The Sustainable Tourism Observatory of South Tyrol (STOST)

Annual Progress Report – 2023 edition

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UNWTO INSTO World Tourism Organization International Network of Sustainable Tourism Observatories

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We thank the INSTO network and the Sustainable Development of Tourism Programme of the United Nations World Tourism Organization (UNWTO), chaired by Dr. Dirk Glaesser, for the excellent platform for networking and knowledge exchange. We also thank the Autonomous Province of Bozen/Bolzano and IDM South Tyrol for their invaluable collaboration in the realisation of this study. Furthermore, we would like to extend our heartfelt thanks to partners and colleagues that kindly shared both data and precious advice. They are all listed on our website.

Recommended Citation:
Windegger, F., Wallnöfer, V., Walder, M., Corradini, P., Cornella, F. (2023). The Sustainable Tourism Observatory of South Tyrol (STOST). Annual Progress Report – 2023 edition. Bolzano: Eurac Research.

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Foreword

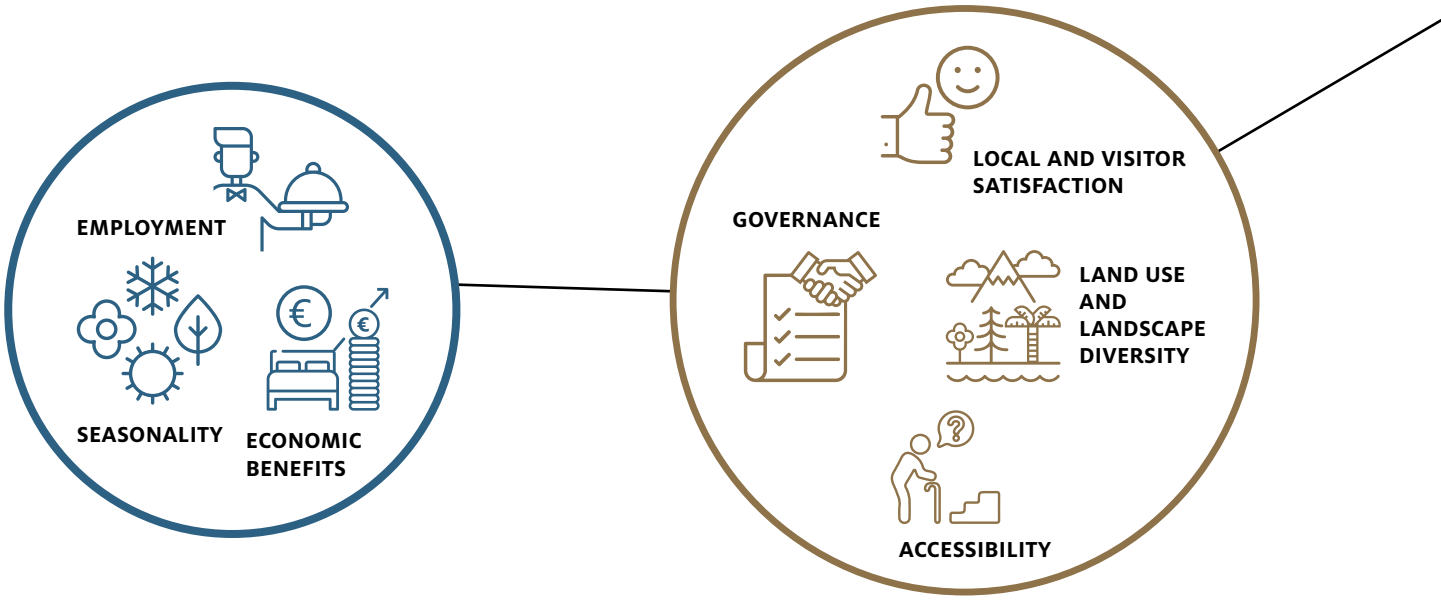
South Tyrol's participation in the International Network of Sustainable Tourism Observatories (INSTO) of the World Tourism Organisation (UNWTO) is of great importance for the current and future tourism development of the Province. After all, the main challenge and objective is to pursue a more sustainable form of tourism, which can only be achieved on the basis of in-depth data. INSTO is slowly but steadily becoming a kind of "destination conscience" for South Tyrol, a guideline for what can be considered sustainable and what cannot. The entire debate on sustainability in tourism still suffers considerably from a credibility problem, since the term sustainability is used for almost anything today, also as a promise for a high-quality products or experiences. Unfortunately, across the world, not every tourism product lives up to that promise. Thus, the identification and selection of indicators in different areas becomes crucial as a basis for monitoring in order to more easily determine what is meant by sustainability and what can be communicated as such. There is no single definition of sustainability; the term rather expresses the overall global effort to keep resource consumption within planetary boundaries and, accordingly, push for development models that don't require an overconsumption of natural resources, thereby allowing future generations to have access to those same resources. To put it more simply, sustainability means an increased focus on achieving major goals, such as reducing inequality, poverty or hunger, achieving climate targets and, ultimately, developing economic and social systems in line with these goals. Sustainable tourism is a form of tourism that is future proof in the sense that it does not lose sight of the next generations and is based on responsible and sensible use of available resources, leading tourism stakeholders as well as guests towards more conscious consumption practices. The INSTO project gives tourism stakeholders in South Tyrol the opportunity to access data and information that can help to create and sharpen this awareness, show interconnections, and provide guidelines to become more resilient. At the moment, this means above all answering the question of whether it is sufficient to achieve pre-Covid-19 tourism numbers, or whether it is rather necessary to develop and strengthen a form of tourism that is no longer exclusively concerned with quantities and capacities but focuses on qualitative growth instead. Transformation is an attitude and mindset that makes it possible to pursue the right paths on the basis of our common sustainability goals.

Harald Pechlaner
Head, Center for Advanced Studies, Eurac Research

Executive Summary

Sustainable tourism "takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities" (UNEP & UNWTO, 2005). STOST – the Sustainable Tourism Observatory of South Tyrol – monitors, evaluates, and communicates tourism developments in the Autonomous Province of Bolzano/Bozen (Italy). It examines social, ecological, and economic benefits and costs of tourism for South Tyrol, and provides recommendations and guidelines for policy makers to support sustainable tourism management.

After an almost complete lack of touristic activity due to the Covid-19 pandemic in 2020 and small steps towards recovery in 2021, the year 2022 marks the moment of full recovery for the sector in South Tyrol. Indeed, in 2022, 7.9 million arrivals and 34.4 million stays were registered in South Tyrol, surpassing the numbers of the pre-pandemic record year of 2019. Simultaneously, the long-term trend towards more beds per accommodation facility (i.e. larger facilities) has continued, just like the trend towards higher star categories of hotels. In addition, accommodation services outside of traditional hotel structures, such as campsites, private accommodations and agritourism ventures, are growing in importance, making up 64.8% of all accommodation facilities and providing 34.6% of all beds. Finally, concerning the origin of guests, in 2022 we can observe a return to the pre-pandemic market distribution, with German (48.4%) and Italian (31.5%) guests being responsible for the bulk of overnight stays.

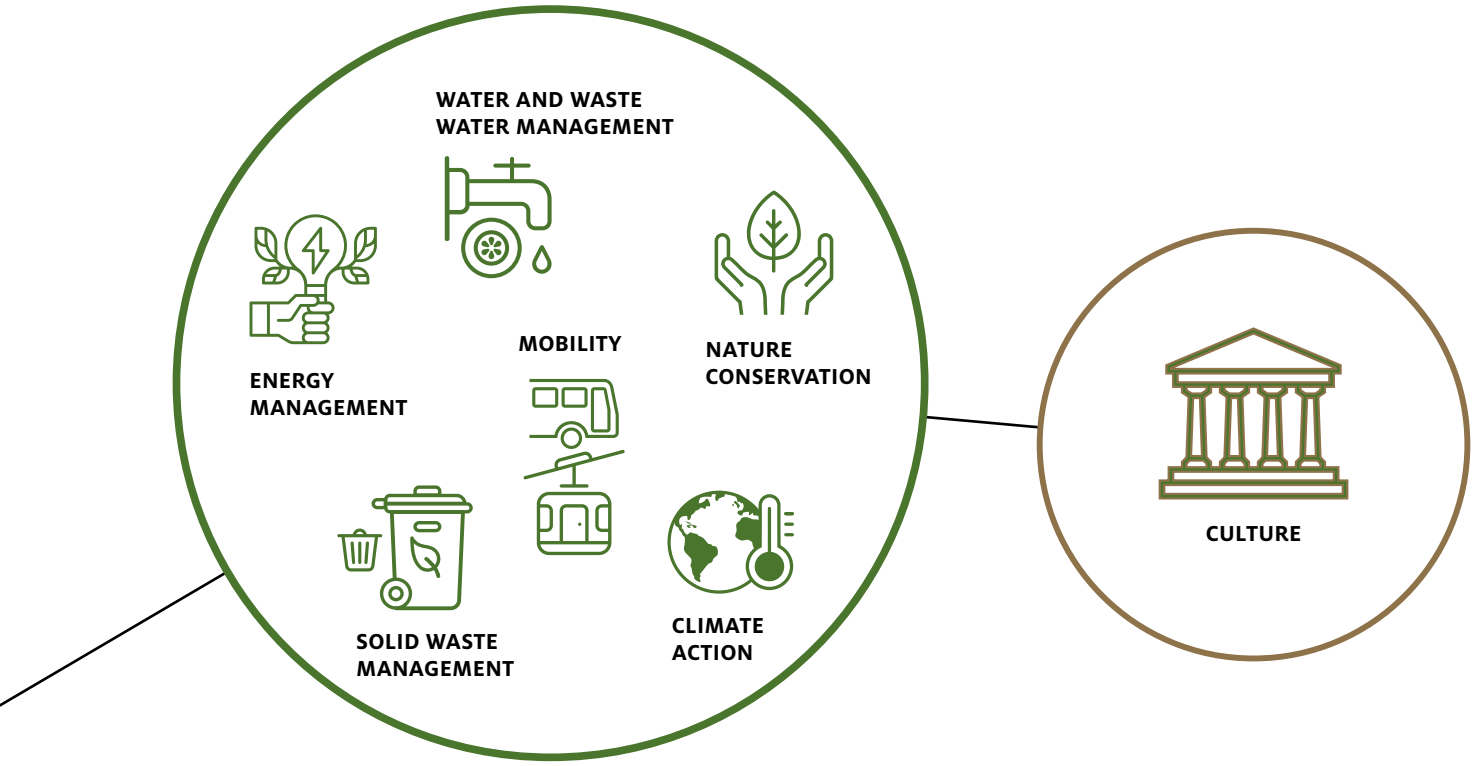


1 Seasonality

After a slight alteration of the seasonal arrival and overnight stays patterns due to the travel restrictions during the Covid-19 pandemic, 2022 saw a realignment of the tourism flows. These comprise the classic bi-seasonality which characterise mountain tourism destinations, which exhibit one peak during the summer, and one during the winter season. Although peak weeks are still mainly concentrated in August, the share of overnight stays in this month decreased from 26.9% in 2021 to 17.8% in 2022, which is a convergence towards the pre-pandemic overnights distribution for August in 2019 (17.1%).

2 Employment

Encompassing on average 13.7% of the overall workforce of South Tyrol between the years 2017 and 2019, and fully recovering from the pandemic years of 2020 and 2021, in 2022, during which the tourism flows started to normalise, the share of employees of accommodation and food service sector encompassed 14.2%, surpassing the pre-pandemic year 2019 by 0.3 percentage points. The share of female led tourism enterprises saw a slow but steady increase from 34.9% in 2014 to 36.4% in 2022, representing a positive trend towards female leadership development and gender equality. In 2022 65% of the tourism workforce were Italian nationals, followed by non-European citizens with 12.9%, 12.5% citizens of EU member states after 2004, 7.5% citizens of other European (non-EU) countries and 2.2% citizens of the EU-15 states.



3 Economic benefits

Based on the currently available information regarding the year 2020, the gross the value added of the accommodation and food service sector saw a decrease of 696.5 Mio. € to 1,924 Mio. € during the pandemic year. This corresponds to a decrease of -26.6% in respect to 2019 and represents the sharpest decline of all the South Tyrolean NACE Rev2 categories. The earnings situation for accommodations, restaurants, and bars and cafes saw an increase from 68.8% of enterprises reporting a good or satisfactory profitability in 2021 to 91.7% in 2022, which can be further divided up into the restaurant subsector (95.7%), bar & cafes (92.0%) and accommodation (91.3%). After the sharp drop to 26.1% due to the pandemic in 2020, and a slight recovery to 28.4% in 2021, in 2022 the gross occupancy rate of bed places in accommodation structures saw an increase to 40.5%, which represents a convergence to the pre-pandemic level of 2019 (41.0%).

4 Governance

After the dip of all relevant numbers regarding certifications in the tourism sector during the Covid-19 period, numbers in 2022 reached "before-covid" heights again. A total of 156 municipalities, accommodation facilities and events were involved in voluntary certification schemes for sustainability in 2022, an increase of 6.7% since 2019. The number of "Red Rooster" branded agrotourism ventures and "Red Rooster" labelled products reached an all-time high in 2022, with 85 ventures selling 844 different products. As in the years before, organic milk accounted for 25% of the milk sold to the members of the main local buying syndicate in comparison to non-organic milk.

5 Local and visitor satisfaction

The tourism intensity index increased by 44.5% from 2021 to 2022 and reached 17.6. average daily overnight stays per 100 inhabitants in South Tyrol, thus surpassing the previous peak of 17.3 from 2019. The index varies a lot among municipalities, with Corvara/Corvara in Badia at the top (199.6) and Branzoll/Bronzolo at the bottom (0.7). Minimum rent prices also vary according to the municipality's tourism exposure. Those with a high tourism exposure featured on average 3.21 €/m² higher minimum rent prices in 2022 than those with a low tourism exposure, which constitutes an increase of 15.6% from the values of 2013.

6 Energy management

The estimated minimum electricity consumption in accommodation facilities increased by 44.1% in 2022 compared to the previous year because of the general increase in tourism after the pandemic-related years and reached a new peak of 284.0 GWh. In 2019, this number amounted to 8.7% of South Tyrol's total electricity consumption; the data of the total electricity consumption are not yet available for 2022. The data regarding the electricity consumption of cable cars and snow guns is only available until the year 2020, where it reached 134.4 GWh, an increase of 5.8% from 2019.

7 Water management & 8 Waste water management

Our estimation regarding the minimum water consumption in accommodation facilities shows similar tendencies to electricity consumption: an increase of 44.5% between 2021 and 2022 could be observed, thus leading to a new peak of 7.9 million m³ in 2022. The water use by snow guns in the winter season of 2021/22, however, only increased slightly and reached 7.7 million m³, which is still below the peak of 2018/19 of 10 million m³ but is 25.7% higher than the values of 2012/13. Regarding waste water generation, the lack of data persists as in the previous year, and no indicator could be monitored.

9 Solid waste management

Similar to energy and water consumption, the estimated waste production in accommodation facilities also increased by 44.7% compared to 2021, which constitutes a long-term increase of 18.6% compared to 2013. The new peak value of 2022 therefore consists of 68,131 tonnes of waste.

10 Mobility

The latest numbers on ski-lift and cable car usage show the full effect of the Covid-19 restrictions. In 2020, during the summer season their use decreased by 27% compared to 2019. For the winter season it looks even grimmer; the numbers plummeted by 92.3%, which means the businesses were almost completely closed. The number of loading stations for e-mobility, on the other hand, is continuing its rise. Since last year, both the number of stations in hotels and stations in public increased (2.9% and 4.5% respectively). The number of activations and uses of Mobilcards by tourists increased by 192.3% and by 163.9% respectively from 2013 to 2019. The pandemic halted this upwards trend, though it is expected to continue in the years to come.

11 Land use and landscape diversity

In 2022 most beds of accommodation facilities are located in residential areas (41.2%), 37.4% were located in agricultural zones (mostly Red Rooster establishments) and 9.8% in various other land use zones. The remaining 11.6% of beds were located in areas for tourist facilities, special zones dedicated to touristic use. But only 101 municipalities made use of this designation zone in 2022. The towns with the highest pressure accommodation facilities put on residential zones could be found in the west of the province, especially in Gröden/Val Gardena. The average density in 2022 was 23.1 beds per hectare.

12 Nature conservation

Natural protected areas with their geographical extension and zones where potential tourism impacts and risk of biodiversity loss are expected can be shown by a cartographic overlap of protected areas and tourism intensity. The proximity of municipalities with intensive tourism to protected areas highlights the importance of managing tourism flows to prevent overloading of and potential damage to these ecosystems, especially around the city of Meran/Merano and in the Dolomites.

13 Culture

Tourists in South Tyrol could visit 104 official museums in 2021. In the year 2019 there were still 111 facilities operating. Most museums hereby can be found in municipalities with average Tourism Exposure (63). Thematically, the biggest number of museums can be categorized as Town/village museums, art museums and natural history museums. Looking at the portion of tourist visitors, they make for almost 79% of total visitors of museums in South Tyrol.

14 Climate Action

In 2022, car-related emissions attributable to inbound tourism in South Tyrol amounted to 103.9 kilotonnes CO_2 equivalents. This is 1.5% more than in the pre-pandemic record year of 2019 and equals around 8.8% of all traffic-related emissions produced in South Tyrol in that year. In order to reduce touristic car-related emissions in the long term, various measures are necessary, the most important of which is the promotion of alternatives to individualised, fossil-fuel-based traffic (e.g. public transport, e-mobility), both for the arrival/departure of guests and their movement within the destination. Additional measures should aim at monitoring and reducing the energy consumption in accommodation facilities and of touristic activities more broadly and increase the share of renewables used across the whole touristic value chain.

15 Accessibility

South Tyrol is becoming a more accessible tourist destination, although in small steps. The number of accessible accommodation facilities (labelled by independent L.) has increased by almost 1% since last year to a total of 365 facilities. Similarly, the number of accessible gastronomy facilities increased to a total of 173 (+1.7% in comparison to 2021). An increase could also be observed in the number of accessible cultural facilities and free time activities: a total of 251 venues and events were labelled accessible.

South Tyrol in brief

South Tyrol is an Italian Autonomous Province and constitutes, together with the Autonomous Province of Trento, the region Trentino-South Tyrol, located in the northern part of the Italian Alps and bordering with Austria and Switzerland. The province has an area of 7,400 square kilometres and a total population of over 530,000. Its capital is the city of Bozen/Bolzano, with about 100,000 inhabitants, but it also has a few other small cities with more than 20,000 inhabitants (Meran/ Merano, Brixen/Bressanone and Bruneck/Brunico).

