new literature from related research is introduced to compare with the findings from the interviews and the document analysis. The theoretical frameworks introduced in section 3 serve to position the findings and analyse them structurally. To ensure clarity, the structure of this chapter mirrors the thematic sequence of the results.

First, section 6.1 synthesises how nationally and internationally determined adaptation goals are translated into the local context, focusing on how actors operationalise adaptation within tourism and the role that mainstreaming strategies play in shaping this process. Next, section 6.2 discusses local actor networks and key roles in adaptation governance, positioning the observed lack of an institutionalised regional intermediary within current academic debates. Following this, section 6.3 considers the primary institutional and economic barriers and conditions specific to tourism governance, which influence potential development pathways. Subsequently, section 6.4 examines the local understanding and framing of adaptation, with a particular focus on the potential long-term consequences arising from these selective rationalities. Based on the topics discussed, section 6.5 recapitulates on the focus of this thesis and specifically answers the research questions. Finally, section 6.6 reflects on the limitations of this thesis.

6.1 Mainstreaming of Adaptation Policy into Local Governance

Mainstreaming is widely understood as a key approach for successful adaptation governance and can play an important role in bridging the adaptation implementation gap (Braunschweiger & Pütz, 2021; Runhaar et al., 2018; Widmer, 2018). In the scope of this discussion, mainstreaming is understood both as the integration of adaptation objectives into strategies and policies as well as into projects or measures. The interviews suggest that several mainstreaming processes are functioning successfully, as adaptation objectives formulated in national and cantonal strategies regularly enter regional and local discourse and are partially integrated into tourism planning and project development. However, the diffusion of adaptation considerations across governance levels is weakened by the lack of binding legal obligations (Widmer, 2018) and institutionalised coordinating actors (Probst & Hohmann, 2019). As a result, the responsibility for integrating and operationalising adaptation objectives often falls to motivated intermediary actors, such as STAG and regional developers.

These findings highlight how adaptation governance in Swiss tourism emerges through multilevel interactions between federal strategies, cantonal funding structures, regional

intermediary actors, and local tourism networks rather than through hierarchical implementation processes alone. As can be seen in Figure 7, the translation of adaptation across the administrative levels is highly influenced by diverse dynamics and interactions between the involved actors. Especially at the regional and local levels, where adaptation and funding enter local governance, actors such as the STAG and the regional developer strongly shape the success of adaptation mainstreaming (see Figure 7). Their central coordinating role among local actors, and especially the regional developer's position within funding streams, contribute to their impact on the success of mainstreaming.

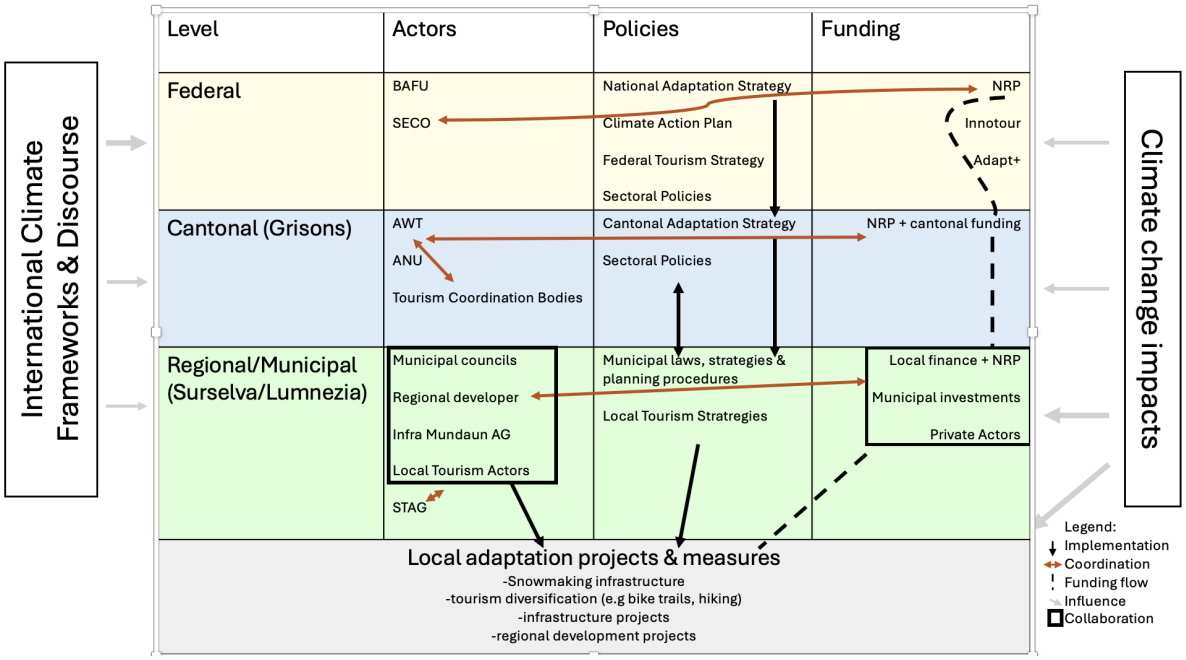


Figure 7: Actors and Structures Influencing Adaptation and Tourism Development in Lumnezia

At the same time, local projects are rarely explicitly framed as "climate change adaptation", but instead enter governance processes under the labels of tourism development, infrastructure expansion, or regional development. This indicates that adaptation considerations are partially mainstreamed into existing tourism governance structures rather than implemented through dedicated adaptation policies. However, in economically-oriented sectors such as tourism, where sectoral objectives do not necessarily align with environmental adaptation goals, horizontal mainstreaming appears particularly important. The interviews highlight that the successful integration of environmental considerations into economic governance structures and funding instruments strongly shapes how adaptation is translated into local implementation processes. Due to the high dependence of municipalities and tourism actors on external funding, the orientation and strategic priorities of funding programmes such as NRP become highly influential in shaping local adaptation

pathways. In this context, successful add-on mainstreaming at the national and cantonal level directly influences the effectiveness of directed mainstreaming towards regional and local actors.

Table 4: Mainstreaming Strategies and Their Influence on Tourism Adaptation Governance in Lumnezia

Mainstreaming Strategy	**Evidence in Lumnezia**	**Influence on Adaptation Governance**
Add-on mainstreaming	STAG promotes biking and outdoor tourism alongside existing ski tourism structures. Adaptation is often framed as tourism development or diversification rather than explicit climate adaptation.	Facilitates local acceptance and implementation but risks reinforcing existing tourism pathways and limiting transformative adaptation. Adaptation potentially becomes integrated into existing tourism governance structures rather than fundamentally reshaping them.
Directed mainstreaming	SECO and AWT influence tourism development through NRP funding orientation and strategic tourism support. Funding structures prioritise economic development and innovation.	Economic development objectives strongly shape adaptation priorities and favour infrastructure-heavy projects that are compatible with existing tourism growth models. Environmental objectives are only slowly integrated into funding criteria.
Regulatory mainstreaming	Adaptation in tourism is only weakly institutionalised in law. National and cantonal strategies provide guidance, but there are few binding obligations for implementation on the local level.	Weak regulatory integration increases dependence on voluntary implementation, motivated local actors, and intermediary organisations. Adaptation priorities remain highly flexible and economically oriented.

Mainstreaming Strategy	**Evidence in Lumnezia**	**Influence on Adaptation Governance**
Inter- and intra-organisational mainstreaming	Notable coordination exists between municipalities, STAG, regional development actors, MTOs and cantonal actors. National and cantonal actors collaborate through committees and sectoral exchange structures.	Supports coordination, information exchange and collective planning processes. However, implementation remains dependent on informal communication structures and personal relationships between actors.
Managerial mainstreaming	Interviewees repeatedly highlighted the absence of institutionalised regional adaptation coordinators or climate managers. Adaptation responsibilities are distributed across already burdened actors and organisations.	Institutional voids limit continuity, long-term coordination capacity and systematic implementation of adaptation measures. Adaptation governance depends strongly on motivated individuals and intermediary actors.
Programmatic mainstreaming	Adaptation considerations are partially integrated into tourism development strategies and infrastructure planning, particularly regarding biking infrastructure and year-round tourism offerings.	Implementation remains selective and shaped by economic feasibility, operational priorities and the structural importance of ski tourism. Transformative adaptation pathways remain limited.