South Tyrol is officially a trilingual region, with German, Italian and Ladin speakers. The statute of autonomy came into force in 1972 and contains concrete measures to protect the German- and Ladin-speaking minorities, such as German and Ladin schools, minority language radio and television broadcasts, and administrative and law-making rights.

The territorial morphology is characterised by mountains and valleys. South Tyrol is known for its mountain areas and natural landscapes covering approximately 90% of the territory. A quarter of the South Tyrolean surface consists of protected areas (Morello & Oggiano, 2015). This includes those protected areas which form part of the core of the renowned Dolomites natural heritage site, declared a UNESCO World Natural Heritage (WHS) site in 2009 for its value in landscape aesthetics and its geologic and geomorphologic importance in science.

THE ROLE OF TOURISM IN SOUTH TYROL'S ECONOMY

Tourism plays a major role in South Tyrol's economy, contributing to 11.4% of the local GDP in 2019 with direct effects only (ISTAT, 2022). In the same year, more than 7.7 million tourist arrivals and 33.7 million overnight stays were registered in South Tyrol. This implies an increase of 87.3% in arrivals and 42.4% in overnight stays since 2000. This massive growth over the last 20 years came to an abrupt halt in 2020 when travelling restrictions were put in place as a reaction to the Covid-19 pandemic. Consequently, the numbers fell dramatically to 4.6 million arrivals (-40.0%) and 21.7 million stays (-35.5%), levels similar to those of 20 years ago. While the year 2021 showed only marginal increases, with the industry still struggling – especially during the winter months where virtually no guests visited South Tyrol – **Figure 1** clearly reveals that in 2022 the tourism industry was back on track. Indeed, in 2022, 7.9 million arrivals and 34.4 million stays were registered in South Tyrol (compared to 530,000 inhabitants). These numbers are even higher than those of the pre-pandemic record year of 2019 and hint at the fact that after the pandemic an entirely new challenge for tourism development in South Tyrol is arising, which is linked to emerging debates on overtourism and the pressures that tourist activity puts on both social and natural resources. In fact, given the high tourism intensity in many destinations, in the coming years it will become necessary to stop pushing for more quantitative growth and, instead, aim to redistribute the existing demand both geographically and between seasons. More broadly, it will be essential to redefine tourism development strategies for South Tyrol that explicitly consider limits to (tourism) growth and embrace social and ecological boundaries.

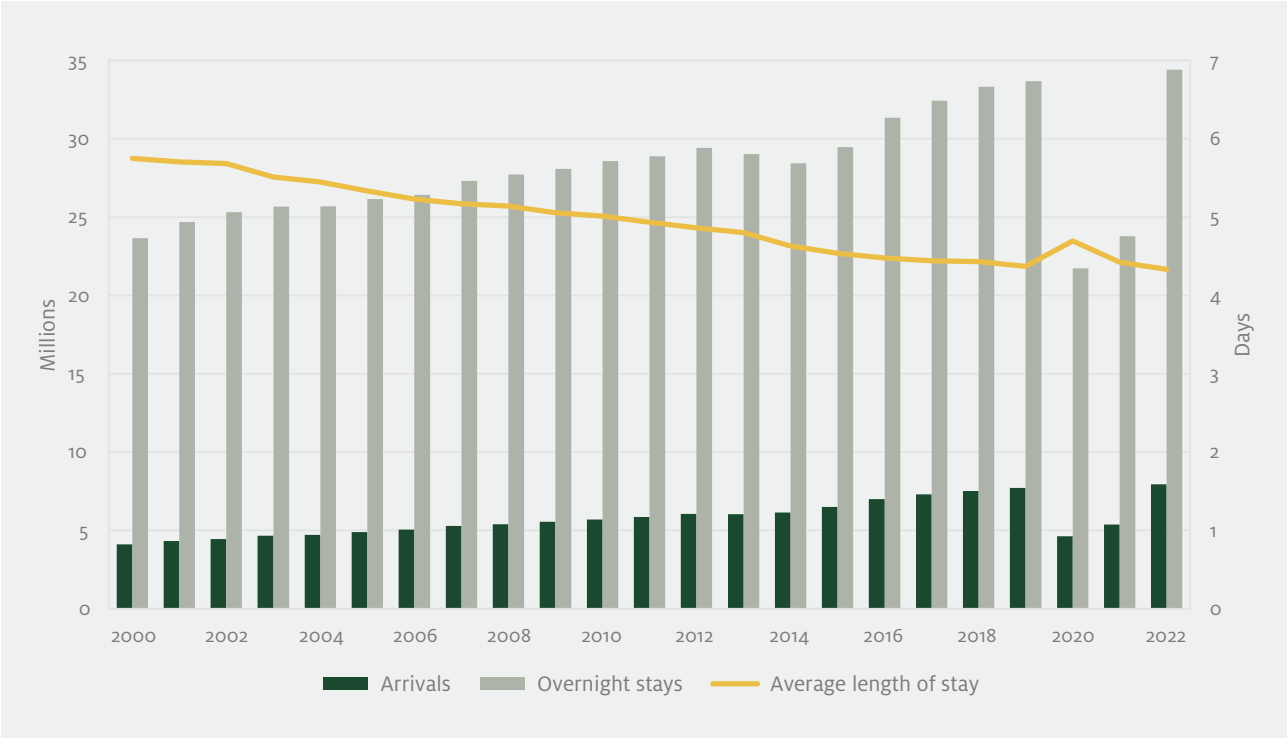


Figure 1: Tourist arrivals and overnight stays (left scale) and average length of stay (right scale) in all accommodation facilities, South Tyrol 2000-2022. Yearly data in millions.
Source: ASTAT, own elaboration.

When it comes to the number of hotels and similar accommodation facilities, the past two decades have seen a continuous reduction from 4,521 in 2000 to 3,920 in 2022 (-13.3%). On the other hand, the number of beds available has experienced an opposite trend, rising by 4.6% over the same period (from 146,147 to 152,936). This implies an increasing average bed capacity per accommodation (from 32.3 to 39.0), that is, bigger facilities. It is likely that this trend is connected to a shift in the quality of accommodation facilities. Indeed, as displayed in **Figure 2**, we can observe a continuous reduction of 1- and 2-star hotels: While in 2000 they made up 55.6% of all hotels and similar accommodation facilities in South Tyrol, in 2022, this share has fallen to 25.0%. Conversely, the share of 4- and 5-star hotels has drastically increased over the same period (from 5.0% in 2000 to 14.7% in 2022). A similar but much more modest increase can be observed for 3-star hotels (from 26.7% to 38.1%).

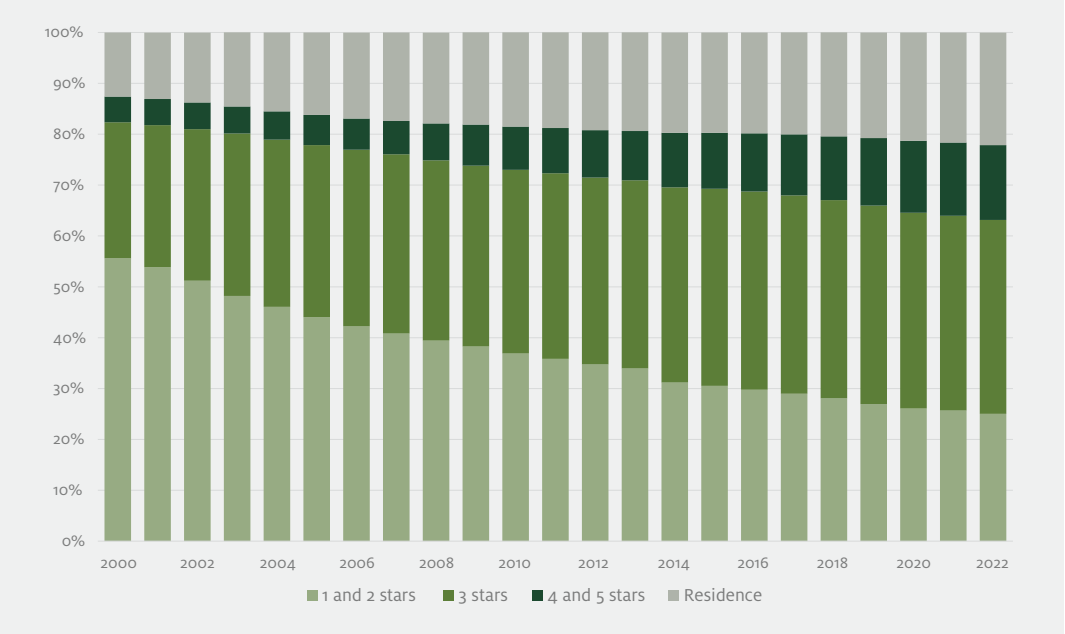


Figure 2: Hotels and similar establishments by accommodation category, South Tyrol 2000-2022. Percentage values.
Source: ASTAT, online database, own elaboration.

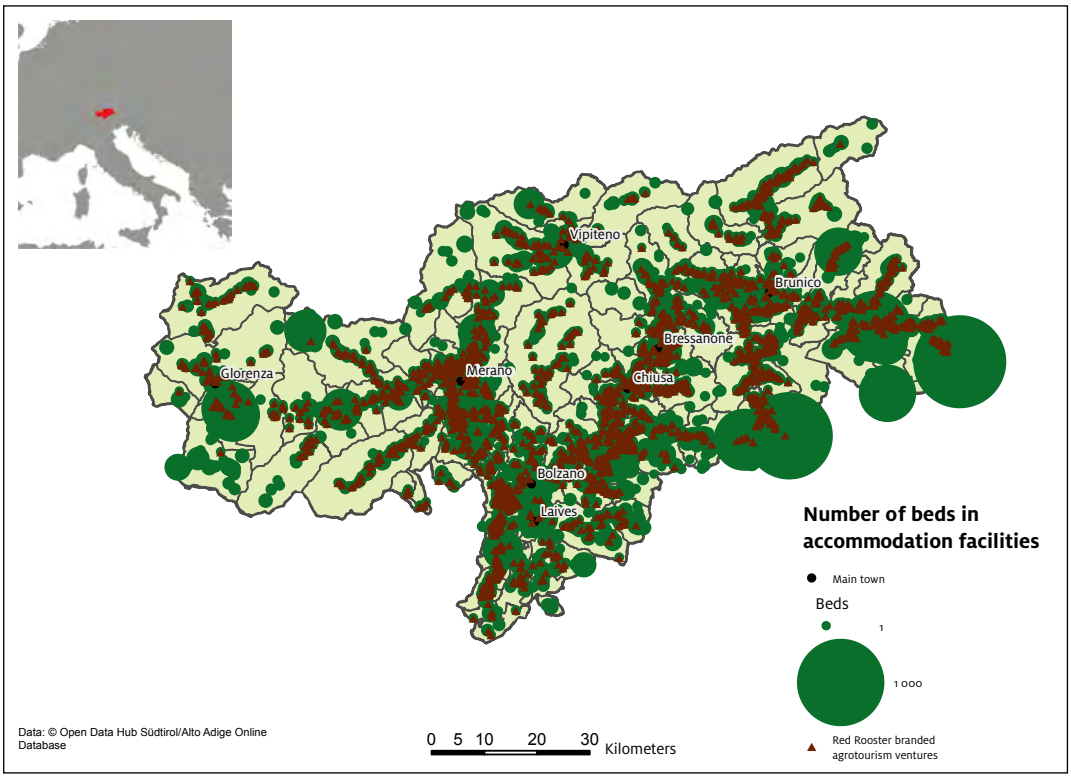


Figure 3: Location of Red Rooster branded agritourism ventures and beds of accommodation facilities.
Source: Open Data Hub Südtirol/Alto Adige, Online Database.

While the number of hotels and similar establishments has decreased over the past two decades, accompanied by a tendency towards higher quality and more beds per facility, the number of other accommodation services such as campsites, private accommodations, and agritourism ventures has increased during the same period, from 5,521 in 2000 to 7,208 in 2022 (+30.5%). Similarly, the overall number of beds in other accommodation services has increased by 23.9% (from 65,274 to 80,910). These numbers highlight the rising importance of services outside of traditional hotel structures. As of 2022, they make up 64.8% of all accommodation facilities and provide 34.6% of all beds, with a rising trend.

The tourism hospitality sector is spread over all South Tyrolean valleys, with a particularly high concentration of beds in the South-Eastern part of the province (see **Figure 3**). Also, agritourism ventures certified by the South Tyrolean quality label "Red Rooster" exist in almost all touristic areas, with only few exceptions. These exceptions are mostly mountainous areas at higher altitudes, which are unsuitable for farming activities typical for agritourism businesses.

Concerning the origin of guests, proximity markets clearly prevail over long-distance markets. The main tourist markets for South Tyrol are the "DACHI countries" (a German abbreviation for Germany, Austria, Switzerland and Italy). In the last two decades, Germany has consistently made up the largest bulk of tourists coming to South Tyrol, with German guests accounting for around 50% of all overnight stays. Their share fell to 41.7% in 2020 due to the Covid-19 pandemic and its resultant substantial reduction in international guests visiting South Tyrol. This loss of international tourism was in part compensated by Italian guests, whose numbers didn't fall as strongly. Consequently, with 40.7%, the Italian market made up a much larger part of the overall overnight stays in 2020 than usual. For 2022, we can observe a return to the pre-pandemic market distribution, with 48.4% of overnight stays being attributable to Germany, 31.5% to Italy, 4.6% to Switzerland and Liechtenstein, 3.5% to the Benelux countries, 3.31% to Austria, and 8.6% to other countries.

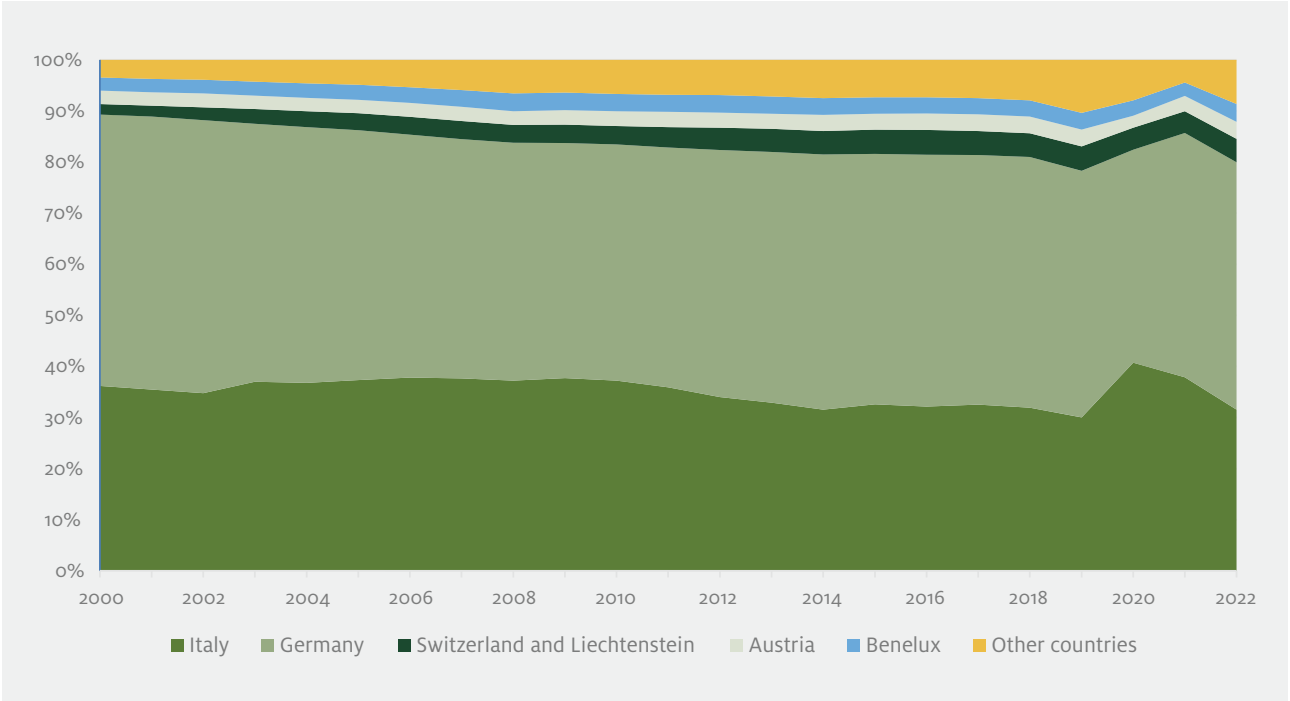


Figure 4: Overnight stays in all accommodation facilities by market of origin, South Tyrol 2000-2022.
Source: ASTAT, own elaboration.

STOST: A tourism intelligence tool

The Sustainable Tourism Observatory of South Tyrol (hereafter STOST) was launched in 2018. It belongs to the United Nations World Tourism Organization's (UNWTO) International Network of Sustainable Tourism Observatories (INSTO), a network of organisations monitoring the economic, environmental, and social impact of tourism at the regional level. The initiative is based on the UNWTO's long-standing commitment to the sustainable and resilient growth of the sector through measurement and monitoring, supporting an evidence-based management of tourism (**http://insto.unwto.org**). The observatory strives to achieve a series of objectives in line with the following vision and mission:

Vision

Through intersectoral and destination-wide cooperation as well as new monitoring and communication models, STOST seeks to contribute to the creation of a liveable socio-environmental habitat for South Tyrol's future generations and their guests.

Mission

STOST monitors, evaluates, and communicates tourism developments in South Tyrol. STOST examines benefits and costs of tourism for South Tyrol and provides recommendations and guidelines for policy makers to support sustainable tourism management. The enabling of a transformation of the tourism sector based on awareness, learning, and evidence-based decision making for different target groups of South Tyrol's society lies at its very core.

Objectives

Striving towards the achievement of the vision and implementation of the mission, various short-, medium- and long-term objectives for the observatory were elaborated based on a synthesis of expert interviews conducted during the preliminary phase of the STOST settlement. They can be divided into five overarching goals: (1) be in the loop of developments and regularly communicate them; (2) serve as a think tank promoting sustainability in tourism; (3) raise awareness and enable learning processes; (4) provide evidence for decision makers; (5) build trust between stakeholders and enable communication, cooperation, and networking.

More information on STOST and its structure as well as on related activities, news, and projects can be found on our website (**https://sustainabletourism.eurac.edu/**). In addition, a detailed technical description of all indicators is provided on the website, along with information on the data management workflow and an extensive list of organisations that have supported STOST in the past years, both with data and precious knowledge and advice.

Governance of STOST

The governance of STOST is shaped by many different actors within and outside the destination. The observatory was installed by the Center for Advanced Studies at Eurac Research in cooperation with the local destination management organisation IDM South Tyrol (abbreviation for Innovation, Development, Marketing) and the provincial government of South Tyrol. The former two institutions keep up to date thanks to regular monthly online meetings.

The stakeholder working group actively contributes to the development of the observatory by supporting Eurac Research in the design of monitoring issues, in data management and feedback processes, and in the validation of results. The stakeholder working group includes a) data providers, among which are, for example, the Provincial Statistical Office (ASTAT), the Chamber of Commerce and Industry, the local Environmental Agencies; b) support providers, such as, for example, the Free University of Bozen/Bolzano, the Hotel and Gastronomy Association (HGV), the Fair of Bozen/Bolzano, and other local research institutions and trade associations. A complete list of the organisations participating in the working group workshops is listed on our website.

Finally, additional organisations such as UNWTO, the National Ministry for Agriculture and the Ministry of Tourism, the provincial administration and international treaties such as the Alpine Convention support the advancement of the observatory by sharing their expertise and bringing in best practices. These entities are crucial because they offer benchmarking opportunities and access to a supra-regional knowledge network.

The last official stakeholder meeting was held online on March 17, 2023. Unlike in previous years, this year only representatives from the core organisations involved in STOST were invited – Eurac Research, IDM and HGV – as well as two representatives of the youth branch of the HGV, the HGJ (*Hoteliers- und Gastwirtejugend*), amounting to a total of 11 participants. The overarching aim was to discuss the achievements of the observatory so far, recent activities and contributions to local projects, and future challenges and new strategic directions. More specifically, with a particular focus on similarities and differences between GSTC (Global Sustainable Tourism Council) and INSTO criteria and procedures and how to best integrate the two approaches for a successful sustainable tourism governance in South Tyrol, recent developments linked to a newly created GSTC-certified Sustainability Label for South Tyrolean hotels and destinations were discussed (see Box: **Sustainability Program and South Tyrolean Sustainability Label**). Furthermore, important foundations were laid for the future of STOST by agreeing on strengthening the collaboration between the key stakeholders even further, for instance, through coordinated efforts to collect more data at company level and through a common engagement with the new Climate Plan 2040 presented by the Provincial Government of South Tyrol in July 2023, and, on this basis, by defining concrete goals and measures for the tourism sector to achieve climate neutrality. Furthermore, it was agreed that the pioneering role of tourism as the first sector in South Tyrol monitoring its sustainability performance systematically should be used to foster similar attempts in other sectors, increasing the overall sustainability of the economy and strengthening synergies between tourism and other sectors (e.g. agriculture, handicraft, or industry). An example of such an initiative is an ongoing collaboration between the Center of Advanced Studies of Eurac Research and the lvh.apa trade association for crafts and service providers in South Tyrol, with the aim to develop a future scenario for a more sustainable handicraft sector in South Tyrol.

A third new issue which was discussed at the last official stakeholder meeting is the organisation of a new conference format with the working title Transformation Tourism South Tyrol. This is a collaboration between Eurac Research and HGJ and will combine two well-established formats dealing with future-oriented and sustainable tourism development: on the one hand the Eurac Research-HGJ conference series, and on the other hand the official STOST stakeholder meeting. The aim is to address big global topics and challenges for the future of tourism and break them down to the South Tyrolean context, while also creating new synergies between tourism actors and forging even stronger relationships between the observatory and the young generation of tourism actors. The first edition of this new conference series combined with the new format for the STOST stakeholder meeting will take place on November 30, 2023. Finally, it was agreed that in the future the concept of transformation will play a much more significant role in the activities of STOST, since dealing with sustainability always also entails transformation processes in the social, political, cultural, and economic spheres. In order to shed light on these processes and explore the ways in which sustainable tourism and transformation are linked, a thematic box was included in this year's report that lays out some important conceptual foundations (see Box: **Social-ecological transformation and sustainable tourism monitoring**). In the future, we plan to operationalise these conceptual considerations and integrate the view on transformation processes into the monitoring activities of the observatory.

Find out more on our website!

Methodological strategy: how to measure and understand

In this report we refer to sustainable tourism according to the UNWTO definition, as a form of tourism that ***"takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities"*** (UNEP & UNWTO, 2005). Following this definition, "sustainability principles refer to the environmental, economic and socio-cultural aspects of tourism development", implying that a "suitable balance must be established between these three dimensions to guarantee its long-term sustainability" (ibid.).

The UNWTO guidelines for INSTO observatories propose eleven mandatory issue areas to monitor sustainability performance in tourism. These are: tourism seasonality, employment, economic benefits, governance, local satisfaction, energy management, water management, waste water management, solid waste management, climate action, and accessibility. Further monitoring topics are welcomed by the UNWTO to assess context-specific topics and issues. Based on 29 qualitative interviews undertaken with local and international tourism experts during the preliminary phase, the STOST research team defined three additional issue areas: mobility, nature conservation, and land use and landscape diversity. In the year 2020, an additional issue area on culture was added with the goal to measure the reciprocal effects of culture and tourism in South Tyrol. Thus, currently, STOST is monitoring 15 issue areas, which are depicted in **Figure 5**.

Figure 5: Mandatory (in black) and additional (in green) issue areas.
Source: own elaboration.

For each of these issue areas, indicators were selected with reference to international standards (e.g. European Tourism Indicators System for sustainable destination management – ETIS, Global Sustainable Council Tourism Criteria for Destinations – GSTC-D). This was done in collaboration with different administrative and private stakeholders. Some indicators were revised and improved over the years, based on the feedback of stakeholders gathered during "think tanks". These think tanks are viewed as opportunities – usually during a working group workshop for a specific issue area – to discuss emergent or innovative aspects in the respective fields for which quantitative data are often not available yet.

In view of the subsequent creation of a general indicator for sustainability (e.g. using the standard by Pulido Fernández & Sánchez Rivero, 2009), indicators were classified according to the DPSIR (Driving forces, Pressures, States, Impacts, Responses) framework (Burkhard & Müller, 2008). This framework enables the classification of indicators based on their typology as: a) driving forces of an impact (DF); b) indicators of pressure on the environment (P); c) indicators of the state of the environment (S); d) indicators of impact measured on the environment (I); and d) indicators of response typically undertaken by civil society to minimise impacts (R). **Table 1** illustrates the indicators and their classification. Beside each indicator, a circular symbol helps to identify the DPSIR typology, as well as the dimension it refers to: a blue circle indicates the economic dimension, a brown one the social-cultural dimension, and a green one the environmental dimension. In addition, a reference to the Sustainable Development Goals (SDGs) linked to each issue area is provided.

ISSUE AREA	INDICATOR	DESCRIPTION	DIMENSIONS	TYPOLOGY (DPSIR)	SDGS
1 **Seasonality**	**1.1**	Tourist arrivals by month and market	Economic	Driving force DF	
	1.2	Overnight stays by month and period	Economic	Driving force DF	
	1.3	Tourist arrivals in peak weeks by municipality	Economic	Driving force DF	
2 **Employment**	**2.1**	Employees in the accommodation and food service sector	Economic/ Social-cultural	Driving force DF	
	2.2	Female enterprises in the accommodation and food service sector	Economic/ Social-cultural	State S	
	2.3	Employees in the accommodation and food service sector by citizenship	Economic/ Social-cultural	State S	

ISSUE AREA	INDI-CATOR	DESCRIPTION	DIMENSIONS	TYPOLOGY (DPSIR)	SDGS
3 **Economic benefits** 	**3.1**	Value added by the accommodation and food service sector	Economic	Driving force DF	
	3.2	Earnings situation for the accommodation and food service sector	Economic	State S	
	3.3	Gross occupancy rates of bed places by municipality and tourism exposure	Economic	Driving force DF	
4 **Governance** 	**4.1**	Municipalities, accommodation facilities and events involved in voluntary certification schemes for sustainability	Environmental/ Social-cultural	Response R	
	4.2	"Red Rooster" branded agritourism ventures producing and selling regional products	Environmental/ Social-cultural	Response R	
	4.3	Organic milk sold to the members of the main local buying syndicate	Environmental/ Social-cultural	Response R	
5 **Local and visitor satisfaction** 	**5.1**	Tourism intensity index	Social-cultural	Pressure P	
	5.2	Difference in minimum rent prices by tourism exposure	Social-cultural	Pressure/ State P S	
6 **Energy management** 	**6.1**	Estimated minimum electricity consumption in accommodation facilities	Environmental	Pressure P	
	6.2	Electricity consumption of cable cars and snow guns	Environmental	Pressure P	

ISSUE AREA	INDI-CATOR	DESCRIPTION	DIMENSIONS	TYPOLOGY (DPSIR)	SDGS
7 8 **Water management** **Waste water management** 	**7.1**	Estimated minimum water consumption in accommodation facilities	Environmental	Pressure P	
	7.2	Water use by snow guns	Environmental	Pressure P	
9 **Waste management** 	**9.1**	Estimated waste production in accommodation facilities	Environmental	Pressure P	
10 **Mobility** 	**10.1**	Mobilcards, bikemobil Cards, museumobil Cards and guest tickets	Environmental/ Social-cultural	Response R	
	10.2	Ski-lift and cable car users by season	Environmental/ Economic	Driving force DF	
	10.3	Charging stations for e-mobility	Environmental	Response R	
11 **Land use and landscape diversity** 	**11.1**	Beds per land use zone and category	Environmental/ Social-cultural	Pressure P	
	11.2	Areas for tourist facilities	Environmental/ Social-cultural	Driving force DF	
	11.3	Bed density in residential zones	Environmental/ Social-cultural	Pressure P	
12 **Nature conservation** 	**12.1**	Endangered biodiversity in natural and protected areas in relation to municipalities by tourism intensity	Environmental/ Social-cultural	State/ Driving force S DF	
13 **Culture and tourism** 	**13.1**	Museums by type	Cultural	State S	
	13.2	Percentage of tourists of total museum visitors	Cultural	State S	

ISSUE AREA	INDICATOR	DESCRIPTION	DIMENSIONS	TYPOLOGY (DPSIR)	SDGS
14 Climate action 	14.1	Car-related CO_2 equivalent emissions from inbound tourism	Environmental	Pressure (P)	
15 Accessibility 	15.1	Accessible gastronomy and accommodation facilities	Social-cultural	State/ Response (S, R)	
	15.2	Accessible cultural facilities and free time activities	Social-cultural	State/ Response (S, R)	

Table 1: List of indicators and their classification.
Source: own elaboration.

As different areas in South Tyrol are affected by and exposed to tourism activity to different degrees, throughout this report we use "tourism exposure" – an index composed of the tourism intensity and the number of beds per surface – as a variable to group municipalities into three categories (high, average, low). This helps to analyse and better understand whether the exposure to tourism influences the indicators we measure in the issue areas to follow (for a detailed description of how the tourism exposure is calculated please refer to the technical notes on indicators which you can find on our website).

In addition, to better compare trends throughout the monitored fields, this report includes summarising tables for each issue area. These tables provide an overview of absolute values for the year 2022 and the pre-pandemic year 2019, as well as of long-term trends (2013-2022 variations) and the variation between the last two years (2021-2022). If values for 2022 are not yet available, the most recent year available will be displayed instead. The same holds for cases where time series do not go back as far as 2013. In these cases, the percentage change between the most recent and the oldest data point will be calculated and shown in the table.

INDICATOR		VALUES (ABSOLUTE/%)		CHANGE (%/PP)	
1.1	Indicator name	2019	2022	2013-2022	2021-2022
		Value 1	Value 2	Change 1	Change 2

Table 2: Structure of the summarising tables used in this report.
Source: own elaboration.

BOX: SOCIAL-ECOLOGICAL TRANSFORMATION AND SUSTAINABLE TOURISM MONITORING

In order to preserve and further develop civilisational achievements without endangering the natural foundations of human (and non-human) life, while also giving people across time and space equal opportunities for a good life, a fundamental and possibly rapid systemic change towards sustainability is required (IPCC, 2023). In terms of depth and scope, this "Great Transformation" towards sustainability is comparable to two of the biggest shifts in human history: the Neolithic Revolution and the Industrial Revolution (WBGU, 2011). Against this backdrop, the study of societal transformation has become more and more established in recent years (for an overview see Feola, 2014).

The attempts to conceptualise and support entailed structural shifts in all dimensions of society have been subsumed under the term "social-ecological transformation", an umbrella term which describes "political, socioeconomic, and cultural shifts resulting from attempts to address the social-ecological crisis" (Brand & Wissen, 2017: 1). Their overarching goal is to provide a "comprehensive understanding of current global environmental change and to contribute to a social and political strategy for dealing with the crisis" (ibid.). Yet, different approaches in political and academic debates have been driven by different normative interests, while also employing different theoretical perspectives, leading to a variety of diverging – and sometimes even contrasting – definitions, analyses, and solution proposals. Nonetheless, three common denominators in academic debates on social-ecological transformation can be identified: (1) the emphasis on deep, wide-ranging processes of societal change that go beyond mere incremental steps and interventions in isolated policy fields, (2) the conception of transformations as non-linear processes of change, dealing with complex, dynamic and multidimensional systems, and (3) the conviction that technological change is necessary, but not sufficient for a social-ecological transformation (ibid.).

In the tourism literature, as in other fields, the term transformation is often used interchangeably with the term transition. While this mixing of terminologies might be explained by the closeness of the terms' etymological origins as well as the different research communities using them, a heuristic distinction between the two concepts is useful for a better analytical understanding of the differences regarding various transformation processes. Typically, a transition is imagined as a rather controlled process of political and institutional change of a social order. It often includes a scientific framing and a clearly defined solution, which makes it more prone to technocratic – and sometimes also authoritarian – approaches (Stirling, 2014). The focus lies on (technological) innovation through structured control and (state) governance as well as on setting the appropriate political-institutional framework and incentives for societal

actors that will bring about the desired change (Hölscher, Wittmayer & Loorbach, 2018). On the other hand, the concept of transformation typically entails a more comprehensive perspective that stresses the need to change the basic social and political forms of a society in all its dimensions, involving numerous actors and strategies on various scales. While top-down political path-shaping can be part of a transformation, these approaches are typically sensitive to issues of power and domination as well as the limits to the controllability of complex transformation processes. That is why there is no single, predefined solution in a transformation. Rather, it is to be understood as a democratic, plural, and open-ended search, experimentation, and learning process towards new societal models of development (Brand, 2014; Stirling, 2014; Asara et al., 2015).

What does all of this imply for the monitoring activities of sustainable tourism observatories? First, a transformation perspective emphasises the complex nature of social change involving non-linear processes, gradual as well as discontinuous change, and both intentional and autopoietic forces. From this follows that a sustainability transformation is never entirely controllable, as it involves a multitude of actors, levels, initiatives, interests, and dynamics which can push in different directions. This calls for a multidimensional approach that encompasses not only traditional monitoring tools and standardised indicators but also the means to unveil and capture phenomena that are an inherent part of a transformation but difficult to measure. This applies, for instance, to visions, narratives and practices emerging in societal niches, signs of shifting paradigms and (social, technical, knowledge, etc.) regimes, and any conflicts or dynamics of inequality and power. Second, a transformation point of view highlights the importance of conceiving monitoring less as taking snapshots of momentary situations and more as a way to analyse dynamics of development over time. This implies taking a step back, looking at longer historical trends and interpreting them in relation to connected socio-historical developments in order to better understand past and present processes of change.

These two approaches can complement traditional monitoring tools and methods to get a richer picture of transformation processes towards a more sustainable tourism. But how exactly can these insights be operationalised, that is, be used concretely in the context of sustainable tourism monitoring? In order to answer this question, another heuristic distinction between what could be called “actual transformation” and “desired transformation” is useful. While the former refers to adaptive, incremental changes aimed at increasing the resilience of a society or field, thereby largely perpetuating ingrained practices, structures, and imaginaries, the latter is inherently more transformative as it implies challenging and rethinking predominant social and economic development models as well as the basic assumptions and paradigms they are based on. Thereby, it is guided by the overarching goal of more sustainable practices and societal-nature relations. While the distinction between an actual transformation and a desired transformation is not the same as that between transition and transformation, there are still important parallels. In fact, the concept of an actual transformation is closer to that of a transition insofar as both focus on more gradual and selective processes of change, which mostly aim at adapting

and modernising rather than fundamentally challenging current modes of being and doing (see Adloff & Neckel, 2019). On the other hand, the desired transformation is clearly closer to a transformation in the sense defined above, as it implies all-encompassing shifts, the unmaking of incumbent structures, and the establishment of entirely new social forms and systems that go beyond what already exists.

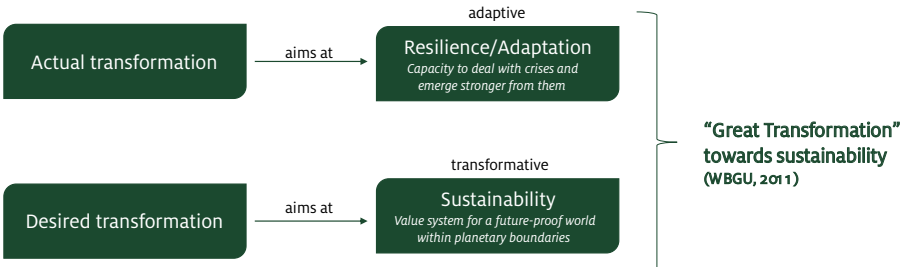


Figure 6: A model of actual and desired transformation.
Source: Own elaboration.

When it comes to monitoring, the actual transformation is more readily observable and can be investigated via quantitative (e.g. historical trend analysis, survey) and qualitative (e.g. interviews) methods. Also, standard indicators can be useful to monitor developments significant in this context. In contrast, monitoring the desired transformation requires more qualitative methods (e.g. qualitative interviews, ethnographic study, discourse analysis, transdisciplinary think tanks, focus groups), as it is concerned with phenomena that are difficult to quantify (e.g. imaginaries, practices, narratives). Nonetheless, traditional (e.g. environmental) indicators can also help to assess the status of the desired transformation. In the coming years, the transformation perspective outlined above will be integrated in a comprehensive way in the monitoring activities of STOST.

Issue areas

1.