Table 4 provides a summarising overview of how mainstreaming approaches are present in the case of Lumnezia and how they influence adaptation governance locally. While several mainstreaming strategies are clearly observable and successfully employed within the tourism sector, particularly through directed, inter-, and intra-organisational approaches, their outcomes and influence on local governance remain uneven. In contrast, regulatory and managerial mainstreaming efforts are highly limited across governance levels. Although add-on, directed, inter- and intra-organisational, and programmatic mainstreaming appear to produce visible effects in adaptation governance, they rely almost entirely, with the exception of directed mainstreaming, on the personal initiative of regional and local tourism actors. These mainstreaming approaches are therefore only partially institutionalised, reflecting the complex entanglement of private economic and public actors in local tourism governance.

Furthermore, while mainstreaming proved effective in producing national and cantonal strategies and practice recommendations, its practical implementation at the local level relies heavily on non-governmental actors. This corresponds to Runhaar et al. (2018), who pointed out that although mainstreaming often appears successful in producing strategic and policy outputs, actual policy outcomes remain limited. Despite strategic efforts at both the national and cantonal levels, actors involved in local projects continue to demonstrate limited motivation and awareness regarding climate adaptation. The findings, therefore, suggest that successful mainstreaming into discourse and planning processes does not automatically translate into the political prioritisation of transformative adaptation measures. This gap closely aligns with the findings of Widmer (2018), who noted that while national adaptation strategies can deploy successful mainstreaming mechanisms, significant outcomes are often restricted to sectors where adaptation goals inherently align with pre-existing sectoral policy objectives. As Widmer (2018, p. 77) argues, "adaptation is integrated more substantially if it supports or overlaps with sectoral objectives and a long-term sectoral perspective". This lack of effectiveness of mainstreamingon strategies in sectors where goals might not naturally align supports the emergence and preservation of adaptation implementation gaps regarding the implementation of policies in the local scale.

Consequently, mainstreaming works best where adaptation interests align with existing sectoral objectives. In the case of tourism, this selective success is clearly visible. Mainstreaming has effectively promoted the diversification of tourism offerings, pushing actors who are heavily dependent on specific climatic conditions, such as reliable snowfall and temperature, to rethink their business models. However, in Lumnezia, it has so far failed to foster transformational change regarding broader tourism infrastructure or deep environmental restructuring. Planned projects and approved investments so far focus mainly on short- and medium-term infrastructure adjustments, leaving long-term strategic visions unaddressed. In tourism governance, adaptation objectives are frequently subordinated to economic development goals and the maintenance of tourism competitiveness, which limits the implementation of transformative adaptation pathways.

In Lumnezia, adaptation becomes operationalised primarily through tourism development and infrastructure planning rather than through explicit climate adaptation governance. Especially, the municipal administration does not actively push adaptation objectives but rather participates in tourism projects and supports them through funding. While this indicates successful integration into existing local governance structures, it simultaneously weakens the transformative orientation of adaptation by subordinating environmental considerations to sectoral economic objectives. By translating adaptation into economically compatible tourism development projects, mainstreaming may simultaneously facilitate

implementation while depoliticising more transformative debates about the long-term future of Alpine tourism.

Throughout the interviews, it became apparent that mainstreaming on the regional level is not only dependent on formal and institutionalised procedures and actors but can also emerge spontaneously and pragmatically through local actor networks. While an institutional void on the regional level was repeatedly highlighted, actors such as STAG, regional developers, or local tourism actors were identified as important facilitators and amplifiers for the integration of adaptation considerations into local governance. Mainstreaming is therefore not exclusively institutional but also partially emergent, relational, and actor-specific (Rahman & Hickey, 2019; Tanner et al., 2019). The interviews further demonstrate that adaptation remains a contested governance issue, in which future development pathways are continuously negotiated between actors with differing economic interests, temporal perspectives and understandings of regional development.

Most importantly, the analysis of the translation of adaptation into local governance has shown how fragmented and uneven mainstreaming functions are. While it can be argued that the sectoral foci defined by the SECO and AWT have been relatively successfully mainstreamed into the local tourism context observed in Lumnezia, the mainstreaming of environmental adaptation considerations remains limited. Even in local networks or projects where adaptation has entered the discourse and is considered in decision-making, it is often only prioritised when it aligns with other sectoral goals. The findings therefore suggest that the adaptation implementation gap in tourism governance is not characterised by an absence of implementation, but rather by the selective translation of adaptation objectives into economically compatible development measures. Adaptation is therefore not simply blocked, but transformed through sectoral governance structures, funding priorities, and local actor constellations. Mainstreaming can be seen as a factor that facilitates adaptation, but it does not guarantee transformative change in the policy field.

While Persson et al. (2016) highlighted the risk that mainstreaming may reduce the visibility and prioritisation of adaptation objectives, Baack et al. (2024) argued that, particularly in sectors strongly dependent on economic performance, mainstreaming can contribute to forms of incremental adaptation that are insufficient to close the existing adaptation implementation gap. These dynamics are partially observable in the case of Lumnezia. Climate change awareness has increased, and adaptation considerations have successfully entered local planning and development processes. However, the resulting measures remain largely centred around existing tourism structures and established development pathways. It appears that rather than fostering transformative adaptation, adaptation objectives are primarily integrated into tourism development and facilitate infrastructure projects that align with historically dominant economic logics and priori-

ties. As a result, adaptation is implemented selectively and in ways that largely reinforce existing structures. This increases the risk of limiting the local resilience and capacity for long-term adaptation.

The selective success of mainstreaming suggests that the adaptation implementation gap in Val Lumnezia is not a product of complete policy blockages, but rather a reflection of how climate objectives are structurally reshaped by localised commercial priorities. To understand why measures with temporally limited adaptation characteristics, such as snowmaking, are consistently favoured over transformative alternatives, it is essential to look beyond formal policy frameworks and examine the specific power dynamics and institutional arrangements that characterise the region's local actor networks.

6.2 Local Actor Networks and Coordination of Local Adaptation

Within multi-level governance literature, the critical importance of local and regional scales in climate adaptation processes is repeatedly emphasised (Bassi et al., 2026; Debela, 2020; Lecuyer, 2026; Rogers et al., 2023). In their analysis of the Swiss multi-level governance system, Braunschweiger et al. (2018, p. 4) conclude that "while adaptation may be decided and funded by actors at the national level, the actual implementation of concrete projects often takes place at the cantonal or local level". This vertical division of labour became highly visible throughout the interviews conducted for this study. National and cantonal actors repeatedly described their direct influence on local implementation as structurally limited. Conversely, local actors strongly emphasised that regional governance networks, intermediary actors, and informal exchange structures constitute the primary arenas shaping adaptation-related decision-making. Due to the relative absence of formal municipal adaptation strategies and awareness of national and cantonal ones, these informal regional networks gain increased importance as vital spaces where actors coordinate projects, exchange knowledge, and negotiate locally viable pathways.

The reliance on informality for information diffusion among local actors can be linked to the insights of Scherer and Schnell (2008), who underlined the central role of knowledge accessibility within regional development. The interviews revealed a persistent information asymmetry: local actors are frequently unaware of existing scientific knowledge, cantonal funding streams, or external best-practice examples. This deficit and the corresponding demand for greater scientific initiative and targeted information tailored to local actors echoes the findings of Matasci et al. (2014). They identified a lack of localised information regarding regional climate impacts and potential adaptation strategies as a primary barrier to increasing adaptive capacity. While the aforementioned local networks and informal exchange structures can partially compensate for this lack of directed knowledge diffusion, their effect is limited according to the results from the interviews.

While top-down platforms like *regiosuisse* exist to facilitate knowledge dissemination, local actors remain constrained by limited administrative capacities and rarely utilise these databases actively for strategic learning. Instead, they are highly dependent on interpersonal networks through which well-connected individuals diffuse relevant information. This local deficit further mirrors the findings of Leck and Simon (2013), who identified poor horizontal information sharing between municipalities as a primary impediment to effective adaptation. In interconnected regional tourism networks where municipalities, private actors and MTOs closely interact, this sharing of experiences among other regions with similar characteristics could therefore be extremely valuable.

In the case of Lumnezia, certain regional actors partially compensate for this institutional coordination gap by organically assuming intermediary functions. Specifically, STAG and the role of the regional developer have emerged as vital regional actors that facilitate communication between municipalities, tourism operators, and economic actors. While regional developers mainly serve an economic development purpose, the integration of adaptation considerations into their work can foster visible adaptation success. Through project coordination, these actors align disparate local interests and translate abstract national adaptation objectives into tangible and economically viable regional development strategies. Such "governance skills" by non-institutionalised actors or actors with different structural tasks can compensate for factors that would otherwise impede adaptation (Braunschweiger, 2022). Furthermore, these intermediaries perform a crucial democratic function: by actively communicating plans to the public, they secure the local community's buy-in and political majority support necessary to pass projects within the Swiss system of municipal autonomy. At the same time, these networks and their dominant actors strongly shape which adaptation pathways become feasible and are implemented. In the case of IMAG, where the MTO acts as one of the main actors, a clear orientation towards projects based around the existing mountain transport infrastructure is pursued (8).

While these local actor constellations can partially bridge the adaptation implementation gap, they also introduce significant systemic fragility. A distinct institutional void persists due to the absence of a formalised, dedicated coordination entity comparable to Austria's KLAR! framework (Probst & Hohmann, 2019), in which institutionalised regional managers act as permanent, specialised intermediaries. Their position aims to bridge the gap between national/scientific knowledge and local actors, and to write adaptation concepts, monitor progress, organise information sharing, and coordinate across municipal boundaries (Umweltsbundesamt, 2025, 2026). Consequently, adaptation in Lumnezia remains highly dependent on the personal motivation, availability, and voluntary engagement of a few key individuals. In policy implementation literature, this is referred to as

"implementation in dispersed governance" (Hudson et al., 2019, p. 3). Because these coordination roles are not structurally institutionalised, the regional adaptation trajectory remains highly vulnerable to staff turnover, while simultaneously fostering fragmented and uneven implementation dynamics across different municipalities and sectors. Braunschweiger (2022) emphasised the opportunities of managerial mainstreaming to increase local governance skills of actors directly shaping the networks and adaptation pathways in the region.

This section highlighted that while informal local actor networks and voluntary intermediaries successfully buffer existing information asymmetries, their reliance on personal initiative leads to systemic fragility and does not guarantee even coordination across municipal boundaries. To understand how these fragmented networks and institutional voids ultimately manifest as concrete planning choices, the following section will analyse the broader economic and institutional dependencies that shape actors' perceptions of future pathways.

6.3 Economic and Institutional Conditions Shaping Adaptation

6.3.1 Local Tourism Pathways

The strong involvement of municipalities and public funding in the winter tourism sector was repeatedly addressed throughout the interviews (1, 2, 3, 6). While interviewees emphasised that the economic and structural importance of tourism, and especially of the Alpine winter segment, for regional value and job creation justifies public involvement, this engagement is viewed critically in the literature. Derungs et al. (2019) argue that municipalities often either lack the technical knowledge or the necessary institutional distance to appropriately judge and steer these operations. This increases the risk that economically unfeasible operations are kept alive through public funding, thereby potentially impeding adaptation and transformation processes (Derungs et al., 2019).

These structural conditions, combined with the strong public and private involvement in a single tourism segment, create co-dependent relationships centred around the continued stability of ski tourism operations. Over time, such interdependencies can generate dominant synergies that become increasingly difficult to replace unless more attractive alternatives emerge and become viable. Therefore, incorporating climate adaptation into these environments may only become feasible if the synergy between climate adaptation and dominant tourism practices is perceived as beneficial by the actors involved in the organisational process (Uittenbroek, 2016). Similar dynamics have been observed in Guilin, where tourism development became strongly focused on a single form of nature-based tourism centred around the region's river landscapes (Ma & Hassink, 2014). Comparable

tendencies are visible in Lumnezia, where path formation within the tourism sector has become apparent. However, the case of Guilin also demonstrates that such development paths are not irreversible. Despite strong path formation, Guilin was eventually able to restructure its tourism offering towards more culturally and experience-oriented alternatives. This illustrates that while path formation can lead to path dependency and make shifts away from dominant development regimes increasingly difficult, these pathways can still be transformed when changing environmental conditions threaten the basis of the existing tourism model.

In the case of Lumnezia, the empirical findings highlight two particularly important factors contributing to path formation and the reinforcement of existing development pathways: regional funding structures (see section 6.1) and the localised guest structure. The guest structure functions simultaneously as a consequence of past infrastructure decisions and as a mechanism reinforcing current development priorities. Unlike forms of tourism characterised by novelty-seeking behaviour, Alpine winter tourism often generates highly stable repeat visitation patterns and deep emotional attachment to specific destinations (Clarke & Bowen, 2021; Stylidis et al., 2020). The diversification or replacement of ski tourism may therefore be particularly challenging, as destinations must not only compensate economically but also create alternative tourism offerings capable of generating similar forms of repeat visitation and long-term place attachment among returning guests (Bluewin news, 2024).

In Lumnezia, these dynamics are amplified by a limited number of hotel beds and a high concentration of second-home owners relative to the permanent local population (7). These second-home owners exert significant political and economic influence over the destination's trajectory, as their stable presence anchors the regional tourism economy (1, 2). Within this structural context, mountain biking is increasingly pursued as a viable diversification pathway because it mimics the winter model by fostering repeat use, skill progression, and long-term engagement with the landscape.

Ultimately, this rigid demand side strongly shapes what local tourism actors perceive as economically and politically feasible (Uittenbroek, 2016). While ski tourism dictates the composition of the guest structure, this clientele conversely solidifies the dominant position of the winter sector. The economic pressure to maintain infrastructure that appeals to this existing, highly valued market segment, in combination with external funding instruments that heavily subsidise these assets, stabilises the established developmental trajectory. This self-reinforcing loop incentivises local decision-makers to prioritise incremental adaptations that yield immediate returns, often conceptualised as "low-hanging fruit" (11). Interviewees from the national and cantonal levels highlighted that these trends might come at the cost of authentic and space-specific tourism alternatives. The

construction of a climbing tower (see section 5.4.1) exemplifies such an easy-to-implement diversification step. While it satisfies immediate infrastructure demands, it represents a generic, interchangeable offering that fails to leverage the unique, space-specific advantages and cultural landscape of Val Lumnezia (1,3).

The findings further suggest that adaptation is shaped by self-reinforcing organisational and economic routines. As argued by Uittenbroek (2016, p. 164), existing governance structures and practices can create "complementary effects", in which interrelated resources, infrastructures and practices become increasingly interconnected and economically efficient over time. In Lumnezia, ski tourism infrastructure, snowmaking systems, second homes, tourism funding structures, and regional economic dependencies create such complementary effects. Adaptation measures are therefore more likely to be implemented when they complement and stabilise these existing synergies rather than fundamentally challenge them. In doing so, they reinforce established development pathways and make alternative trajectories more difficult to successfully integrate into planning and implementation processes. This helps explain why adaptation is predominantly operationalised through diversification and the extension of existing tourism structures rather than through more transformative restructuring of the regional tourism model.

6.3.2 Barriers to Adaptation in Lumnezia

The following Table 5 summarises the barriers to adaptation based on Biesbroek et al. (2011) and gives a short overview of the barriers' manifestation in the case of Lumnezia. The barriers will thereafter be discussed and put into context regarding their impact on adaptation implementation.