Tourism seasonality

Philipp Corradini

The quantitative fluctuations of tourists' arrivals and overnight stays, defined as tourism seasonality, are a distinctive feature of the global tourism industry. Although considered unavoidable and oftentimes fuelled by external factors such as mandatory holidays the uneven distribution of tourist presences within a specific area (in our case the Autonomous Province of South Tyrol) throughout the year can oftentimes result in issues such as overcrowding, high prices, inadequate infrastructure in peak seasons, and a lack of services and job opportunities in shoulder and low seasons. To address these challenges and ease the burden on resources and local communities, it is crucial to understand the seasonal patterns in the destination. Monitoring tourist arrivals by month and week allows for identifying low and peak periods, enabling timely anticipation and resolution of associated problems. Moreover, it forms the basis for effectively managing visitor flows and balancing demand fluctuations. In South Tyrol, specific goals to consider include reducing demand during peak seasons, shifting demand from peak to low and shoulder seasons, and redistributing demand geographically from destinations with high tourism exposure to those with lower or average exposure.

Find out more on our website!

INDICATOR		VALUES (ABSOLUTE/%)		CHANGE (%/PP)	
1.1	**Tourist arrivals by month and market (Reported value: Gini index)**	**2019**	**2022**	**2013-2022**	**2021-2022**
		0.277 (Germany)	0.308 (Germany)	+18.0% (Germany)	-47.2% (Germany)
		0.350 (Italy)	0.370 (Italy)	-7.6% (Italy)	-35.1% (Italy)
1.2	**Overnight stays by month and period**	**2019**	**2022**	**2013-2022**	**2021-2022**
		17.1% (August)	17.9% (August)	-0.8 pp	-9.0 pp
1.3	**Tourist arrivals in peak weeks by municipality**	**2019**	**2022**	**2013-2022**	**2021-2022**
		4.8% (Abtei/ Badia, week 52)	4.1% (Abtei/ Badia, week 32)	-1.0 pp	-3.0 pp
		3.3% (Meran/ Merano, week 33)	3.2% (Meran/ Merano, week 33)	-0.1 pp	-1.4 pp
		2.8% (Bozen/ Bolzano, week 33)	3.0% (Bozen/ Bolzano, week 34)	+0.2 pp	-1.4 pp

Table 3: Indicators for seasonality.
Source: own calculation based on data from ASTAT 2023 (1.1, 1.2, 1.3).

Figure 7 illustrates average monthly tourism arrivals in South Tyrol from 2013 to 2022, categorised by source markets. A distinct seasonal pattern is evident, with a winter and summer season influenced by holidays, events, and favourable climatic conditions. The dominant proximity markets (Italy and Germany) exhibit different seasonal trends, with Italian guests arriving mainly in August (22.4%), July (14.8%) and December (13.8%), while German guests are more evenly distributed throughout the year. Austrian, Swiss, and Liechtensteiners, which together represent more than 9% of the overall guest arrivals, tend to concentrate their visit in the summer season (more than 70% of the respective arrivals are between May and October).

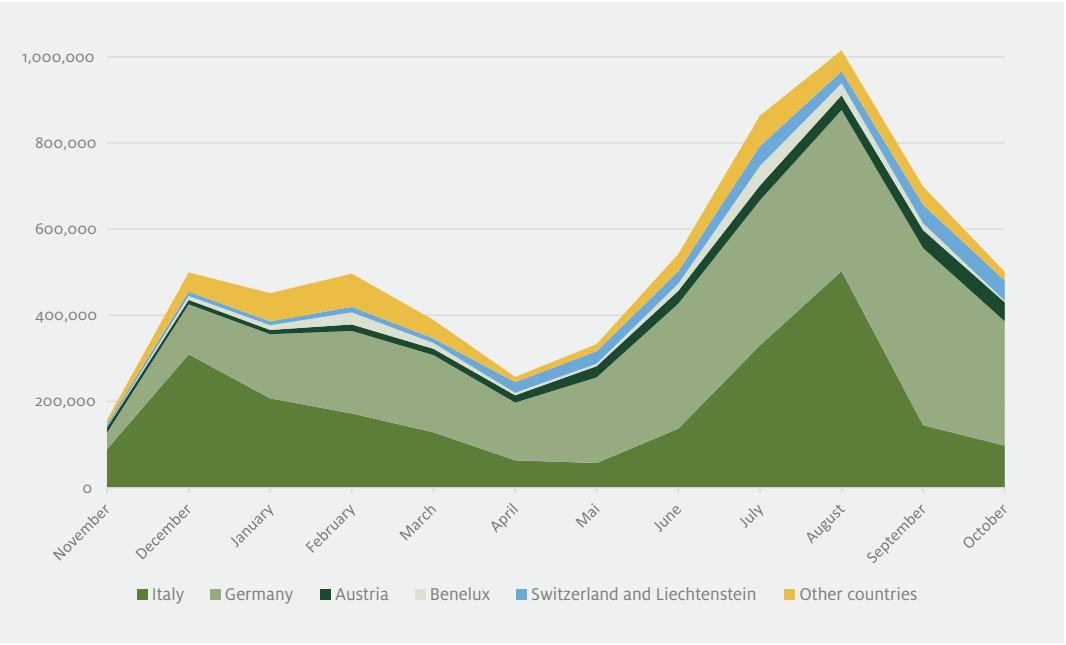


Figure 7: Tourist arrivals by month and market, South Tyrol 2013-2022. Monthly average values.
Source: ASTAT, own elaboration.

Analysing the **Gini index**[1] over the 10-year span (2013-2022) for tourist source markets, German guests showed the most evenly distributed arrivals throughout the year with a Gini value of 0.327, followed by Austria (0.332), Switzerland and Liechtenstein (0.368), and Italy (0.397). Tourist arrivals from the Benelux countries, although few in absolute numbers, displayed the most uneven distribution (0.481).

1 The Gini index measures inequality in distributions, including tourist markets' seasonality. A value of 0 signifies even distribution of arrivals in all the months of the year, while 1 indicates all guests arrive in a single month.

The analysis of **monthly distribution of overnight stays** shows a comparable pattern. Over the 10-year average (2013-22), a significant concentration of stays occurs during the summer months, especially in August (19.2%) and July (14.7%). In comparison to 2021, the last year influenced by the pandemic, 2022 saw a slight reduction of seasonal fluctuations, especially regarding the concentration of overnight stays in the month of August, which in 2022 was 17.8% of the overall overnights, almost aligning to the pre-pandemic level of 17.2% in 2019 (in comparison to 2020 with 25.8% and 2021 with 26.9%).

The analysis of **tourist arrivals in peak weeks at the municipal level** over the last decade (2013-2022) reaffirms their concentration during the summer months. Among 116 South Tyrolean municipalities, 112 experienced their highest arrivals in August. The calendar week 33 recorded the highest share of tourism arrivals for 54.3% of the municipalities, while in 19% the arrivals peaked in week 34 and in 23.3% in week 32. These weeks signify periods of intense demand for tourist attractions and infrastructure like roads and railways. Municipalities with low and average tourism exposure showed a more pronounced arrival concentration, with Laurein/Lauregno (10% of yearly arrivals, week 32), Proveis/Proves (8.1%, week 32), and Waidbruck/Ponte Gardena (6.5%, week 12) leading the trend. For high tourism exposure municipalities, weekly peaks ranged from 3.1% (Hafling/Avelengo) to 5.0% (Stilfs/Stelvio).

2.

Employment

Philipp Corradini

Monitoring tourism employment is vital as it affects the well-being of residents' and tourists' satisfaction. Comparing the number of tourism employees with other sectors provides an indicator of tourism's economic impact. Exploring additional employment aspects can help us better understand the socioeconomic effects of tourism on destinations. For instance, gender equality indicators reveal insights into employment quality. Gender composition plays a crucial role as the tourism sector often exhibits horizontal and vertical gender segregation (see Baum, 2013). Women tend to work in roles like waitressing and cleaning, while men dominate maintenance, construction, and managerial positions (horizontal segregation). Furthermore, women outweigh men within lower-level jobs with fewer career opportunities, while men are more likely to hold managerial positions (vertical segregation, see Campos-Soria et al., 2011). In South Tyrol, where the accommodation and food service sector is crucial for the economy, specific goals should prioritise strengthening tourism as an important employer, reducing gender disparities in the industry and improving working conditions for both domestic and international tourism employees.

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	INDICATOR	VALUES (ABSOLUTE/%)		CHANGES (%/PP)	
2.1	**Employees in the accommodation and food service sector**	**2019**	**2022**	**2013-2022**	**2021-2022**
		30,340 (yearly avg.)	31,905 (yearly avg.)	+42.4%	+32.5%
2.2	**Female enterprises in the accommodation and food service sector**	**2019**	**2022**	**2014*-2022**	**2021-2022**
		36.6%	36.4%	+1.6 pp	-0.2 pp
2.3	**Employees in the accommodation and food service sector by citizenship**	**2019**	**2022**	**2013-2022**	**2021-2022**
		64.6% (domestic) 35.4% (foreign)	65.0% (domestic) 35.0% (foreign)	+3.4 pp (domestic) -3.4 pp (foreign)	-3.4 pp (domestic) +3.4 pp (foreign)

Table 4: Indicators for employment.
Source: own calculation based on data from AMB (2.1, 2.3) and WIFO (2.2).

*No data available for 2013.

On average the **accommodation and food service sector encompassed 13.7% of the overall workforce** of South Tyrol between the years 2017 and 2019. Throughout the pandemic years of 2020 and 2021 with the resulting drop in touristic demand, this share fell to 11.1%. In 2022, during which the tourism flows started to normalise, the share increased to 14.2%, surpassing the pre-pandemic year 2019 by 0.3 percentage points, and the year 2021 by 32.5 percentage points. In all months the monthly total workforce number of 2022 exceeded the 3-year average of the pre-Covid years (2017, 2018 and 2019). In **Figure 8** this development is represented by the relation between the absolute numbers of 2022 and the average values from the three pre-Covid years[2].

Figure 8: Employees in the accommodation and food service sector by month, South Tyrol 2017-2022 (left axis) and percentage change of 2022 in relation to the years' 2019, 2020 and 2021 average (right axis). *Source: AMB, own elaboration.*

2 It is important to mention that the data displayed in Figure 8 refer to employees and do not include the self-employed. They also exclude all other tourism-related economic activities (e.g. museums, natural parks, commercial activities).

The **share of female led tourism enterprises**, as defined by the Institut für Wirtschaftsforschung (Institute of Economic Research, hereafter WIFO) of the Chamber of Commerce of Bozen/Bolzano saw a steady increase from 34.9% in 2014 (2,470 enterprises) to 36.4% in 2022 (2,851 of 7,824 overall active enterprises). This represents a positive trend towards female leadership development and gender equality, although currently its peak share of 37% was registered in 2020.

The percentage distribution of **employees' different nationalities** between the years 2008 and 2012 has only seen slight changes, with Italian nationals representing 60.3% of the overall tourism workforce on average. Between 2013 and 2019 this percentage increased consistently to 64.6% and spiked up to 67.9% in 2020 and 68.4% in 2021, possibly influenced by mobility restrictions of non-Italian seasonal workers during the Covid-19 pandemic. In 2022 Italian nationals represented 65%, followed by non-European citizens with 12.9%. Furthermore, in 2022 citizens of EU member states after 2004 represented 12.5% and citizens of other European (non-EU) countries 7.5% of the workforce. Lastly, citizens of the EU-15 states represented the remaining 2.1% of the overall tourism workforce.

3.

Economic benefits at the destination level

Philipp Corradini

Tourism is recognised for driving economic growth and prosperity in regions (Brida & Risso, 2009). It creates jobs, attracts private investment, and boosts infrastructure spending. While tourism is volatile and vulnerable to disruptions like the pandemic (see Becken et al., 2014), well-managed tourism systems can recover swiftly (see Sharma et al., 2021). In South Tyrol, tourism is vital to the local economy, employing over 30,000 people and contributing significantly to the gross domestic product. Monitoring the Gross Value Added (GVA) of the accommodation and food service sector over time provides a proxy for tourism's contribution to the overall economy. Additional indicators, such as entrepreneurs' profit reports and accommodation occupancy rates, help to measure tourism exposure. Combining objective indicators like value added and occupancy with subjective assessments and employment considerations provides a comprehensive view of local tourism benefits. Concrete goals for South Tyrol include better assessment of tourism's economic impact. This involves considering indirect effects in GVA calculations and understanding resource consumption related to positive economic impacts. Another goal is addressing seasonality by achieving a balanced occupancy rate throughout the year. Low-exposure municipalities should extend the tourism season, while high-exposure areas should aim to redistribute tourist flows to shoulder seasons.

Find out more on our website!

	INDICATOR	VALUES (ABSOLUTE/%)		CHANGES (PP)	
3.1	Value added by the accommodation and food service sector	**2019**	**2020***	**2013-2020***	**2019-2020***
		2,621 Mio € (11.4% of GVA)	1,924 Mio € (8.9% of GVA)	-1.6 pp	-2.5 pp
3.2	Earnings situation for the accommodation and food service sector	**2019**	**2022**	**2013-2022**	**2021-2022**
		92.8%	91.7%	+16.5 pp	+23.1 pp
3.3	Gross occupancy rates of bed places	**2019**	**2022**	**2013-2022**	**2021-2022**
		41.0%	40.5%	+4.4 pp	+12.1 pp

Table 5: Indicators for economic benefits.
Source: own calculation based on data from ISTAT 2023 (3.1), WIFO (3.2) and ASTAT 2023 (3.3).

*No data available for 2021 or 2022.

Based on the relative contribution of the single European NACE Rev2 categories (EUROSTAT, 2008), the total **Gross Value Added** (economic output) of South Tyrol for 2020[3] amounted to 21,634 million € which, in comparison to 2019 resulted in a reduction of 6.3%. In 2019, the sum of all goods and services produced by the tourism sector amounted to 2,635.5 million € which corresponded to 11.4% of the total output. Within the year of the pandemic, the sector saw a reduction of 696.5 Mio. € to 1,924 Mio. € corresponding to a decrease of 26.6% in respect to 2019. This decrease represents the sharpest decline of all the South Tyrolean NACE Rev2 categories, resulting also in its placement as the fourth-highest driving force of the South Tyrolean economy[4].

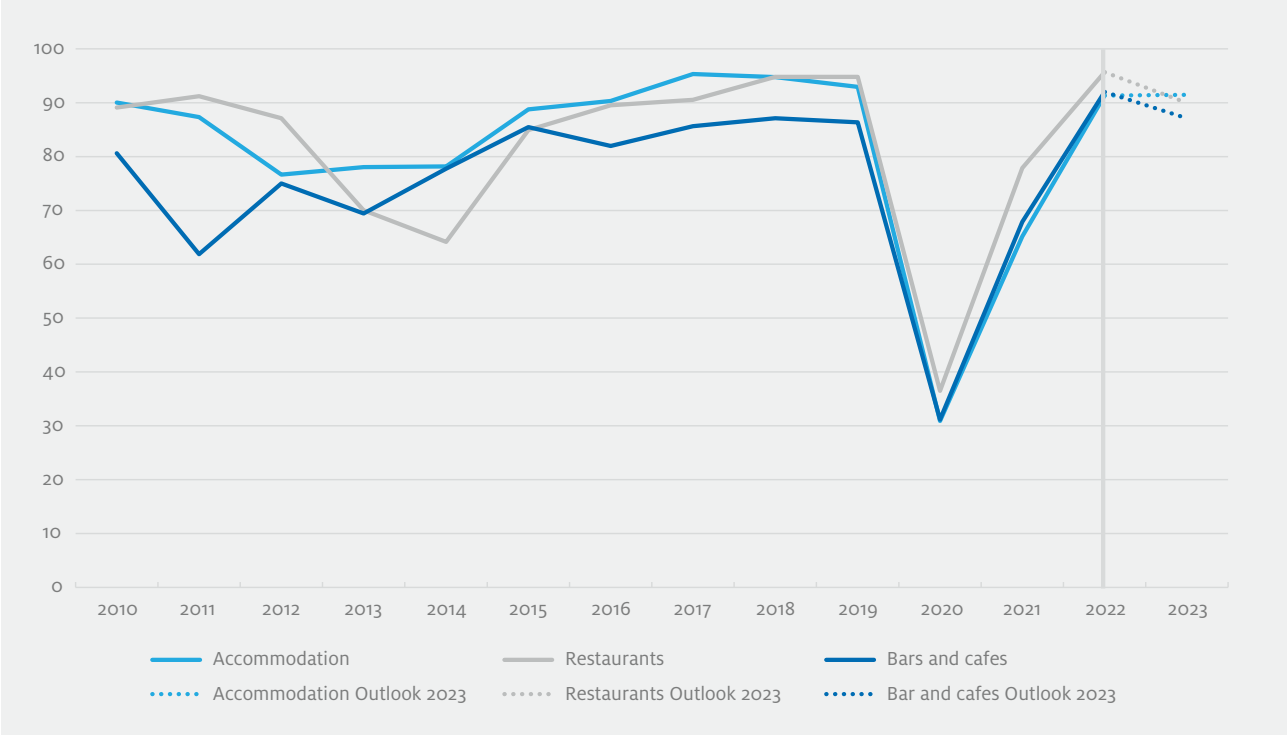

Figure 9: Earnings situation in the accommodation and food service sector, South Tyrol 2010-2022, index and expectations for 2023.
Source: WIFO, own elaboration

3 Unfortunately, at the time of writing, more recent data were not available.

4 It must be underlined that the national account data consider only the direct effects produced by this sector, while the indirect and induced economic activities produced by tourism, i.e., how much the output of other sectors depends on demand from the tourism sector itself, are not considered.

The **earnings situation for accommodation, restaurants, and bars and cafes** in South Tyrol, represented in **Figure 9**, is the indicator based on business tendency surveys conducted by WIFO among a large panel of firms[5]. After a sharp drop to 32.9% due to the pandemic in 2020 and an increase to 68.8% in 2021, 2022 saw a further increase to 91.7%, composed of the restaurant subsector (95.7%), bar & cafes (92.0%) and accommodation (91.3%). The outlook for the year 2023 in terms of good/satisfactory profitability expectation comprises on average 89.5% for the overall tourism sector.

Being an additional indicator of economic benefits, the **gross occupancy rate** encompasses the capacity utilisation of the **bed places of accommodation structures**. If not achieved merely through price reductions, a high occupancy rate can represent higher margins and a positive development of the contribution margin. After the sharp drop to 26.1% due to the pandemic in 2020, and a slight recovery to 28.4% in 2021, in 2022 the overall occupancy rate of South Tyrol increased to 40.5%, which represents a convergence to the pre-pandemic levels of 2019 (41.0%).