Table 5: Adaptation Barriers in Tourism Governance in Lumnezia Based on Biesbroek et al. (2011)

Barrier	**Manifestation in Lumnezia**	**Influence on Adaptation Governance**
Conflicting timescales	Long-term climate risks compete with short-term operational pressures; slow implementation processes; seasonal tourism logic	Weak prioritisation of long-term adaptation; preference for incremental and economically secure measures

Barrier	**Manifestation in Lumnezia**	**Influence on Adaptation Governance**
Substantive, strategic and institutional uncertainty	Uncertainty regarding future snow conditions, technological viability of snowmaking, and future tourism demand; differing actor visions	Reinforces cautious and path-dependent adaptation strategies; limits transformative planning
Institutional crowdedness and institutional voids	Many actors are involved across governance levels, but there is a lack of institutionalised regional adaptation coordination	Unclear responsibilities; dependence on informal coordination and motivated intermediary actors
Resources	Limited financial, temporal and personnel capacities among municipalities and tourism actors; dependence on external funding	Restricts local initiative and long-term planning capacity; strengthens dependence on NRP and cantonal support
Fragmentation	Separation between environmental and economic governance structures; weak integration across sectors	Environmental adaptation objectives remain secondary to tourism development and economic priorities
Motives and willingness to act	Strong attachment to ski tourism and existing tourism structures; economic dependence on winter tourism	Supports continuation of existing development pathways and limits transformative adaptation
Lack of awareness and communication	General awareness of climate change exists, but adaptation is often not prioritised operationally	Adaptation enters discourse but only partially translates into implementation and prioritisation

All barriers identified by Biesbroek et al. (2011) are to some extent present in the climate change adaptation landscape of Val Lumnezia, although their relative influence varies substantially.

Conflicting timescales emerge as one of the most central barriers to local adaptation governance (Biesbroek et al., 2011). The short-term economic logic of tourism, political election cycles, and operational pressures generate temporal dynamics that compete di-

rectly with the long-term, gradually unfolding impacts of climate change. Interestingly, the previously discussed institutional voids at the regional scale actively reinforce this temporal mismatch. The lack of institutionalised coordination and long-term strategic steering weakens policy continuity across planning cycles, allowing short-term commercial and municipal concerns to override future-oriented adaptation objectives.

Furthermore, both the fragmentation between environmental and economic governance structures and regional institutional voids act as relevant hurdles. These findings align with those of section 6.1 and section 6.2, which show that the absence of an institutionalised intermediary and sectoral office fragmentation limited the horizontal mainstreaming of long-term considerations into local tourism governance.

This fragmentation heavily shapes how resources function as a barrier. While Matasci et al. (2014) identified raw economic constraints as the primary barrier to adaptation in the Swiss tourism sector, and Biesbroek et al. (2011) ranked resources as the least important, the case of Lumnezia presents a more nuanced dynamic. Access to financial capital is not the primary barrier; rather, it is the limited personnel and temporal capacity of local actors that hinders independent action. This creates a high dependence on external funding mechanisms such as NRP, linking local resource availability directly to the institutional fragmentation between environmental and economic cantonal offices. Consequently, external funding structures heavily dictate which projects receive structural support and can ultimately be implemented (see section 6.1).

Barriers related to motives, willingness to act, and substantive or strategic uncertainty further push the destination towards established development pathways. As discussed in section 6.3, strong economic and emotional attachments to ski tourism, combined with uncertainty regarding future climatic developments and localised risks, promote a cautious adaptation behaviour based on what actors already know. As a result, adaptation measures are predominantly implemented incrementally and in ways that remain strictly compatible with existing winter tourism assets. Conversely, a lack of awareness and communication appears to be the least influential barrier in Val Lumnezia. General awareness of climate change and its potential impacts was emphasised as high across all governance levels. However, as the local adaptation governance and implementation gap demonstrates, awareness alone does not automatically translate into operational prioritisation or concrete implementation when other institutional, economic, and political barriers persist.

Ultimately, the barriers identified in Lumnezia rarely operate in isolation. Instead, they act as an interconnected web that reinforces each other and hinders adaptation locally. While mainstreaming was beneficial for the integration of adaptation into local discourse,

it has been less effective at overcoming structural barriers related to economic dependence and institutional fragmentation. This closely corresponds to the findings of Runhaar et al. (2018), who identified a dynamic, reciprocal relationship between organisational routines, mainstreaming limitations, and systemic barriers. A similar interplay is evident in Lumnezia: weak managerial mainstreaming directly creates regional institutional voids, while vertical and horizontal fragmentation restricts the capacity of various state offices to unify adaptation strategies with local development frameworks. As adaptation objectives are only partially integrated into the economic governance structures that shape tourism development, their influence on funding priorities and local implementation remains limited. This creates a situation in which adaptation considerations can enter local discourse and project planning, but are often insufficiently prioritised when competing with established economic objectives. The findings, therefore, suggest that barriers and mainstreaming processes are closely intertwined. Limitations in mainstreaming contribute to the persistence of adaptation barriers, while existing barriers simultaneously constrain the effectiveness of mainstreaming efforts across governance levels.

The lock-in and path formulation dynamics discussed in this section demonstrate that the path dependencies and structural barriers that tie Lumnezia to its winter model not only hinder physical implementation but also directly shape how local actors perceive climate change and potential adaptation to it. To unpack how these institutional and economic constraints influence the cognitive boundaries of local governance, section 6.4 will analyse how the framing of adaptation reflects underlying dynamics and how actors prioritise adaptation in governance structures.

6.4 Framing and Prioritisation of Adaptation

In their comparative work on adaptation governance in India and Switzerland, Dupuis and Knoepfel (2013) address the institutional difficulties associated with implementing projects that are explicitly framed as climate change adaptation. In contrast, vulnerability-centred adaptation (VCA), which focuses less on climate change as an isolated phenomenon and more on resolving the structural, economic, or environmental vulnerabilities that constrain adaptive capacity, proves more successful in reaching the execution phase (Dupuis & Knoepfel, 2013). Because VCA framings are generally perceived as more politically and economically tractable than abstract climate narratives, they can be strategically employed by governance actors to increase a project's legitimacy, prioritisation, and feasibility of implementation. The framing of projects can therefore directly influence the political prioritisation and enable accelerated processes.

In the context of Alpine winter tourism, measures such as the merger of ski-lift companies or the modernisation of tourism infrastructure can be legitimised far more easily

when framed as direct responses to immediate economic vulnerabilities and regional development needs, rather than as explicit climate adaptation measures. In Lumnezia, this dynamic is directly visible, as several projects discussed by interviewees were justified primarily through the logic of regional economic development and tourism competitiveness rather than explicit climate objectives. Measures such as the expansion of snowmaking infrastructure, the construction of new cycling paths, and the upgrade of mountain transport networks were primarily framed as necessary investments to secure economic viability and ensure continued regional attractiveness. While these developments are shaped and coordinated by diverse actor networks (see section 5.2), their framing remains relatively consistent. Similar tendencies were observed in Austrian Alpine tourism destinations, where key actors regularly presented their infrastructure investments as sustainable strategies without explicitly referring to them as climate change adaptation strategies (Ausserladscheider, 2026, p. 3). Especially interviewees at the national and cantonal levels repeatedly criticised such infrastructure-based understandings of tourism development and the loss of destination authenticity, revealing a misalignment between local and national understandings of tourism adaptation pathways.

Based on the predominant understanding, local actors rarely referred to planned initiatives as climate change adaptation, opting instead for labels such as infrastructure development, tourism diversification, or the modernisation of the destination's offering. Embedding adaptation within dominant local economic rationalities and detaching it from its explicit climate change character profoundly influences how environmental and transformative aspects enter local implementation processes. Whether these selective framings emerge as an inevitable consequence of structural constraints and limited top-down mainstreaming or represent a deliberate strategic choice by local actors to ease project approval remains difficult to isolate.

Nevertheless, these empirical findings closely align with the conflict between environment and development described by Leck and Simon (2013, p. 1224), wherein environmental considerations are frequently subordinated to short-term economic promotion. While awareness of climate change and its general future impacts is high across all governance levels, some local actors voiced persistent uncertainty regarding the precise downscaling of future climate projections (see section 6.3.2). Crucially, this localised uncertainty produces a behavioural default: actors prioritise investments and projects that feel tangible and secure, precisely because they align with established tourism trajectories and pre-existing infrastructural plans. Similar tendencies in winter tourism destinations are highlighted by Ausserladscheider (2026), who argues that conceptually decoupling climate change impacts from the long-term viability of ski tourism allows decision-makers to rationalise further infrastructure investments. By framing these projects as immediate

economic necessities, actors can promise future growth without recognising that they are reinforcing existing path-dependencies and potentially facilitating maladaptive outcomes.

A clear example of this dynamic is artificial snowmaking, which was perceived ambiguously by interviewees across different levels. At the local level, however, snowmaking remains highly prioritised by tourism actors. This priority is crystallised in the planned projects by the IMAG, where the lion's share of capital is designated specifically for artificial snowmaking infrastructure (IMAG, 2026). Within these initiatives, immediate economic value creation is prioritised, leaving it highly contested whether a transformative restructuring of the local tourism offering can prevail before the skiing infrastructure becomes increasingly climatically inoperable. This conflict is exacerbated by the fact that environmental actors possess only limited influence over local tourism development trajectories (1, 3), highlighting the steep institutional barriers to integrating long-term ecological considerations into economically driven regional planning without successful mainstreaming across all levels and sectors.

These dynamics may become critical when evaluating the long-term implications of adaptation prioritisation. When measures are primarily legitimised through short-term economic benefits and their compatibility with existing business models, there is a recognisable risk that adaptation efforts reinforce rather than reduce structural climate vulnerabilities. Consequently, these localised prioritisation processes may inadvertently drive forms of incremental adjustment that stabilise a vulnerable tourism system in the short term, while systematically blocking the emergence of more transformative, climate-resilient adaptation pathways. Magnan et al. (2016) offer a framework with four critical dimensions to identify and prevent potential maladaptation, wherein they define maladaptation as adaptation efforts that unintentionally increase long-term vulnerability. Due to their long-term implications, maladaptive practices are often difficult to identify as they occur. Maladaptation literature, however, offers opportunities to identify potentially maladaptive practices.

The risk of maladaptation becomes more pronounced through investments in hard infrastructure, which increases the sensitivity of the sector to future climate shocks (Magnan et al., 2016). "A major issue with large infrastructural developments is the way they commit capital and institutions to trajectories that are difficult to change in the future. Whilst in the past large infrastructure projects may have had some success, in the future such path dependent responses may lead to decreased flexibility to respond to unforeseen changes in climatic, environmental, economic and social conditions" (Barnett & O'Neill, 2010, p. 212). This quote from Barnett and O'Neill (2010) aligns with the fears and worries voiced by national and cantonal interviewees who pointed out that for many low- and medium-altitude ski resorts, skiing is temporally limited for the future, and current

and future financial investments in sustaining the sector need to be done carefully and thoughtfully (1, 2, 3, 5).

While many of the planned and ongoing projects in Lumnezia may strengthen short-term economic resilience and maintain regional competitiveness, they also exhibit characteristics associated with maladaptive pathways identified in climate adaptation literature. In particular, the sole prioritisation of economically viable and politically feasible projects risks reinforcing existing dependencies on climate-sensitive winter tourism structures and may narrow the scope for more transformative and resilient adaptation approaches in the future. Rather than constituting direct maladaptation, the findings, therefore, point towards emerging maladaptive tendencies and potential lock-in dynamics that may shape future adaptive capacity.

Crucially, these maladaptive tendencies are not confined to the preservation of winter infrastructure but extend to the very measures framed as sustainable alternatives. As Ausserladscheider (2026) demonstrates, an unrestricted expansion of summer and year-round tourism can also function as a form of maladaptation. Her study on (mal-) adaptation in tourism focuses on the destination Seiser Alm in Italy. Despite a more intense tourism model and further progression towards year-round tourism offerings in the destination, discussing these developments as potential pathways with implications provides an informative conceptual lens for Val Lumnezia. While actors across all administrative levels frame initiatives such as new cycling paths or regional diversification strategies as a progressive shift away from climate risk, this structural move often deepens the municipality's overarching socio-economic dependence on the tourism sector as a whole. Instead of decoupling the region from environmental vulnerabilities, a commercial focus on year-round visitor volumes can intensify pressures on localised ecosystems and reduce community wellbeing through intensified visitor presence. Consequently, the prevalent understanding and framing of adaptation as tourism diversification must be critically evaluated. It potentially risks transferring climate vulnerability and increasing economic dependency rather than providing a shift away from structural path-dependencies.

6.5 Answering the Research Questions

To evaluate the multi-level governance dynamics shaping climate change adaptation in Val Lumnezia, this section synthesises the empirical findings against the three guiding research questions. The answers to the respective questions are given in the three subsequent subchapters.

1. How is climate change adaptation integrated into local tourism governance in Val Lumnezia, and how do local actor constellations influence its interpretation and

prioritisation?

2. How do governance structures, policy frameworks, and intermediary actors influence the coordination and implementation of climate change adaptation in tourism?
3. In what ways do actor dynamics, economic dependencies, and institutional arrangements shape adaptation priorities and development pathways in the tourism sector?

6.5.1 Discursive Framing and Selective Prioritisation of Local Adaptation

Climate change adaptation is not integrated into the local governance of Val Lumnezia through formal, dedicated climate strategies, but instead primarily through existing tourism development and infrastructure planning structures. Rather than being treated as a distinct policy field, adaptation is integrated into broader discussions about the future development of tourism and the region.

This integration is shaped by a dominant local actor constellation consisting of the mountain transport organisation (MTO), the regional destination management organisation (DMO), and the municipalities, who collectively negotiate future development pathways within local governance arenas such as the Infra Mundaun AG (IMAG). Although municipal administrations possess only limited capacities and specialised climate expertise, municipalities nevertheless play an influential role in adaptation governance due to their strong involvement in tourism development and their close connections to key tourism actors.

Consequently, adaptation measures are rarely articulated as explicit climate adaptation initiatives. Instead, they are framed under terms such as tourism development, diversification, or infrastructure projects. This economic framing allows local actors to align responses to the effects of climate change with local development priorities and gain political support for their implementation. As a result, adaptation becomes embedded within broader tourism governance rationales, but often loses its explicit climate focus and long-term strategic orientation.

6.5.2 Institutional Voids and Funding Rationales

The vertical coordination and execution of adaptation in Alpine tourism remain heavily dictated by institutional voids at the regional scale, policy fragmentation across cantonal offices, and the inherent design of state funding mechanisms. Funding structures such as the NRP and, in specific instances, adapt+, serve as the primary instruments for mainstreaming adaptation and tourism-related objectives into local contexts because most tourism actors rely on external funding for project realisation.

A particularly interesting finding of this research is the identification of the ways in which the design of important funding instruments attenuates the integration of long-term ecological criteria into project selection. Because these instruments are designed for economic use, they lack a structural ecological or sustainability mandate. This deficiency trickles down to the local implementation level and limits the ecological and long-term climate resilience orientation of projects funded through NRP. This bottleneck reflects a broader institutional fragmentation between economic and environmental national and cantonal offices, which severely limits the horizontal mainstreaming of climate policy.

Furthermore, while national and cantonal authorities are highly effective at producing rich strategic baselines and actionable policy recommendations, there is a pronounced lack of a formalised, institutionalised mechanism to diffuse these insights down to the municipal level. Consequently, national non-governmental organisations and regionally vital tourism actors, such as the regional DMO and the regional developer, have partially taken on the roles of information distributors and project facilitators on their own initiative. Nevertheless, interviewees repeatedly highlighted the systemic absence of a designated, institutionalised climate coordinator at the regional scale. Drawing a contrast to Austria's KLAR! framework, where dedicated regional climate managers are explicitly funded, these findings suggest that the Swiss governance model, which relies heavily on bottom-up, local initiative, requires a localised coordination and support entity. Without such a formal entity or a completely new approach to bridge the current mainstreaming and adaptation implementation gap, the execution of long-term sustainable adaptation initiatives will remain dependent on the goodwill of motivated intermediary actors and informal, fragmented governance networks.