5 At the beginning of each year, WIFO asks firms to assess their profit of the previous year. Therefore, we report the reference year and not the survey year. The indicator refers to the share of enterprises for each subsector of the tourism industry (Accommodation, Restaurant and Bar & Cafes) who have reported either a good or at least satisfactory profitability in the reference year.

4.

Governance

Maximilian Walder

Monitoring different steering approaches with regard to sustainability is key to understanding local decision-making capacities, observing the presence of a common vision and strategy, and tracking the coherence of local and cross-sectoral policies. When investigating and collecting data on governance, some key objectives should be established. In order to achieve good governance in tourism, a concerted advance of stakeholders towards sustainability should be achieved. Moreover, not only top-down, but also strong bottom-up approaches for a sustainable tourism governance should be developed, and certification schemes should be leveraged to strengthen intersectoral governance.

Find out more on our website!

	INDICATOR	VALUES (ABSOLUTE/%)		CHANGES (%/PP)	
4.1	**Municipalities, accommodation facilities and events involved in voluntary certification schemes for sustainability**	**2019**	**2022**	**2013-2022***	**2021-2022**
		148	158	+618.2%	+182.1%
4.2	**"Red Rooster" branded products**	**2019**	**2022**	**2013-2022**	**2021-2022**
		687	844	+112.1%	+8.6%
4.3	**Organic milk sold to the members of the main local buying syndicate**	**2019**	**2022**	**2016**-2022**	**2021-2022**
		23%	24%	+22.4 pp	-1 pp

Table 6: Indicators for governance.
Source: own calculation based on data from Bio Hotels, KlimaHaus, ISPRA, Provincial department for waste management (4.1), Red Rooster (4.2) and Hogast (4.3).

*One certification was only introduced in 2016 and one only in 2019

**No data available for 2013, 2014 and 2015.

Various **certification schemes** are currently awarded in South Tyrol. Accommodation facilities can strive to be a "Biohotel", Climahotel" or achieve an "Ecolabel"; municipalities can be awarded with "ComuniClima" or "Alpine Pearl"; and events can be either be a "GreenEvent" or "Going GreenEvent". It shows that stakeholders on different levels and in different areas are working towards a more sustainable tourism governance. The data shows that sustainability programmes have expanded for cities, accommodation facilities, and events since their introduction in the late 2010s. In relation to accommodation facilities, overall, only a small percentage of hotels have been awarded with sustainable certifications in 2022 (29). This is obviously a very small percentage compared to the overall number of establishments in South Tyrol, but the number has steadily grown. It should be noted that there may be other certificates and labels used by various institutions (such as GSTC certifications of hotels) that are not listed here due to a lack of information or their unavailability. Looking at sustainable events, one can observe a return to the normal growth curve before Covid-19 hit. After a dip in 2020 and 2021, the number of Going GreenEvents and GreenEvents has again risen to levels similar to those before the corona crisis. In 2022, 95 events in total were certified; in 2019, it was 99.

In relation to the municipality level, more and more towns are awarded with sustainable certifications. In 2022, 29 municipalities had the certification of "ComuniClima", with ten new towns since the year 2021. One can clearly observe a growing interest in sustainable labels on a communal level. At the time of writing, IDM South Tyrol is developing another Eco-Label, which is already anticipated by many towns (see **Box: Sustainability Program and South Tyrolean Sustainability Label**).

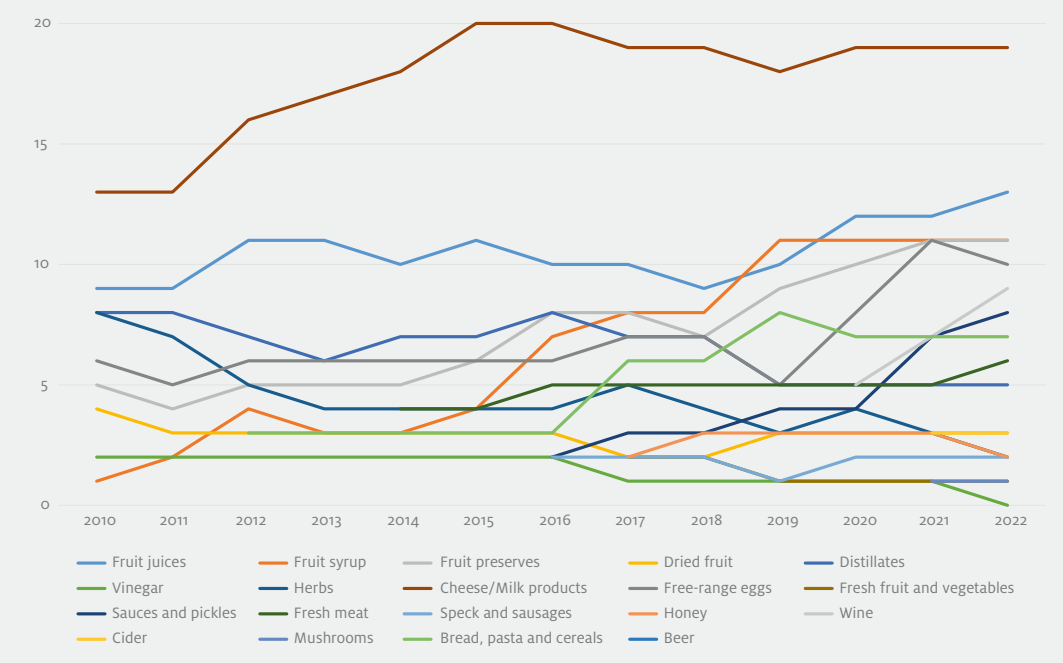

Figure 10: Number of Red Rooster labelled agrotourism ventures (left scale) selling Red Rooster branded products (lines) 2010-2022.
Source: Red Rooster, own elaboration.

One accommodation type that is focused very heavily on sustainable, regional and seasonal products is the "**Red Rooster**" branded facility. These agrotourism facilities produce regional products, ranging from fruits and jams to alcoholic beverages (see **Figure 10**) and can thus have an additional positive spillover on the local agricultural sector. The number of facilities that offer these kinds of products have risen over the last ten years. In 2022, 85 South Tyrolean farms comprehensively sold 844 Red Rooster labelled products, a new record. **Figure 10** shows how many Red Rooster labelled facilities offer Red Rooster branded food products. One can observe that over time, the offer increased significantly (398 products in 2013 compared to 844 products in 2022). In addition to the Red Rooster products, a trend to use more **organic milk** can be observed. In fact, the share of organic milk in comparison to non-organic milk sold has leapfrogged from 0.6% in 2016 to 24% in 2022.

BOX: SUSTAINABILITY PROGRAM AND SOUTH TYROLEAN SUSTAINABILITY LABEL

Stefanie Prieth, IDM South Tyrol

The newly created Sustainability Program Tourism South Tyrol was presented to the public at the beginning of March 2023 by IDM South Tyrol in the presence of the Provincial Council for Tourism and representatives of the South Tyrolean Hotel and Restaurant Association (HGV). The first destination to reach the 3rd (and highest) level of the newly introduced South Tyrolean Standard and thus the first destination in South Tyrol to be awarded the sustainability label is Eggental/Val d'Ega. Brixen/Bressanone and St.Vigil in Enneberg/San Vigilio di Marebbe have also been successfully audited since then. Additionally, the following destinations are currently present in the program: the Dolomite region Seiser Alm/Alpe di Siusi, Meran/Merano, Passeiertal/Val Passiria, Ratschings/Racines, Ahrntal/Valle Aurina, Ritten/Renon, Gröden/Val Gardena. These destinations are being supported by IDM South Tyrol. Further destinations will start with the programme during the course of this year.

Based on the GSTC destination criteria, IDM South Tyrol, in collaboration with various partners and on behalf of the provincial administration, developed a catalogue of criteria for destinations. This catalogue is based on the GSTC standard and has been adapted for the South Tyrolean context.

The work preceding an audit consists primarily of the collection of data documenting the touristic developments in any given destination. For instance, the programme foresees the involvement of the local population through a residents' questionnaire. For this purpose, IDM South Tyrol, together with Eurac Research, has developed a series of questions that can be used by the destinations. Furthermore, IDM South Tyrol offers destinations a tracking system to assess the added value of tourism as well as the development of

a climate change adaptation plan. These two measures are another integral part of the Sustainability Program.

The programme includes a series of measures which the destination must define and implement in cooperation with local partners before the audit begins. Alongside sustainable management, the programme includes target objectives in the domains of socio-economy, culture, and ecology.

The final audit, which is carried out by two certification bodies recognised by the GSTC, namely Green Destinations and Vireo, not only includes a final assessment report, but also long-term measures to be implemented by the destination before the next audit. Very often, this process also involves raising awareness about the topic among local tourism partners. A sustainable destination can only be successful if all local partners are pursuing the same goal.

With this in mind, a sustainability programme was also developed for businesses in collaboration with the Hotel and Restaurants Association (HGV). This programme is again based on the criteria of the GSTC and divided into three levels. This system is based on already established sustainability certificates, which were divided into nine fields of action. Level 1 considers not only sustainable management and communication, but also resource consumption and waste management. At level 2, additional aspects such as employee management and procurement are analysed. To obtain level 3, the company must further demonstrate a commitment to sustainable development in the areas of mobility, cultural awareness, and the facility itself. Besides the certificate, in order to be awarded the South Tyrolean Sustainability Label, a business must also submit a self-declaration documenting that it has purchased fresh milk, butter, yogurt, apples and apple juice from the region. Furthermore, South Tyrol must be the region with the greatest number of wines in the designated wine list.

IDM South Tyrol is currently working together with the Association of Private Room Renters, the campsites, as well as with agritourism ventures (*Urlaub auf dem Bauernhof*) on extending the programme to include non-commercial establishments as well.

During the past year, employees from various departments of IDM have participated in a number of GSTC training programmes and have also passed exams. Moreover, GSTC training programmes were organised for tourism partners. Lastly, IDM South Tyrol also operates a sustainability community that regularly meets to exchange ideas and experiences.

5.

Local and visitor satisfaction

Valentin Wallnöfer

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Sustainable tourism implies considering both the positive and negative effects of tourism on the local population and on visitors, trying to promote the positive while avoiding or minimising the negative (UNWTO, 2004). Tourism plays a vital role in South Tyrol's economic structure. Many residents profit directly or indirectly from it (e.g. through direct income), while some experience mostly the negative impacts (e.g. pressure on infrastructures). Maintaining high levels of visitor satisfaction is crucial to remain a competitive tourism destination. This requires a constant effort in monitoring satisfaction levels among locals and visitors and conducting policy intervention where necessary. At the moment, STOST measures two indicators within this issue area: the tourism intensity index, describing the average daily overnight stays per 100 inhabitants in South Tyrol, and the difference in minimum rent prices by tourism exposure. Both indicators have continuously increased and reached a new high in 2022, implying that the pressure of tourism on the local population is steadily increasing. This is supported when looking at the results of a recent study on local tourism satisfaction conducted by the University of Bolzano, where 43.9% of the respondents wished for less tourism, 43.2% wished for the same amount of tourism and only 7.4% preferred more tourism in South Tyrol in the future (Bausch & Tauber, 2023). The same question was asked in a STOST survey in December 2020, where only 23% wanted less, 65% wanted the same amount and 12% wanted more tourism in South Tyrol (de Rachewiltz et al., 2021). Although the results are not entirely comparable due to different survey structures and sample sizes, they still imply a substantial decrease in local satisfaction with tourism over the course of only two years.

Concrete goals for South Tyrol in this context are the inclusion of needs and concerns of the local population in destination management (e.g. by applying a tourism sensitivity index as proposed in the current tourism development concept of South Tyrol (Pechlaner et al., 2022)), the securing of affordable living costs for the local population, as well as the increase of quality standards in tourism offers instead of the increase of quantitative tourism flows.

	INDICATOR	VALUES (ABSOLUTE)		CHANGES (%)	
5.1	**Tourism intensity index**	**2019**	**2022**	**2013-2022**	**2021-2022**
		17.3	17.6	+13.8%	+44.5%
5.2	**Difference in minimum rent prices by tourism exposure (high vs. low tourism exposure)**	**2019**	**2022**	**2013-2022**	**2021-2022**
		3.07 €/m²	3.21 €/m²	+15.6%	+4.9%

Table 7: Indicators for local and visitor satisfaction.
Sources: ASTAT (5.1), own calculation based on data from Agenzia del Territorio (5.2).

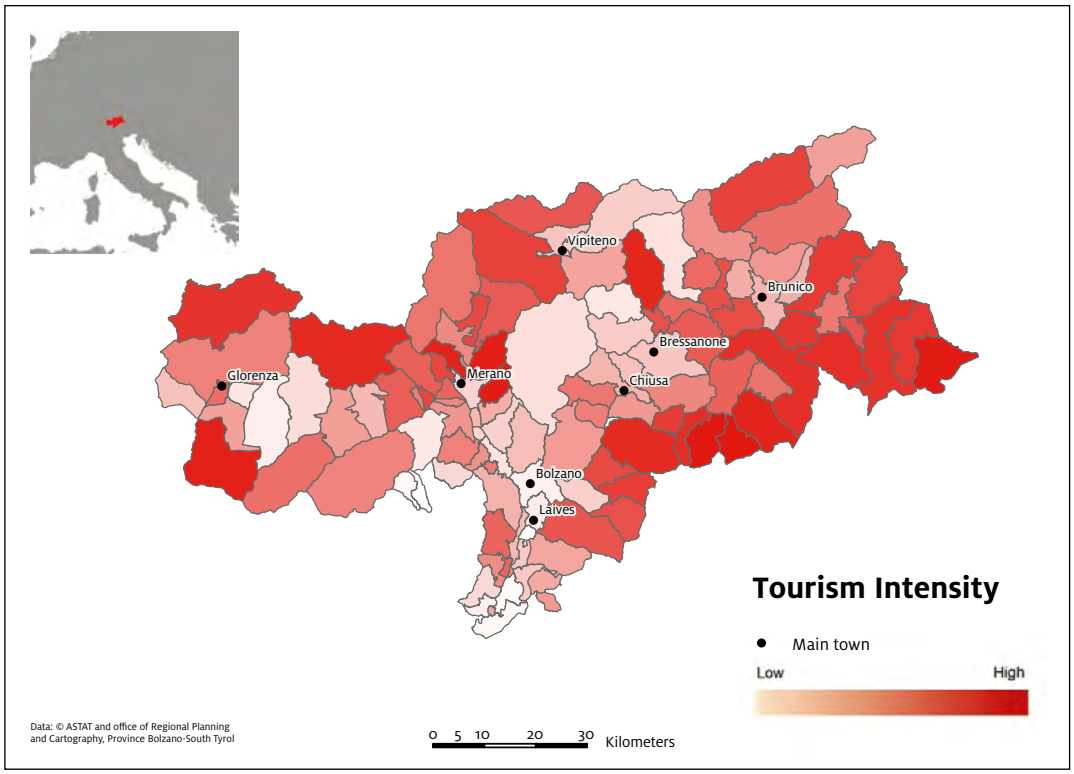

Figure 11: Tourism intensity, South Tyrol 2022.
Sources: ASTAT and office of Regional Planning and Cartography, Province Bolzano-South Tyrol, own elaboration.

A closer look at the **tourism intensity index** shows a continuous increase between 2013 and 2022 of 13.8%, implying a rising proportion of tourists compared to inhabitants. Although the absolute value dropped from 17.3 in 2019 to 11.1 in 2020 due to the general sharp decline in overnight stays caused by the Covid-19 pandemic, it started to rise again in 2021 up to 12.1, while in 2022 a new high of 17.6 was reached. An important factor to consider is, however, the geographical heterogeneity. The map above shows the differences in tourism intensity for each municipality of South Tyrol, where some municipalities like Corvara/Corvara in Badia (199.6) and Wolkenstein in Gröden/Selva di Val Gardena (139.6) experience much higher values than the provincial average, while others such as Branzoll/Bronzolo (0.7) have a much lower tourism intensity. Also, the capital city Bozen/Bolzano has a low tourism intensity of just 2.0. Overall, territories in the east (i.e. in the Dolomites area) are more touristic compared to those in the rest of the region. Therefore, a place-specific approach to measuring visitor satisfaction levels and conducting policy intervention is crucial.

Also, when it comes to **rent prices, differences** among municipalities depending on **tourism exposure** can be observed. In 2022, those municipalities with a high tourism exposure had on average 3.21 €/m^2 higher minimum rent prices than those with a low tourism exposure, making tourism a potential factor contributing to inflation. When looking at the long-term developments, an increase of those rent price differences can be observed.

6.

Energy management

Valentin Wallnöfer

Energy consumption is an important factor in the rising levels of CO_2 emissions and the acceleration of climate change. Measuring the impact of tourism on energy consumption is challenging, as in addition to the energy directly attributable to guests (e.g. in accommodation facilities), there is also indirect energy consumption. As an example of the latter, STOST therefore also includes data on the electricity consumption of cable cars and snow guns, since they are important touristic infrastructures in South Tyrol. The other indicator of this issue area is the estimated minimum electricity consumption in accommodation facilities (see Figure 12). All in all, our data shows a constant increase in energy consumption attributable to tourism. For a more complete picture it would, however, be necessary to also monitor other forms of energy consumption, for instance, those used for transportation or heating systems. Furthermore, enterprises should actively be encouraged (e.g. by destinations and political authorities) to measure and monitor their own energy consumption, which would eventually facilitate an overall reduction. Other important actions that need to be adopted for the reduction of the negative environmental impact of energy consumption include the increase of energy efficiency, the replacement of fossil fuels with renewable energies, and a general decrease of consumption levels (e.g. through energy-saving measures).

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	INDICATOR	VALUES (ABSOLUTE)		CHANGE (%)	
6.1	**Estimated minimum electricity consumption in accommodation facilities**	**2019**	**2022**	**2013-2022**	**2021-2022**
		277.7 GWh	284.0 GWh	+20.5%	+44.1%
6.2	**Electricity consumption of cable cars and snow guns**	**2019**	**2020***	**2013-2020***	**2019-2020***
		127.1 GWh	134.4 GWh	+17.2%	+5.8%

Table 8: Indicators for energy management.
Sources: own calculation based on data from ASTAT (6.1, 6.2).

*No data available for 2021 and 2022.

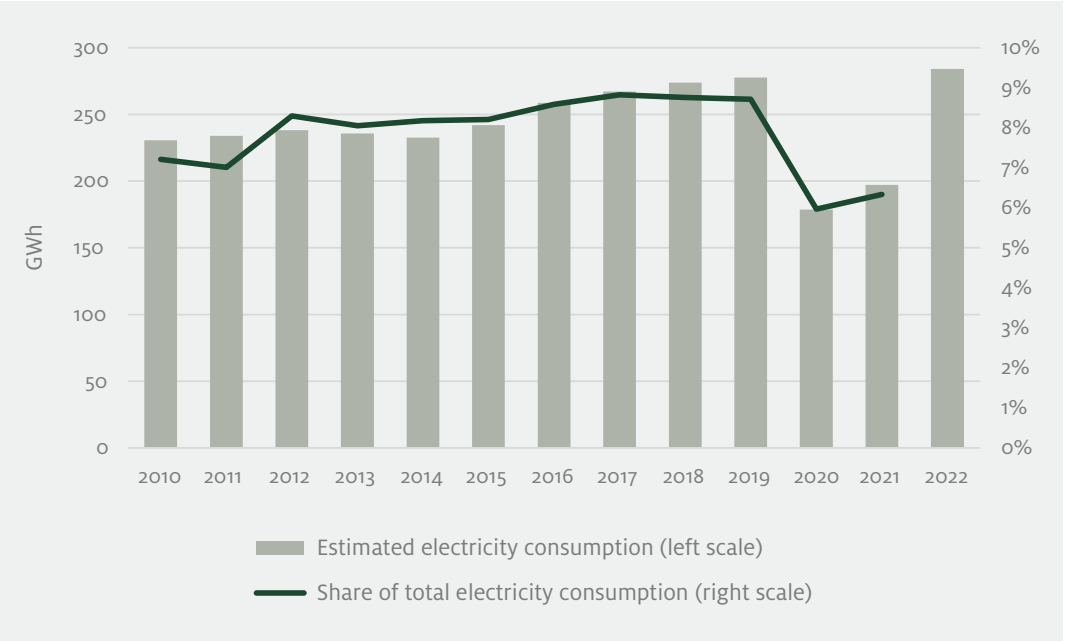

Figure 12: Estimated minimum electricity consumption in accommodation facilities, South Tyrol 2000-2022. In GWh.
Source: own calculation based on data from ASTAT.

Since there is no data on the actual amount of electricity consumed by tourists, we estimated the **electricity consumption in accommodation facilities** based on overnight stays and coefficients for electricity consumption per accommodation category (Bundesministerium für Wirtschaft, Familie und Jugend, Wirtschaftskammer Österreich, Fachverband Hotellerie, Fachverband Gastronomie, Österreichische Hoteliervereinigung, 2015). These coefficients represent a proxy for the energy consumption of an energy-efficient accommodation facility in South Tyrol, which is why the estimate can be interpreted as a lower bound. Furthermore, changes in individual consumption patterns cannot be accounted for in this calculation (for more detailed information on the calculation procedure see our website). Figure 12 shows that between 2013 and 2019, the estimated minimum electricity consumption has steadily increased up to 277.7 GWh. This amounted to 8.7% of South Tyrol's total electricity consumption in that year. In 2020, the value decreased to 178.5 GWh (6.0% of the total electricity consumption) as a result of the pandemic-related restrictions, while in 2022, it reached a new peak with 284 GWh.

The **electricity consumption of cable cars and snow guns** on the other hand has increased by 17.2% in the time frame from 2013 to 2020. This is, however, largely based on a strong increase until the year 2015, whereas the years afterwards have been marked by a decrease. Although cable cars and ski resorts form an important part in the touristic infrastructure of South Tyrol, they are not only used by tourists but also by many residents, which is why their energy consumption can of course not exclusively be attributed to tourism.

7. & 8.

Water and Waste water management

Valentin Wallnöfer

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Water is a central resource for tourism since its use is crucial for touristic leisure activities such as swimming, golf, and skiing. Furthermore, it is used to maintain the high hygiene standards of touristic facilities, e.g. for cleaning rooms and washing bed and table linen (Gössling, 2015). To better understand the link between water and tourism, STOST estimates the yearly minimum water use in accommodation facilities and looks at the yearly amount of water used for snow guns. Both have continued to increase over the last two decades, which is attributable to the general increase of overnight stays, but also to the changing structure of the hotel sector in South Tyrol consisting of more and more high-class hotels with a respectively higher level of water use per night. Concerning waste water generation, there is no data available regarding the impact of tourism. However, since a lot of the consumed water also has to be discharged (e.g. water used for swimming pools or cleaning purposes), the amounts of water consumption and waste water generation are highly intercorrelated, and thus the latter is expected to be increasing in a similar way.

At the same time, climate change causes reduced snowfall and a greater evapotranspiration, which makes water an increasingly scarce resource in South Tyrol and beyond (Zebisch et al., 2018). In the future there may be cross-sectoral conflicts for its use, e.g. between tourism and agriculture. Monitoring water consumption is, therefore, essential to anticipate and avoid potential water shortages and stresses. Concrete goals of this issue area present themselves in reducing water consumption and increasing water use efficiency in accommodation facilities, which will consequently also result in a decrease of waste water generation.

INDICATOR		VALUES (ABSOLUTE)		CHANGES (%)	
7.1	**Estimated minimum water consumption in accommodation facilities**	**2019**	**2022**	**2013-2022**	**2021-2022**
		7.7 million m³	7.9 million m³	+19.4%	+44.5%
7.2	**Water use by snow guns**	**2018/19**	**2021/22**	**2012/13-2021/22**	**2020/21-2021/22**
		10 million m³	7.7 million m³	+25.7%	+3.5%

Table 9: Indicators for water and waste water management.
Sources: own calculation based on data from ASTAT (7.1) and APAC (7.2).

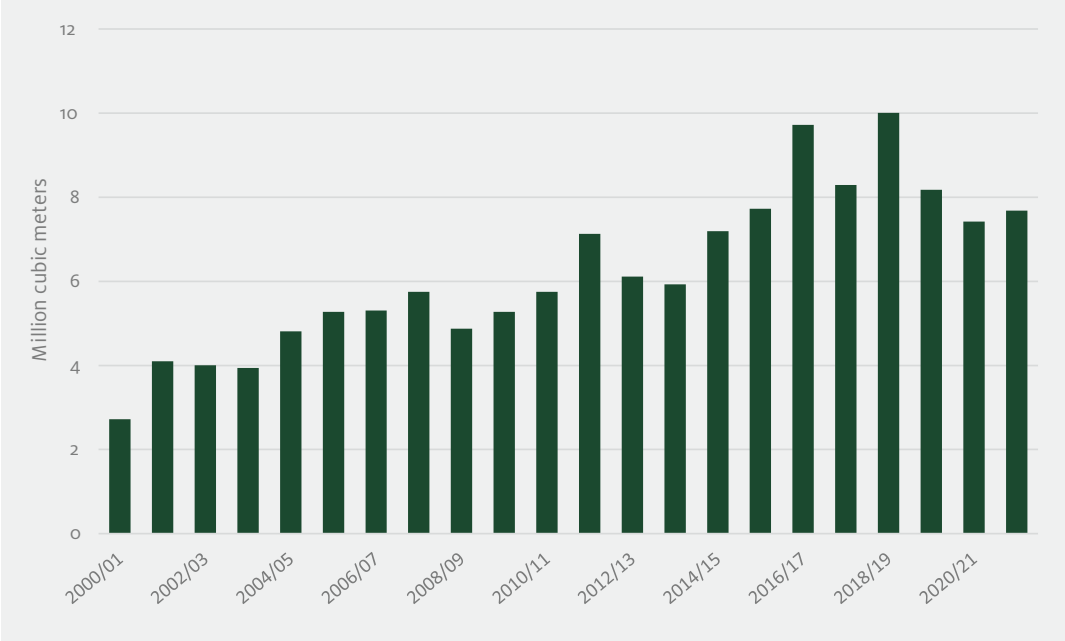

Figure 13: Water used by snow guns, South Tyrol 2000-2022. In million cubic meters.
Source: APAC, own elaboration.

When looking at the long-term developments, the **estimated minimum water consumption in accommodation facilities** increased by 19.4% from 2013 to 2022. Only the years 2020 and 2021 resulted in a sharp decrease due to the pandemic-related restrictions in tourism, while in 2022, it increased again by 44.5% in comparison to the previous year, which puts the numbers back in line with pre-pandemic developments.

To also include other forms of water consumption by tourism outside accommodation facilities, available data for the seasonal **water use by snow guns** is used as an indicator for this issue area. As seen in the figure above, water used for artificial snow production has increased steadily over the last two decades and reached 7.7 million m³ in the winter season of 2021/22, which amounts to a long-term increase of 25.7% from 2012/13 to 2021/22, but is below the peaks of previous years. The amount is, of course, very dependent on the actual weather conditions each winter season and on the overall rising temperatures due to climate change, which is resulting in a decreasing natural snowfall over time. However, a high number of ski tourists additionally increases the need for artificial snow production. The decline of water used by snow guns in the winter seasons 2019/20 and 2020/21 is therefore likely to be connected to the Covid-19-related restrictions on winter tourism.

9.

Solid waste management

Valentin Wallnöfer

Solid waste is generated through nearly all human activity. Since tourists often expect higher standards of hygiene and a wider range of choice in food and other services, tourism-related activities produce amounts of waste well above the domestic average. Additionally, people tend to use more disposable products on vacation than they would at home, a habit that also increases waste volume (Hamele & Eckardt, 2006). Since the number of overnight stays in South Tyrol has been steadily increasing over time, the amount of waste generated through tourism is increasing likewise. To mitigate these developments, a good waste management system with regular monitoring of the waste produced in each facility is needed. Furthermore, information policies for guests and staff members containing ways of reducing, reusing and recycling can help to reduce waste production (UNWTO, 2004). The adoption of said measures should not only be considered within accommodation facilities, but also at destination level in order to establish overarching goals and strategies. Next to the necessity for increasing the environmental sustainability of tourism, efficient waste management can also represent a source of cost saving for tourism businesses, serving as a further motivation (Pirani & Arafat, 2014).

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INDICATOR		VALUES (ABSOLUTE)		CHANGES (%)	
9.1	Estimated waste production in accommodation facilities	2019	2022	2013-2022	2021-2022
		66,695 tonnes	68,131 tonnes	+18.6%	+44.7%

Table 10: Indicator for waste management.
Source: own calculation based on data from ASTAT.

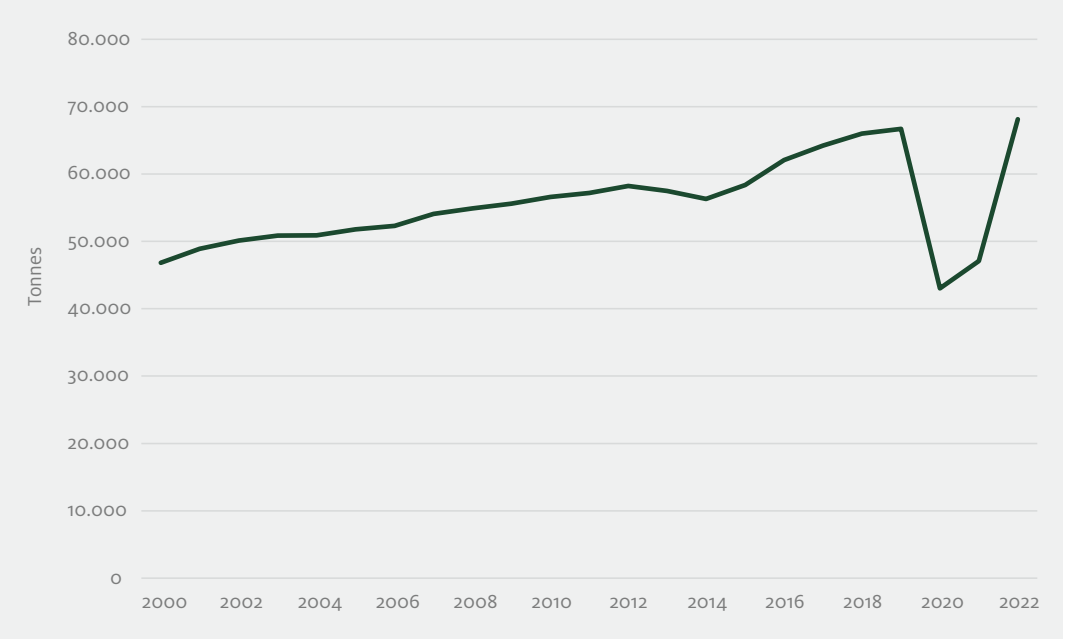

Figure 14: Waste production estimated for accommodation facilities by year, South Tyrol 1990-2022. In tonnes.
Source: own calculation based on data from ASTAT, own elaboration.

Although monitoring waste production is becoming increasingly relevant for the tourism sector, the prevalence of data on the topic is still very limited. Thus, it is difficult to pin down the exact impact of tourism on waste production. To circumvent this problem, as for energy and water management, the decision was made to **estimate the production of waste in accommodation facilities** using a coefficient retrieved from Hamele & Eckardt (2006) on the production of waste per overnight stay. As seen in the graph above, following the Covid-19 related decline in waste generation in 2020, the numbers slowly started to increase again in 2021 and reached a new high in 2022, with an estimated value of 68,131 tonnes of waste. Since the estimation does not integrate possible reductions of waste generation per overnight stay within the last years, additional effort is necessary to produce more precise measurements of real waste production levels as well as more place-specific estimations. The establishment of a waste monitoring system in each facility and the exchange of data on destination level can be an important milestone in achieving this, making individual improvements visible and possibly also serving as a further motivation for accommodation facilities.

10.

Mobility

Maximilian Walder

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De-carbonising tourist mobility is key to achieving sustainable tourism globally and on site, as tourism without transportation is inconceivable. However, carbon emissions are not the only negative effects of tourist transport: spatial use, energy consumption, air and noise pollution are just as relevant, particularly for remote and rural regions. Therefore, monitoring possible modal shifts towards more sustainable forms of transport is crucial in this issue area. As far as mobility on site is concerned, notwithstanding the energy use and the possible negative impact on the landscape, the use of cable cars in Alpine contexts can be generally read as an encouraging signal, as they can replace less sustainable means of transport such as private cars or motorcycles, especially in summer and in combination with traffic regulations and road closures (see, e.g., Scuttari et al., 2016). In South Tyrol, previous statistics showed that 90.4% of incoming tourists entered the region by private transport and 70.3% used this mode of travel around during their holiday (De Rachewiltz, 2021). Indicators in this issue area were selected to show the actions taken to tackle this problem and shift modal choices towards public transport or shared use of vehicles, rather than to estimate the magnitude of impacts. The table below offers a summarised overview of the magnitude and change of each indicator over the last year of data collection.

INDICATOR			VALUES (ABSOLUTE)		CHANGE (%)	
10.1	Mobilcards, bikemobil cards, museumobil cards and guest tickets	Activation	**2019**	**2021**	**2012*-2019**	**2019-2021***
			1,658,620	916,618	+258.5%	-44.7%
		Uses	**2019**	**2021**	**2012*-2019**	**2019-2021***
			6,924,310	4,075,548	+282.2%	-41.1%
10.2	Number of ski-lift and cable car users by season	Summer	**2019**	**2021**	**2010-2019**	**2019-2020***
			10,817,425	no data	+38.8%	-27%
		Winter	**2019**	**2021**	**2010-2019**	**2019-2020***
			118,094,699	no data	-7.5%	-92.3%
10.3	Number of loading stations for e-mobility	In hotels	**2019**	**2021**		**2021-2022**
			209	207		+2.9%
		Public	**2019**	**2021**		**2021-2022**
			110	177		+4.5%

Table 11: Indicators for mobility.
Sources: STA - Südtiroler Transportstrukturen AG (10.1), ASTAT (10.2) and Neogy and Tesla (10.3).

*Latest available data.

In order to incentivise public transport and to reduce the use of individual vehicles, "**Mobilcards"** can be purchased in hotels, tourism offices, train stations and local vending places and allow guests to travel with all public transport means. Furthermore, some forms of Mobilcards include additional benefits: **bikemobilcards** also allow tourists to rent bikes and to bring them in public transport, **museumobil** cards are a combination of a travel ticket for public transport and an admission ticket to around 80 museums in South Tyrol. Since its introduction in 2012, both the usage and the activation of these special tickets rose significantly. Compared to ten years ago, an increase of 192.3% was registered for activations in 2019. For the uses the change was +163.9%. Like in other areas, due to the Covid-19 pandemic, this trend came to a halt in the year 2020 and the effect was still felt in the year 2021. Both, activations and uses declined by 44.7% and 41.1% respectively since before the pandemic. Nevertheless, one can expect the (before-Covid-19-) trend to continue in the coming years.

Cable cars and ski-lifts present alternative transportation possibilities for guests in the mountains and incentivise tourists to reduce the use of cars, hence minimising traffic and CO_2 emissions. The most recent data on the use of cable cars and ski-lifts, referring to the year 2020, shows the devastating effect of the Covid-19 restrictions on this type of transportation. The total number of uses plummeted to about two million. During the summer season tourists were allowed to use cable cars and ski-lifts to some extent, following strict hygiene and safety instructions. On the one hand, people wanted less contact with strangers; on the other hand, cable cars limited the amount of people allowed to use the transportation modes at a time. These two factors certainly explain why the use of cable cars and ski-lifts shrank about 27% compared to the summer season of 2019. An even more striking development can be observed during the winter season, where usage was reduced by 92.3% compared to the year before. During the cold months of the year, cable cars and ski-lifts were almost completely shut down due to the serious Covid-19 situation in the region. Winter tourism almost came to a complete halt, which could not only be seen in the overnight stays and arrival numbers but also in this indicator.

Another strategy to minimise CO_2 emissions is the greater emphasis on electromobility. A trend towards this more sustainable transportation mode can also be observed in South Tyrol. The total number of **charging stations for e-mobility** has risen over the last few years, with 398 stations in 2023. This means an increase of 14 stations compared to the previous year. Tourists have the possibility to either charge their vehicle in hotels (if their residency offers such a service) or at public spaces. The red dots on the map below indicate the position of the stations throughout the province. One can observe that more than half the stations can be found in tourism facilities (53.5%) and that more stations can be found in the high touristic areas (e.g., Gröden/Val Gardena). However, public stations are also on a steady rise over recent times, which in the long run might also incentivise locals to switch to e-mobility alternatives.