6.5.3 Economic Path-Dependencies and Incremental Adaptation

Actor dynamics, economic dependencies and institutional arrangements strongly influence how adaptation priorities and development pathways are negotiated within the tourism sector. Local adaptation decisions are embedded within a broader socio-economic context characterised by a high dependence on tourism revenues, established winter tourism structures, and relatively stable visitor groups. Especially second-home owners and repeat visitors who share strong recurring expectations regarding tourism infrastructure and winter offerings wish for development that aligns with their vision of the destination's tourism offering.

These structural conditions shape what local actors perceive as economically viable and politically feasible. At the same time, they contribute to the persistence of existing development pathways centred around winter tourism. While regional and cantonal actors increasingly try to promote diversification strategies and a transformation towards year-

round tourism offerings, local adaptation efforts and adaptation discourse in Lumnezia remain closely connected to the continued functionality and competitiveness of the ski tourism sector. The tension between short-term revenue and the need for long-term adaptation to climate risks that are not yet tangible challenges transformative future projects that misalign with economic investment cycles.

As a result, adaptation priorities frequently focus on measures that are compatible with existing tourism structures, such as investments in tourism infrastructure, snowmaking, or the expansion of complementary summer offerings. Rather than representing a fundamental transformation of the tourism model, many of these measures can be understood as incremental adaptations that seek to reduce vulnerability while maintaining the economic foundations of the destination. These continued investments in infrastructure consequently increase the need to amortise the investments through the financed infrastructure, which potentially leads to focused investment cycles. The findings therefore suggest that adaptation pathways in Lumnezia are not only shaped by climatic considerations, but also by existing economic dependencies, actor interests and institutional arrangements, which collectively influence how future development opportunities are interpreted, prioritised and implemented.

6.6 Limitations

Several limitations should be considered when interpreting the findings of this thesis. First, the study is based on a single case study of adaptation governance in a winter tourism destination. This case was selected because of Lumnezia's pronounced dependence on winter tourism and its increasing exposure to climate change impacts, which provide a particularly illustrative context for investigating adaptation governance dynamics. While this focus enables an in-depth analysis of local governance processes and facilitates the identification of actor dynamics, institutional conditions, and barriers, these findings are highly context-specific and may differ substantially in other tourism destinations. Furthermore, by concentrating primarily on ski tourism, climate-sensitive tourism activities such as hiking, biking, or nature-based tourism were only considered to the extent that they emerged within the interviews.

The selection of interviewees presents an additional limitation that merits further methodological reflection. While the sample included actors from various governance levels and sectors, certain viewpoints are underrepresented in this study. In particular, broader engagement with local actors, female participants, second-home owners, residents without direct ties to the tourism sector or from more peripheral parts of the study area, and tourists themselves would have offered a richer and more nuanced understanding of local adaptation processes. The perspectives of these groups could illuminate aspects of

adaptation dynamics not fully captured in the present analysis. In a similar vein, more extensive input from national-level actors on mainstreaming processes and adaptation governance would strengthen the reflexive depth of the methodological approach. Recognising these missing perspectives is important for interpreting the scope and limitations of the findings.

While this thesis provides an overview of ongoing and planned tourism development processes in Lumnezia, it focuses primarily on actors' perceptions and interpretations of these developments rather than on evaluating their effectiveness. It analyses adaptation governance rather than adaptation performance. Evaluating adaptation effectiveness in terms of resilience gains would require longitudinal data, outcome-based metrics, and alternative methodological designs such as impact assessments or long-term monitoring, which are beyond the present study's focus. Nevertheless, it is noteworthy that one interviewee proposed long-term economic viability as a potential proxy indicator for adaptation success in tourism destinations, highlighting an avenue for future, outcome-oriented research.

The findings must also be interpreted in light of the positionality of the interviewees. Interview statements do not represent objective truths but rather reflect the perspectives, experiences and priorities of the actors involved. Given that many interviewees are directly connected to the tourism sector, their positionality may influence how adaptation processes are perceived and presented. Consequently, these statements should be regarded as actor-specific viewpoints, which may emphasise particular dimensions or rationales aligned with their backgrounds, rather than as wholly neutral or detached accounts of adaptation governance and outcomes.

The chosen qualitative coding approach involves a degree of interpretation. While efforts were made to ensure transparency and consistency throughout the analytical process, the identification and emphasis of themes remain partially subjective. Other researchers might therefore highlight different aspects of the interview material or draw alternative conclusions from the same dataset.

Finally, the findings presented in this thesis capture adaptation governance at a specific moment in time. The interviews revealed a highly dynamic and evolving governance landscape in which actor constellations, political priorities and development trajectories can change relatively quickly. The trends and dynamics identified in this study may therefore develop differently in the future.

7 Conclusion

This thesis set out to address the limited attention paid to the translation of adaptation into local governance contexts, specifically within the academically underexplored tourism sector. By analysing the underlying structures and dynamics of tourism development in Lumnezia, this study contributes to a deeper understanding of the factors that influence the success of mainstreaming and adaptation within complex multi-level governance constellations.

In conclusion, the findings highlight that, despite the strategic richness on the national and cantonal level, evolving adaptation policies and ongoing efforts to mainstream adaptation across governance levels, the integration of adaptation into local governance remains limited. The empirical results emphasise how the translation of adaptation into local tourism governance remains strongly shaped by local actor constellations, economic dependencies and existing development pathways. Adaptation objectives are frequently entered into local governance processes, but are rarely implemented as dedicated adaptation measures. Instead, they are integrated into tourism development, infrastructure planning and regional diversification strategies, where they are negotiated alongside economic and political priorities.

While mainstreaming was partially successful in bringing adaptation considerations into local decision-making processes, these considerations were often subordinated to existing tourism development logics and sectoral objectives. Consequently, local projects were primarily shaped by the requirements of funding structures, perceptions of economic feasibility and socially accepted visions of regional development. The findings therefore suggest that adaptation governance in Lumnezia is characterised less by a lack of adaptation than by a selective and economically conditioned implementation of adaptation objectives.

The repeated emphasis on the absence of an institutionalised coordinating entity further illustrates how adaptation governance remains dependent on motivated intermediary actors. In Lumnezia, the regional manager and the regional DMO partially filled this institutional gap by facilitating coordination, knowledge exchange and project development. However, a reliance on spontaneous local initiative and informal actor networks does not guarantee the long-term prioritisation of adaptation objectives or the systematic diffusion of adaptation knowledge and capacities. Addressing this structural vulnerability represents a critical lever for increasing future mainstreaming success.

The findings, therefore, indicate that the adaptation implementation gap in Lumnezia is less defined by a total lack of adaptive action and more by how adaptation objectives are translated, reframed, and prioritised within the constraints of economic viability and pre-existing governance arrangements. As a result, adaptation in Lumnezia currently ap-

pears to follow incremental pathways that remain closely aligned with existing tourism structures. The destination finds itself at a strategic crossroads between further reinforcing its dependence on ski tourism and its associated infrastructure or pursuing a more transformative reorientation of regional tourism development in response to a changing climate. To ensure sustainable development pathways, it will be crucial to incorporate more long-term reflection into future projects and to examine potentially maladaptive practices.

7.1 Action Recommendations

Based on these findings, several potential actions can be recommended to improve local adaptation governance.