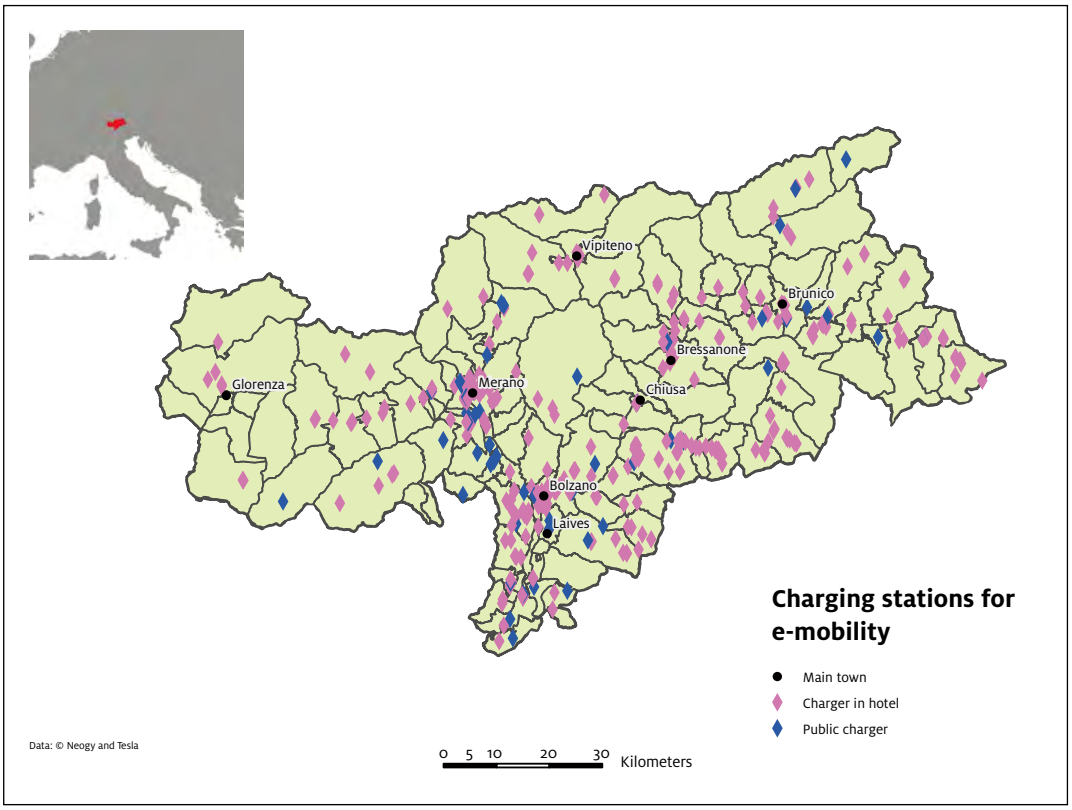
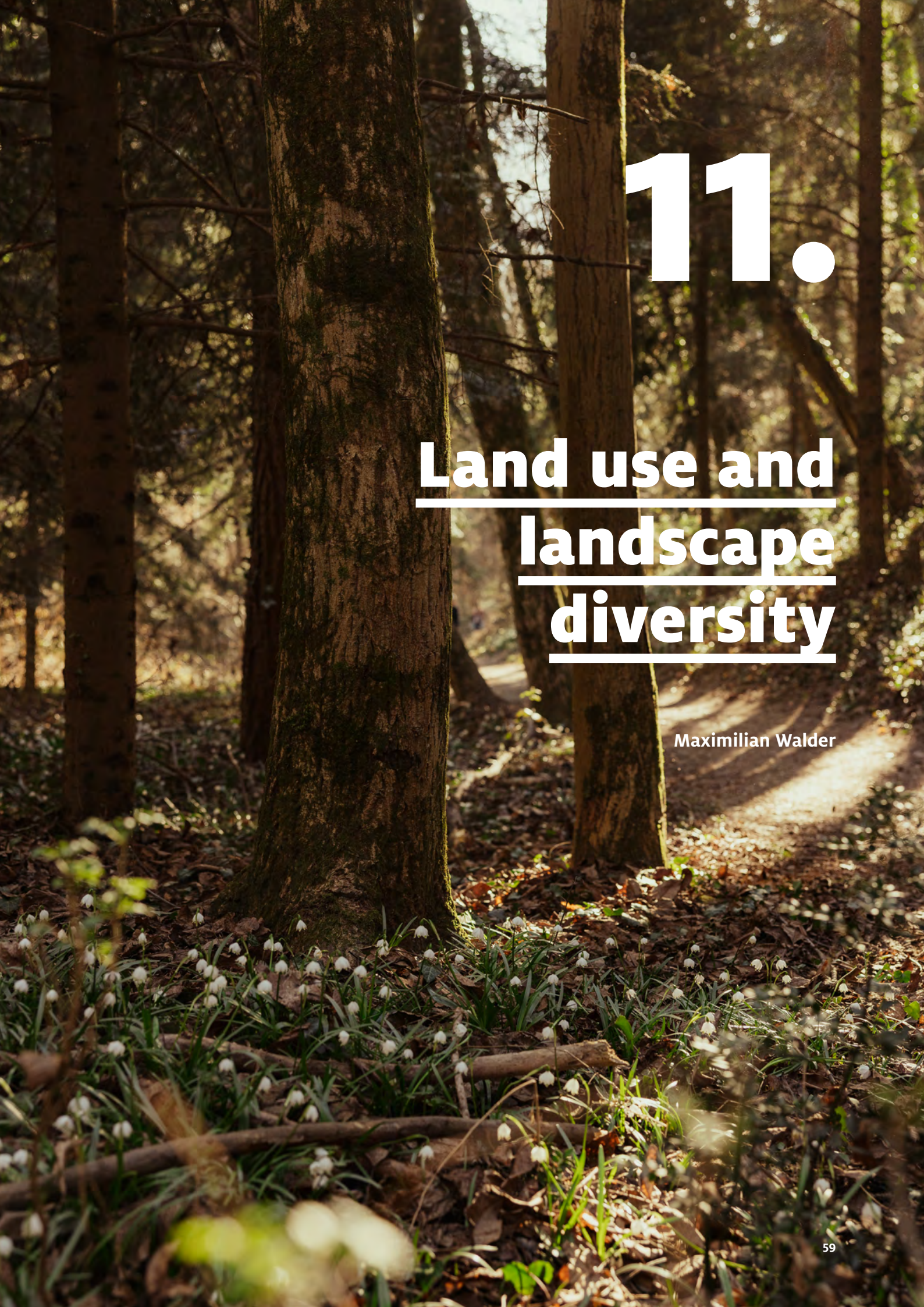


Figure 15: Charging stations for e-mobility in hotels and in public areas, South Tyrol 2021.
Sources: Neogy and Tesla, own elaboration.



11.

Land use and landscape diversity

Maximilian Walder

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A permanently environmentally friendly land use should contribute to the preservation of natural ecosystems, guarantee the supply of humankind with natural resources, and thus not endanger the basis of a good life of present as well as future generations. In the Agenda 21 formulated in 1992, the United Nations referred to the urgency and relevance of sustainable settlement development (Chapter 7) and to integrated, sustainable planning and management of land resources (Chapter 10) (United Nations, 1992). Similarly, reference to this topic was also made by the United Nations in 2015 in the 17 Sustainable Development Goals developed, as well as in its adaptation by the UNWTO for tourism, particularly in goals 11, 13 and 15 (United Nations, 2015; UNWTO, 2015). Especially for an Alpine region like South Tyrol, characterised by a lot of natural landscape and little more than 5% of area of permanent settlement, a well-founded discussion about the finite resource land is central (ASTAT et al., 2013). Humans are the main factor influencing land use and landscape through their consumption and lifestyle habits as well as through economic activities. Along with other economic sectors, such as agriculture and industry, tourism shapes the natural landscape and the land use of South Tyrol. At the same time, an intact nature, and well-kept and an attractive natural as well as cultural landscape are the basis for a functioning and successful tourism in South Tyrol. Against this backdrop, an analysis of the influence of tourism on landscape diversity and land use is particularly important.

In order to manage the land use in South Tyrol, the surface area of the province is divided into specific land use zones, with each having specific provisions and regulations. In the year 2022, as in the years before, most beds of accommodation facilities (hotels, Red Rooster, residencies) were located in residential areas (areas A, B, C), namely 41.2%. Beds in agricultural area zones (mostly belonging to Red Rooster establishments) amounted to 37.4%, with 9.8% in other, various land use zones. The remaining 11.6% of beds were located in areas for tourist facilities.

These are special areas which, since 2007/2008, can be designated by each municipality as being especially for touristic activities. To date, 101 municipalities make use of this type of designation zone[6]. In most South Tyrolean municipalities, more areas were designated over the last five years. Between 2018 and 2022, **areas for tourist facilities** increased in 84 South Tyrolean municipalities, in seven municipalities the area did not change[7], and in 10 municipalities the areas decreased slightly. It should be noted that the increases and decreases are minimal in some cases and that the concept of areas for tourist facilities is debated in general. The underlying idea for this type of designation was to protect the environment and the locals, and thus limit the spread of hotels and similar establishments. Schenna/Scena and Tirol/Tirolo, two highly touristic municipalities, do not have such area zones. Especially in such contexts, these zones would make sense, but are not used because of their limiting characteristics.

6 Municipalities without areas for tourist facilities: Altrei/Anterivo, Andrian/Andriano, Gais, Kuens/Caines, Kurtinig/Cortina sulla strad del vino, Laurein/Lauregno, Margreid/Magrè, Mölten/Meltina, Nals/Nalles, Percha/Perca, Schenna/Scena, Taufers/Tubre, Tirol/Tirolo, Tscherms/Cermes, Waidbruck/Ponte Gardena.

7 Terenten/Terento, Truden/Trodena, Salurn/Salorno, St. Pankraz/San Pancrazio, Villanders/Villandro

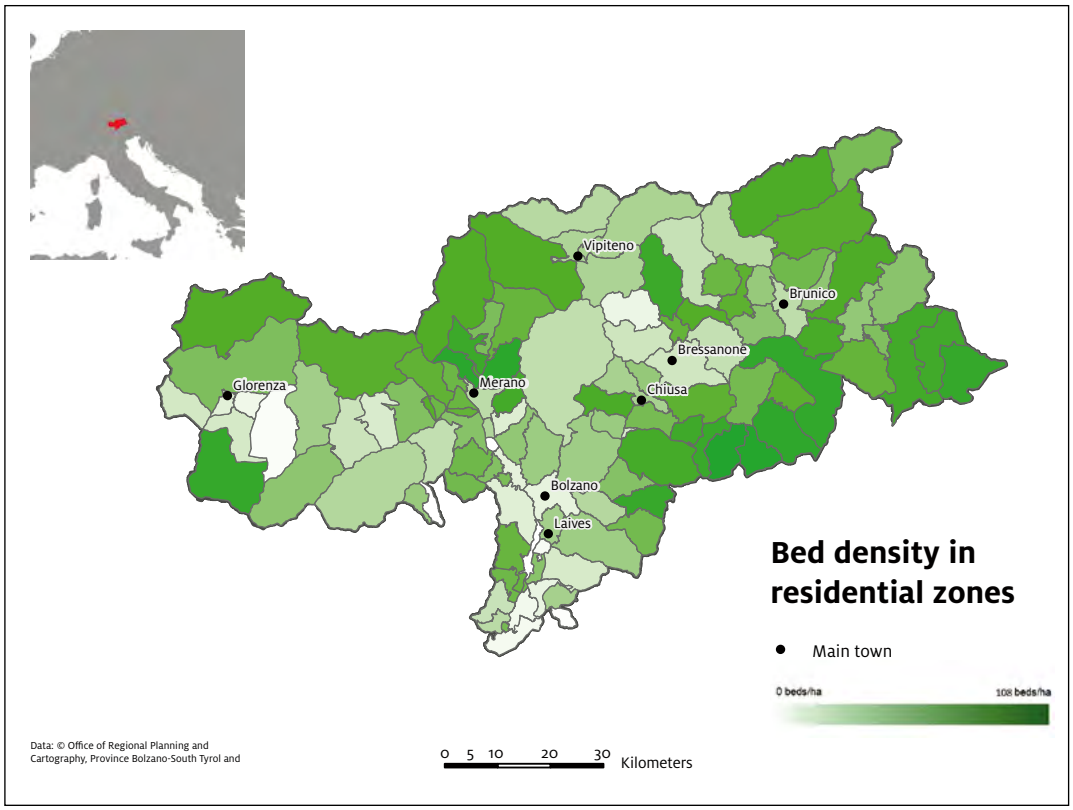

Figure 16: Bed density in residential zones at municipality level, South Tyrol 2022.
Source: Office of Regional Planning and Cartography, Province Bolzano-South Tyrol and LTS, own elaboration.

In **Figure 16** one can observe the **pressure accommodation facilities put on residential zones**. The darker the blue in each municipality, the higher the bed density in residential zones (for information on how the bed density is calculated see the technical description on our website). The average density in South Tyrol is 23.1 beds per hectare. One can observe that the bed density is higher in the west of the Province and especially high in Gröden/Val Gardena, where two of the highest bed densities can be found[8]. Two municipalities, Pfatten/Vadena and Laurein/Lauregno, do not have any beds in residential zones.

8 Corvara/Corvara in Badia, Wolkenstein/Selva di Val Gardena

Concerning the accommodation category, the majority of traditional hotels are located in residential areas (44.3%), agricultural areas (31.6%) and areas for tourist facilities (15.5%). The majority of the Red Rooster establishments, namely 82.8%, are located in agricultural areas, followed by residential areas (10.5%) and forest areas (3.5%). Almost two thirds of the "sun establishments" (private room rental facilities) are located in residential areas (58.3%), followed by agricultural areas (34.9%) and the forest (2%).

12.

Nature conservation

Francesca Cornella

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Biodiversity indicates the diversity within and between species, as well as the diversity of ecosystems. The integrity of biodiversity can be expressed in terms of the extent of diversity at the genetic level and resilience at the species and ecosystem level (Martens, Rotmans, de Groot, 2003). It is integral to natural and cultural dimensions of heritage (Hall, 2010). Depending on the intensity, concentration, and behaviour of visitors, tourism can either constitute an impulse for positive change or endanger biodiversity and ecosystems, becoming a source of stress for nature and certain fragile environments. Fossil-fuel driven capitalist development with its pursuit of continuous economic growth has been identified as one of the main causes of recent biodiversity loss (Büscher et al. 2017). Tourism is one of the largest and fastest growing industries in the world and thus carries special responsibility for the conservation of the environment (Büscher & Fletcher, 2019). In order to enhance biodiversity, tourism development should be designed in such a way as to promote biodiversity both at the individual and collective level and embrace ecological boundaries. This necessitates a move beyond traditional models of mass tourism and the classical nature-culture dichotomy. One concrete approach to tackle biodiversity loss can be found in "convivial conservation", which fosters the integration of non-human nature into social, cultural, and ecological contexts (Bhola et al. 2020). A sustainable conservation strategy needs to include biodiversity policies into all policy areas. Moreover, it is necessary to recognise that biodiversity conservation should protect biocultural diversity and thus preserve and enhance the communities coevolving with biodiversity (Moranta et al. 2022).

In order to link tourism and nature conservation, biodiversity data and tourism intensity hot-spots have been analysed and overlapped in this issue area – being aware that trying to derive a causal connection between tourism intensity and biodiversity loss is a complex (and maybe even impossible) task, as there are many interconnected factors affecting biodiversity (among one of the main influences in South Tyrol being agricultural activity).

Figure 17 shows the **location of the main critically endangered and vulnerable species**[9] in the UNESCO and Nature 2000 sites in South Tyrol **in relation to municipalities by tourism intensity** in 2022. Each point displayed constitutes a geo-localised data point (from 1980 onwards) about taxonomic attribution of species. In total, 28 endangered, 120 critically endangered, and 192 vulnerable species have been detected in protected areas of South Tyrol. Most of the endangered and critically endangered species are vascular plants.

9 For the extinction risk assessment, IUCN categories and criteria were used. See: https://portals.iucn.org/library/sites/library/files/documents/RL-2001-001.pdf

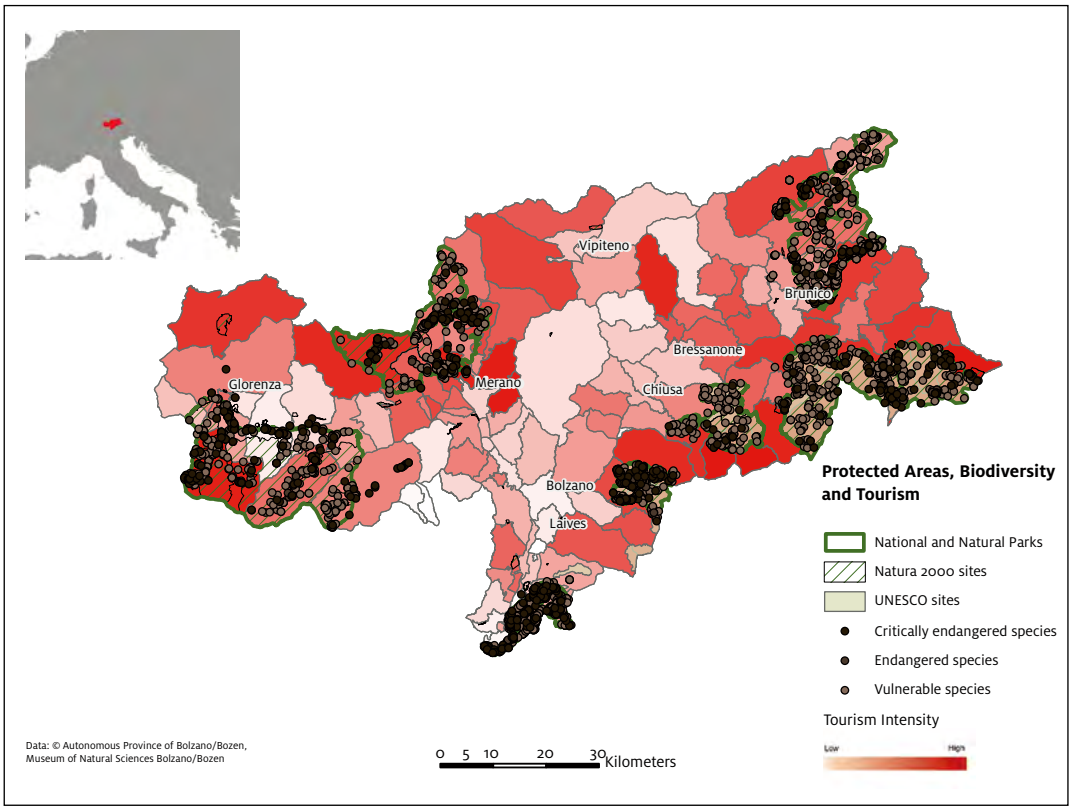

Figure 17: Endangered biodiversity in natural and protected areas in relation to municipalities by tourism intensity. Red to white: high to low tourism intensity.
Source: Naturmuseum Südtirol Bozen/Museo di Scienze Naturali Bolzano, Office of Regional Planning and Cartography, Province Bolzano-South Tyrol and LTS, own elaboration.