First, the criteria for national funding instruments like the NRP should be more closely coupled to the climate resilience of proposed projects. If public funds are used for projects aimed at enabling transformation, they must be paired with alternative measures that actively reduce future vulnerability to climate change. Furthermore, stronger integration of adaptation goals into other sectors and funding strategies on the national level is needed, as better mainstreaming on the horizontal axis directly improves mainstreaming vertically. Second, following STAG's lead, the region should focus even more on a cohesive regional tourism offering in which individual destinations complement one another through distinct seasonal orientations. This regional approach could enable single MTOs and tourism actors who are currently strongly dependent on ski tourism to gradually shift toward different forms of value creation, supported by the financial stability generated by other diversified actors within the region. Choosing a participatory approach and including the key actors, such as second-home owners, would be a crucial aspect in this strategic shift. Finally, introducing a designated adaptation entity on the regional level could complement the regional manager's position. This entity would be tasked with coordinating adaptation efforts inside the region, thereby making long-term transformation and sustainable development both politically and financially feasible for smaller municipalities like Lumnezia. Additionally, it could bridge the knowledge gap and make strategies and goals defined at higher governance levels accessible to regional tourism actors, therefore increasing mainstreaming success.

7.2 Future Research Opportunities

In this thesis, I have identified governance constellations and tourism development pathways present in the case of Lumnezia. Investigating how the strategic decisions made by IMAG and the development plans for the region play out in the near future would be highly interesting. It could be especially enlightening to investigate how further climate

change and increased local effects influence the behaviour of local tourism actors. This could pose an opportunity to find out at which point local actors perceive transformative adaptation as the only desirable option. With regard to Ausserladscheider (2026), it would also be highly interesting to see how long-term developments and a potential expansion of year-round tourism affect the region, and whether similar problems to those the Italian tourism destination Seiser Alm emerge. Future research could also build on this thesis's findings by expanding the perspective and comparing adaptation governance across multiple Alpine tourism destinations, including a broader range of actors. Comparative research could help identify which barriers and governance dynamics are specific to Lumnezia and which occur more broadly across mountain regions. Especially the comparison with regions and countries that take different approaches, such as Austria's "KLAR!" framework, could be useful to see how proposed improvements hold up in different environments. Additionally, further research could investigate how perceived climate risks influence adaptation priorities and development pathways in tourism destinations. As highlighted by Braunschweiger (2022), the perception of climate-related hazards can play an important role in motivating adaptation. It would therefore be particularly interesting to examine whether destinations experiencing more immediate and visible climate impacts display different governance dynamics, adaptation priorities or tourism development trajectories. Finally, future studies could focus more explicitly on the implementation phase, evaluating the effectiveness and long-term outcomes of adaptation measures in tourism, and thereby complementing the governance-oriented perspective adopted in this thesis.

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Appendix

Table 6: Overview of Interview Partners and Informants

Name	**Institution**	**Format**
Kevin Brunold	Surselva Tourismus AG	18.12.2025, Ilanz
Georg Thomann	ANU	18.12.2025, remote
Kristin Bonderer	AWT	30.12.2025, remote
Dominik Braunschweiger	WSL	29.01.2026, remote
Claudio Alig	Bergbahnen Obersaxen	20.01.2026, remote
Celine Meury	Regional Developer	04.02.2026, remote
Patrick Keller	Ski School Lumnezia	09.02.2026, Vella
Thomas Egger	SAB	31.03.2026, remote
Maren Kern	Mountain Wilderness	02.04.2026, remote
Thomas Probst	Planval	21.04.2026, remote
Daniel Soler	Lumnezia Municipal Council	24.04.2026, written

Interview Guidelines (Leitfaden Deutsch)

Der folgende Fragebogen definiert die Themen, welche ich im Interview anzusprechen gedenke. Je nach Richtung des Gespräches können Fragen angepasst oder weggelassen werden. Falls sich ein Thema als besonders spannend erweist, kann es auch sein, dass im Laufe des Gespräches noch mehr Fragen dazu aufkommen. Dieser Leitfaden gibt Ihnen als Interviewpartner:in die Möglichkeit, sich auf die Themen einzustellen. Ich bin dankbar für Ihre Zeit und Ihr Wissen.

Introduction

1a Stellen Sie sich vor? Wer sind Sie und in welcher Institution arbeiten Sie?

1b Beschreiben Sie, welche Berührungspunkte Sie im Alltag mit der Anpassung an den Klimawandel und dem Tourismus haben.

Governance

2a Welche föderalen Levels (Bund/Kanton/Gemeinde) und Akteur:innen beeinflussen Ihre Arbeit?

2b Wie nehmen Sie diesen Einfluss wahr?

Regional development

3 Was haben Sie für Erfahrungen (gemacht) bezüglich nationalen, kantonale und lokalen Klimastrategien und Plänen zur Regional- und Tourismusentwicklung?

4a Welche Veränderungen in der Regionalentwicklungen sind Ihnen im Rahmen Ihrer Arbeit aufgefallen und welche spezifischen Beispiele können Sie nennen?

4b Inwiefern denken Sie, hängen diese Veränderungen mit der Anpassung an den Klimawandel und den föderalen Strategien zur Anpassung zusammen?

Participation and ability to speak up

5 Wie funktioniert Ihre Kommunikation mit der politischen Ebene wenn es um Ihre Probleme und Herausforderungen geht?

6 Haben Sie Probleme dabei gehabt, wichtige Themen der Politik vorzulegen? Wenn ja, welche?

Awareness of support systems and frameworks *NRP, Innotour, adapt+, Tourismus Forum Schweiz, Klima Toolbox Surselva*

7 Sind Ihnen diese Akteur:innen und Programme bekannt und inwiefern hatten Sie schon Berührungspunkte mit ihnen oder anderen Förderinstrumenten für die Klimawandelanpassung?

8 Welche anderen föderalen Einrichtungen und Hilfsmittel sind Ihnen bekannt, die Ihnen bei Ihren Anliegen Unterstützung bieten können?

9 Wie nehmen Sie die Kooperation und Koordination zwischen Tourismusakteur:innen untereinander und mit der politischen Ebene in der Region wahr?

Perceived influence from administration and governance bodies

10 Wie zufrieden sind Sie mit dem, was die Gemeinde(n) in Bezug auf Klimastrategien und die Anpassung an den Klimawandel macht/machen?

11 Welche Beispiele für gute und schlechte Anpassung an den Klimawandel im Tourismus (in der Region) fallen Ihnen ein und wie sehen Sie die Rolle von künstlicher Beschneiung in der Klimawandelanpassung?

12 Können Sie eines oder mehrere Beispiele aufzeigen, wo deutlich wird, wie die Zusammenarbeit mit der Gemeinde oder dem Kanton (Graubünden) in Themen zur Klimawandelanpassung funktioniert? Wie zufrieden sind Sie mit dieser Zusammenarbeit?

Policy Implementation

13 Wie entwickeln Sie Strategien und Projekte in Bezug auf den Umgang mit dem Klimawandel und wie setzen Sie diese dann um?

14 Wie werden involvierte Akteur:innen dazu ermutigt, bei diesen Projekten/ Strategien mitzuwirken? Wie funktioniert dabei die Kommunikation mit den Betroffenen?

15a Wo sehen Sie das grösste Potenzial für zukünftige Entwicklungen im Bereich der Anpassung an den Klimawandel?

15b Wo sehen Sie die grössten Hürden für Akteur:innen, welche in der Klimawandelanpassung tätig sind? Welche Bereiche/Institutionen/Gesetze müssen dabei am meisten verändert/verbessert werden und wie denken Sie, gelingt dies am besten?

Future development plans and outlooks

16 Was denken Sie, wie wird sich die Region/ der Tourismus im Alpinen Raum naher und mittlerer Zukunft (bis in 50 Jahren) verändern/entwickeln?

17 Welche Probleme und Herausforderungen müssen in dieser Zeit am dringendsten bewältigt werden? Gibt es Ihrer Meinung nach ein ideales Szenario oder Vorgehen um diese Probleme zu bewältigen?

18 Was sollen politische Akteur:innen in der Zukunft verändern/ verstärkt beeinflussen?

19 Gibt es noch Themen oder Punkte, die Sie gerne ansprechen würden, welche in diesem Interview bisher noch nicht vorgekommen sind?

Qualitative Coding Scheme

The following Table 7 details the qualitative coding scheme applied to the semi-structured interview data. It illustrates the hierarchical relationship between the core thematic categories, localised subcategories, operational definitions, text anchors, and explicit inclusion/exclusion rules used during content analysis.

Table 7: Qualitative Content Analysis Coding Framework

Category	**Subcategory**	**Operational Definition**	**Anchor Quote (Original Transcript)**	**Coding Rules & Criteria**
Economic and Institutional Conditions	Financial constraints and incentive structures	Financial influences on adaptation pathways, encompassing economic incentives that catalyse adaptive measures or budget deficits that obstruct them.	«dass mer en teil vode chöschte so finanziegi kriegt Also das Projekt, isch NRP sehr wichtig grad für d Berggebiet zum neui Projekt chöne finanziere»	Statements must address financial capability, capital availability, or external funding streams directly enabling or constraining adaptation.
	Planning limitations	Structural, bureaucratic, or spatial planning hurdles that constrain or delay the strategic design and physical execution of adaptation measures.	«de fläschehals sind ingenieure und planer Es git halt ned meh planer im kanton. Es git au ned gneg kantonsagstel-lti wo das chönd prüfe (...) es isch sehr zäch» ¶	Must relate to localised administrative bottlenecks, institutional review backlogs, or technical design limits. Exclude financial and multi-level governance dynamics.

Category	Subcategory	Operational Definition	Anchor Quote (Original Transcript)	Coding Rules & Criteria
	Time horizon of measures	Temporal orientation and friction within adaptation actions, capturing the clash between long-term environmental hazards and short-term operational realities.	«Es git immer Lüt wo nachher chömed ich hans vor 15 johr scho gseit Ich han s gfühl bi uns isches mega präsent und ich empfinde dass mer au wirklich die richtig richtig schafft und wichtige player i die richtig»	Requires an explicit reference to temporal metrics, planning cycles, seasonal constraints, or long-term vs. short-term strategic horizons.
	Ski tourism as main driver	The absolute macro-economic dominance and structural priority assigned to the Alpine winter segment within regional development.	«d skigebiet im winter wo wichtige motore sind für die ganz destination und grad bide skigebiet bide jetzige situation merkemers natürlich wie mer abhängig sind vom Klima oder vom wetter»	Statements highlighting the structural indispensability, direct revenue contribution, or baseline reliance on winter ski sports within the valley.
	Economic dependency	The path-dependent lock-in and structural reliance of specific actors, corporate entities, or public networks on capital-intensive legacy assets.	«es sind denn au so investitionsspirale. Wemmer eimal inen skilift investiert het denn muess mer de au ammortisiere denn muess mer nomal es agebot für de summer schaffe, und so wiiter»	Explicit evidence detailing self-reinforcing financial loops, asset amortisation pressure, or business model constraints.

Category	Subcategory	Operational Definition	Anchor Quote (Original Transcript)	Coding Rules & Criteria
Mainstreaming of Adaptation	Vertical governance and access to decision-making	Multi-level institutional dynamics and relational friction dictating policy translation, power delegation, and actor feedback loops across governance scales.	«rein us politische gründ werdemer ned chöne d gmeinde zu irgendöppis verpflichte rein ufgrund vode gmeindautonomie, das würd bekämpft werde im grosse rat (...) also wemmer eppis wend durebringe müesst das uf stufe Bund passiere, zum bispil es verbot vo fossile heizige»	Must explicitly address at least one vertical dimension: power symmetries, cross-level collaboration structures, or the legal protection of municipal autonomy.
	Regulatory framework and institutional constraints	Statutory parameters, legal frameworks, and policy mandates that directly dictate or restrict local adaptation planning boundaries.	«Dann gibt's halt auch wenig oder keine Verpflichtungen gesetzlicher Art wie bei den grossen Unternehmen und Konzernen (...) es gibt da ein gutes Beispiel bei den Gemeinden im Vergleich zum Südtirol. Südtirol hat da vor Structural has introduced, dass alle Gemeinden verpflichtend einen Klimaanpassungsplan machen müssen.»	Must contain reference to statutory provisions, formal legal directives, legislative deficits, or mandatory vs voluntary policy implementation.

Category	Subcategory	Operational Definition	Anchor Quote (Original Transcript)	Coding Rules & Criteria
	Role and capacity of communal level	Local administrative competencies, resource baselines, and executive mandates available to municipalities for steering climate adaptation.	«oft sind bi eus die periphere Gebiet au d gmeinde die zentrale akteure vode entwicklig (...) wenn e gmeind das Thema addressiert und bewusst dra gaht chan au meh ide region gooo passiere»	Requires clear connection to local municipal boundaries, public administrative duties, or localised executive execution capacity.
Framing and Prioritisation of Adaptation	Framing of adaptation	The cognitive conceptualisation, discursive labelling, and narrative justification used by actors to frame climate responses.	«Also wemmer eus wend apasse an Klimawandel heisst das mer müend die Sommermönet stärker nutze wenn die Wintermönet chürzer werded. De Winter finanziert im Moment immer no au de Ufbau vom Summer (...) das müemer anebringe dass mer au übers Jahr chan überlebe»	The text must demonstrate a clear diagnostic or prognostic connection between perceived environmental shifts and corresponding sectoral adjustments.
	Prioritisation of adaptation	The explicit degree of strategic weight, political capital, and operational urgency allocated to adaptation actions within competitive policy spaces.	«aber klar für uns isch die beschneiig es wichtiges Thema wo jetzt sicher priorisiert wird und so gschwind wie möglich Ziel sölled erreicht werde» ¶	Requires direct references to resource ranking, explicit prioritising actions, or comparative evaluations of competing organisational goals.

Category	Subcategory	Operational Definition	Anchor Quote (Original Transcript)	Coding Rules & Criteria
	Raising awareness	The intentional diffusion of climate-related knowledge and the systematic communication of risk vectors to expand local adaptive capacities.	«Halt die Verbreitung von den guten Projekten, die es gibt. Das wird zu wenig promotet, es wird zu wenig zielgerichtet und nutzergerecht verbreitet. Das muss ja jemand machen.»	Evidence must highlight active communication strategies, knowledge exchange barriers, public outreach efforts, or signalling mechanisms.
Local Actor Networks	Regional and horizontal collaboration	Inter-municipal partnerships, horizontal steering bodies, and collective planning networks operating within the localised destination landscape.	«das sind die zwei Territorialgmeinde, Obersaxen Mundaun und Ilanz und d Bergbahne wo eigentlich jetzt au die Planig finanziered. Denn mir sind i dere Gruppe, Lumnezia isch au mit dine zum mitübercho was lauft, de Verteter vode IG Zweitwohnungsbesitzer isch dine, de Präsident, das mer die wichtige Komponente au mit am Tisch het zum s begleite»	Must highlight horizontal multi-actor structures, cross-sectoral task forces, or regional collaborative forums operating within tourism development.

Category	**Subcategory**	**Operational Definition**	**Anchor Quote (Original Transcript)**	**Coding Rules & Criteria**
	Participation and communication	The collaborative channels, public participatory instruments, and feedback arenas utilised by local networks to include actors in policy design.	«ich glaub i dene destinatione funktioniert das sehr guet das was ich mitkrieg... Destinationsübergreifend im Summer no chli meh als im winter Ich glaub im winter isch mer no chli meh ad skigebiet bunde»	Statements detailing structures that enable, facilitate, or constrain multi-actor participation, community vocalisation, or public feedback loops.

Personal Declaration

I hereby declare that the submitted thesis is the result of my own, independent work. All external sources are explicitly acknowledged in the thesis.

AI has been used in this thesis as follows:

- Translation and stylistic improvements using DeepL translator.
- Correction of spelling and stylistic improvements using Grammarly.
- Formulation and structure suggestions of my own text using Gemini 3 and ChatGPT 5.5.
- Assistance in finding relevant sources for my literature research using Gemini 3 and ChatGPT 5.5.

All text parts created by AI have been checked by me, the author of this text. I take full responsibility for the text.



Jari Kern 26.06.2026, Zürich