Tourism hotspots and areas at high risk of biodiversity loss are often located near to each other – or even superimposed. This connection is illustrated in the map above. The proximity to ecologically sensitive zones can be observed especially in the Dolomites and in the nature park Texelgruppe/Gruppo di Tessa near the city of Meran/Merano. Generally speaking, the disturbance of wildlife, wildlife poaching, removal of vegetation on a large and small scale (e.g. with trampling or path opening), degradation of forest due to trekking lodges, improper garbage management, incidental forest or grassland fires, and several other human activities can cause biodiversity loss or displacement of species, especially in fragile environments. Since it is often the most touristic and popular places that constitute ecologically valuable and often particularly vulnerable areas, it is of particular importance for tourism actors and policies to promote awareness of existing nature reserves, reduce negative impacts in destinations through guidelines and regulations, and promote biodiversity through concrete measures.

13.

Culture

Maximilian Walder

South Tyrol is a popular holiday destination for culturally interested tourists due to its many cultural treasures and its rich history. Over the last 150 years, tourism has had a great impact on the most diverse forms of culture worldwide. The influence of tourism on immaterial cultural assets is difficult to assess and is underexplored in tourism research, but tourism stakeholders report that it clearly exists. When investigating and collecting data on culture and tourism, some key objectives need to be established and pursued in order to continually develop the issue area. First of all, establishing the issue area of culture and tourism has shown that raising awareness of the importance of tangible and intangible culture for the region is a key element for sustainable development. Second, culture should be preserved and promoted as a living heritage for future generations, both for locals and tourists. The transformative experiences of the tourists and the contribution to intercultural understanding is important for this development, while at the same time negative aspects such as the commodification and homogenization of culture, cultural appropriation or the loss of identity need to be monitored and reduced. Third, the mediation role of the hosts is crucial to communicate and transfer the principles of cultural sustainability to its guests.

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INDICATOR		VALUES (ABSOLUTE)		CHANGE (%)	
13.1	**Museums by type and tourism exposure (Reported value: Total numbers of museums)**	**2019**	**2021***	**2013-2021***	**2020-2021**
		111	104	+23.8%	-2.8%
13.2	**Percentage of tourists of total museum visitors**	**2016****	**2020****	**2016-2020****	**2019-2020****
		76.3%	78.9%	+2.6 pp	+12.9 pp

Table 12: Indicators of Culture.
Source: ASTAT (13.1) and Lorima (13.2).

*Latest available data.
**Earliest and latest available data.

In South Tyrol, since the nineties, museums started to open all around the province and with a steady increase. The number of museums peaked in 2019 with 111 single facilities and decreased slightly during the pandemic to 104 (official) museums in 2021. **Figure 18** shows the **variety of museums** and their distribution in the single municipality categories. Numbers show that most museums (63) can be found in municipalities with average Tourism Exposure, obviously also the Tourism Exposure category with the most municipalities. Comparing municipalities with high and low Tourism Exposure we can observe that more touristic towns offer more museums than less touristic municipalities. This might indicate an effect the presence of tourists might have also on the cultural sector. Regarding the type of museums, it would be wrong to assume much, but we can see that touristic low developed municipalities have a larger number of town or village museums and castle and palace museums, whereas municipalities with High Tourism Expo-

sure offer cultural historical museums, art museums and folklore museums. This might obviously be connected to characteristics of the individual towns themself and their local specificities.

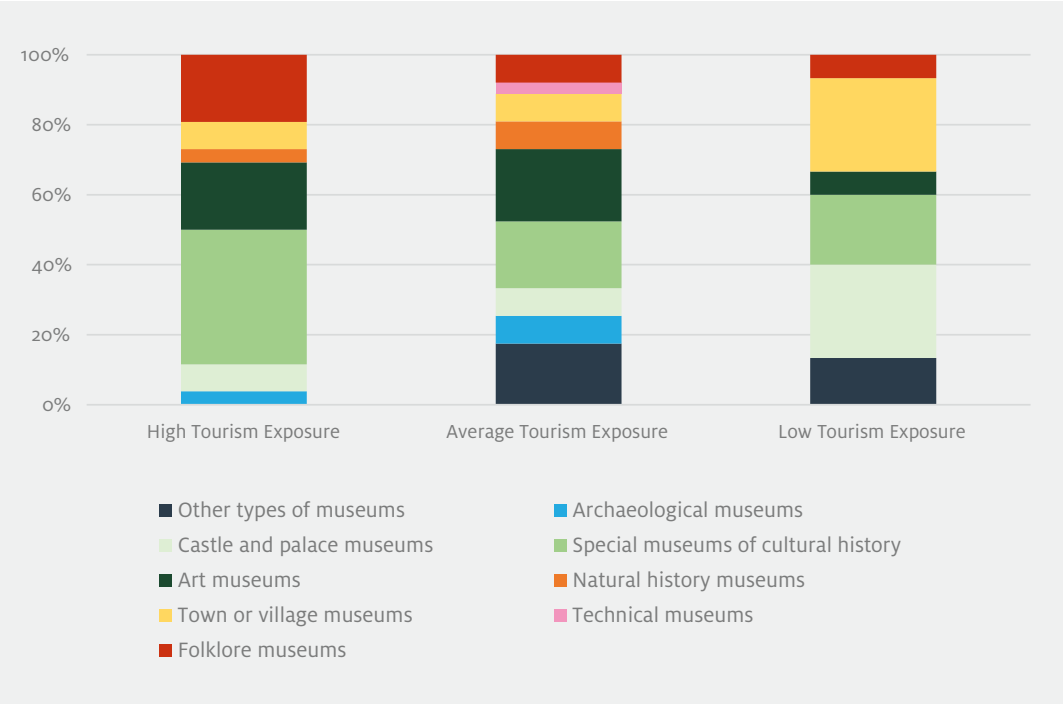

Figure 18: Museums by type and tourism exposure, South Tyrol 2020.
In percentage values. Source: ASTAT, own elaboration.

Overall, tourists constitute a large part of **museum visitors** in South Tyrol. In fact, estimates calculate that tourists made up 76.3% of the total museum visits in 2016. During 2018 and 2019 this portion shrank to around 66% but increased again to 78.9% in 2020 (Source: ASTAT, 2021, data available on demand). Despite the sharp decline in overall visitor numbers due to the Covid-19 pandemic, there is nevertheless a trend towards the use of combined tourism products such as the areas of mobility and museum admissions (see also **Issuea Area 10**). As has been the case before the pandemic, the months of July, August and October are the three months with the highest number of visitors.

14.

Climate action

Felix Windegger

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Being responsible for around 8% of global greenhouse gas emissions (Lenzen et al., 2018), the tourism industry substantially contributes to climate change. At the same time, the touristic offer is directly affected by changing climate conditions, with negative effects for many destinations worldwide (Scott et al., 2012). South Tyrol is no exception when it comes to this two-way relationship between tourism and climate change. Rising average temperatures, a lack of snowfall and the increasing risk of avalanches, as well as extreme weather events pose major challenges for future tourism in South Tyrol. Although data on the emissions attributable to the tourism sector in South Tyrol are rare – as they are quite difficult to measure – three key areas to look at can be identified: transport, accommodation, and touristic activities. While no data is available for tourist attractions and activities, according to a recent estimation, accommodation facilities alone are responsible for almost 5% of South Tyrol's total greenhouse gas (GHG) emissions (Zebisch et al., 2018). As the transport sector constitutes the largest emitter of CO_2 emissions in South Tyrol, this issue area aims to provide a regular estimation of transport-related touristic emissions. This is in line with the new Climate Plan 2040 of the Provincial Government of South Tyrol, according to which touristic mobility constitutes one of the biggest leverage points for climate change mitigation in South Tyrol.

INDICATOR		VALUES (ABSOLUTE)		CHANGE (%)	
14.1	Estimated car-related CO_2 equivalent emissions from inbound tourism	2019	2022	2013-2022	2021-2022
		102.4 kt CO_2eq	103.9 kt CO_2eq	+36,4%	+50.9%

Table 13: Indicator for climate action.
Source: own calculation based on data from ASTAT, STOST, Google Maps, German Umweltbundesamt (UBA).

To estimate the transport-related touristic emissions in South Tyrol, we rely on various data sources from which we draw key information on the number of arrivals per market, the travelling behaviour of guests, and average emission factors per vehicle kilometre, among other things. In order to reduce complexity, and since around 90% of guests arrive by car (de Rachewiltz et al., 2021), we focus on private cars and exclude other types of transportation in our calculation (such as trains, coaches or motorcycles). Following the territorial principle, used among others by the International Panel on Climate Change (IPCC) and also in the Climate Plan 2040 mentioned above, which attributes to a region only those emissions that are produced within its geographical boundaries, we considered the movement of tourists from the moment they entered the South Tyrolean border to the moment they left it (i.e. arrival/departure as well as internal mobility). A detailed description of the estimation procedure can be found on our website.

According to our calculation, in 2022, the **car-related CO_2 emissions attributable to inbound tourism** in South Tyrol amounted to 103.9 kilotonnes (kt) CO_2eq. This implies a significant increase with respect to the previous year (+50.9%), which is explained by the fact that after the

breakdown of international tourism during the pandemic, the tourism sector in South Tyrol has by now fully recovered and reached new record levels. In fact, in 2022, even more CO_2eq were emitted than in the previous record year of 2019 (+1.5%). If we put these numbers in relation to the total traffic-related emissions produced in South Tyrol in 2019 (the latest year for which official data is available), we can see that about 8.8% of total traffic-related emissions in South Tyrol are attributable to touristic mobility. In order to reduce touristic car-related emissions on South Tyrolean territory in the long term, different measures are instrumental, the most important of which is the promotion of alternatives to individualised, fossil-fuel-based traffic (e.g. public transport, e-mobility), both for the arrival/departure of guests and their movement within the destination.

While the territorial approach of calculating emissions employed above is useful in terms of international and interregional accounting and comparability, a more comprehensive analysis would need to consider emissions generated outside of South Tyrolean borders as well. If we thus include the journey to and from the South Tyrolean border in our calculation, we reach 520.5 kt CO_2eq. Furthermore, taking a consumption-based rather than a production- based approach would imply considering production-related emissions as well, based for instance on the lifetime mileage of the means of transport, as well as upstream emissions from fuel supply (Davis & Caldeira, 2010). If we include these indirect emissions, our estimation of car-related CO_2 equivalent emissions of inbound tourism in South Tyrol increases by 23.5%. This broader perspective opens new possibilities to reduce emissions, beyond the one mentioned above. This includes, for example, national as well as international cross-border cooperation in providing alternatives to private cars (e.g. network of high-speed trains, better range of night trains) and a strategic selection of touristic markets, aiming at reducing the distance to be travelled by car (or by airplane). In this latter regard, South Tyrol is already well positioned and should, from a mitigation perspective, continue to focus on close-distance markets.

BOX: HOW TO MEASURE GREENHOUSE GAS (GHG) EMISSIONS IN TOURISM

In order to compare GHG emissions for different human activities, scientists typically resort to the conversion of GHG quantities into "tonnes of CO_2 equivalent". The proportion is determined by the ability of each gas to contribute to the greenhouse effect. For instance, 1 tonne (t) methane equals 24 t CO_2eq. Among the different techniques employed to gather information on GHG-emitting activities, the most used is the one developed by the IPCC. Based on the territorial principle, this method estimates only direct emissions, meaning those that "physically arise from activities within well-defined boundaries of, for instance, a region, an economic sector, a company, or a process" (Allwood et al., 2014). This approach guarantees a thorough global balance; however, it accounts neither for embodied emissions – i.e. those associated with the entire lifecycle (production, transport, etc.) of a product or service – nor indirect emissions, meaning those caused by activities within well-defined boundaries but which occur outside the specified boundaries. The Italian National Institute for Environmental Protection and Research (ISPRA) estimates a total of 5.3 tonnes of CO_2eq per year for each resident of South Tyrol. By including embodied emissions, this number rises to almost 7.5 t of CO_2eq, according to the South Tyrolean KlimaHaus-Agentur (Zebisch et al., 2018).

15.

Accessibility

Maximilian Walder

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Accessibility is a comprehensive concept that enables everyone to participate in social life on an equal basis and is not solely limited to special solutions for people with disabilities (PwD). Globally, the WHO estimates that 15% of the population has some kind of need for accessibility assistance (WHO, 2022). This number includes people who might have temporary difficulties, like pregnant women or persons recovering from accidents, and in a progressively aging society elderly people also cannot be forgotten. In order to ensure a fair society with room (and the possibility to move in this room) for everyone, every part of life needs to be accessible. This includes people's holidays. To ensure that people with disabilities and the people who take care of them can fully enjoy the destination, certain standards need to be met. Independent L., a social association with the mission to promote a self-determined life and mobility for PwD in South Tyrol, provides the online platform Südtirol für alle – Alto Adige per tutti, among many other things. The organisation uses trained staff to evaluate and describe structures and services in respect of their accessibility and if acceptable includes them on their platform. Independent L. hereby ranks accessibility from 1 to 5, with 5 being the highest grade of accessibility and 1 the lowest grade. Indicators for the level of accessibility are, for example, reserved parking spaces for PwD, level-access showers, inclusive menus, or barrier-free facilities within the structure.

INDICATOR			VALUES (ABSOLUTE)		
15.1	Number of accessible gastronomy and accommodation facilities	Accommodation	2019	2022	2021-2022
			no data	365	+0.8%
		Gastronomy	2019	2022	2021-2022
			no data	173	+1.7%
15.2	Number of accessible cultural facilities and free time activities		2019	2022	2021-2022
			no data	251	+2.8%

Table 14: Indicators for accessibility.
Source: independent L. (15.1, 15.2).

In the year 2022, 365 **accommodation facilities** in South Tyrol were labelled "accessible" by independent L. standards. Compared to the overall number of accommodation facilities in South Tyrol (11,128), this represents only 3.2%, which shows a huge need to catch up in this regard. Three hundred and ten of these facilities are hotels, 37 are apartments, 16 farm residences, and 2 camping sites. More than half of accommodation facilities are in municipalities with average tourism exposure (55.3%), 37.9% are in municipalities with high tourism exposure, and only 6.8% are in the lesser touristic towns. About three quarters of all accommodation facilities (75.1%) are rated with the grade 3 or higher, indicating a high level of accessibility in the included structures. The distribution of accessible facilities is quite even in the whole province; the highest presence of facilities, though, can be found in the greater Meran/Merano area.

Looking at the service industry, 173 restaurants and bars were labelled accessible in 2022. Similar to the situation with accommodation facilities, they only represent a very small percentage of the overall establishments. Most **"accessible" gastronomy facilities** can be found in municipalities with average tourism exposure (62.4%), around a third in high touristic municipalities (29.5%), and only 8.1% in lesser touristic towns. Meran/Merano, again, has the biggest offer of accessible gastronomy in the province. **Figure 19** shows that most accessible restaurants are in the main towns.

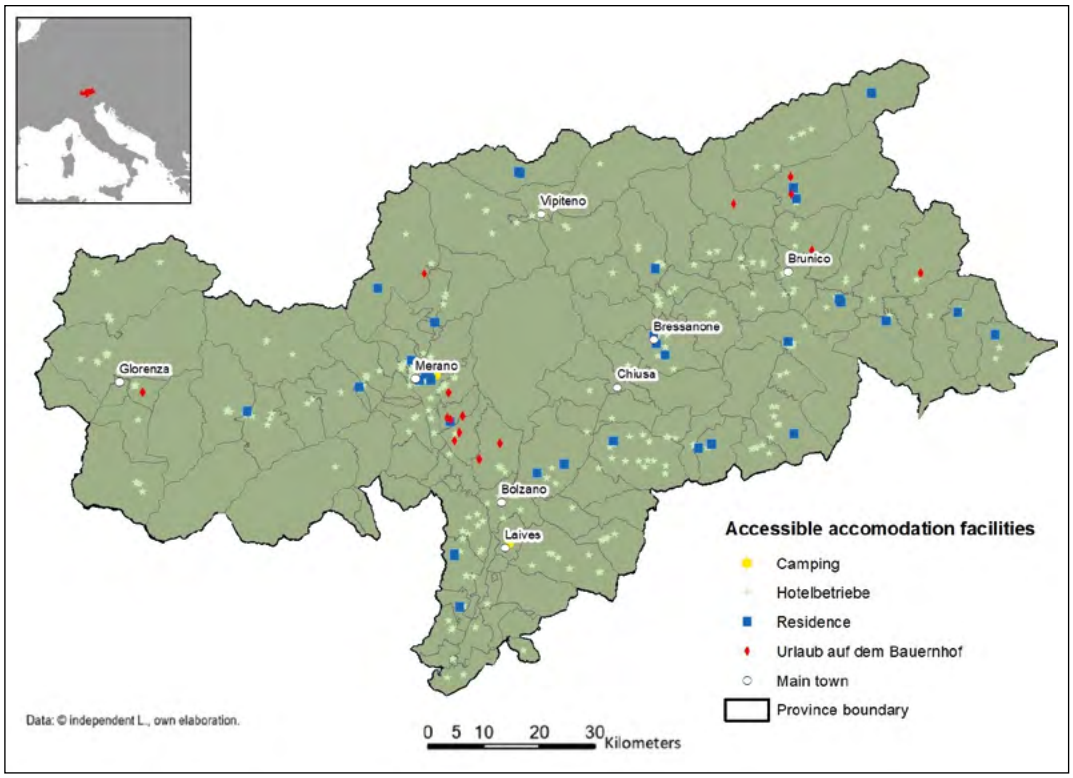

Figure 19: Accessible accommodation facilities by the standards of Südtirol für alle - Alto Adige per tutti, South Tyrol 2022.
Source: independent L., own elaboration.

On their online platform *Südtirol für alle – Alto Adige per tutti,* for each activity, information on the specific characteristics of the structures is shown. In 2022, 81 **museums and cultural institutions** were labelled accessible. Only 26 out of the 107 museums in the destination are not recognised as accessible, which is already a good quota, even if there is still room for improvement. Most of these museums are located in the two main towns, Bozen/Bolzano and Meran/Merano. Furthermore, guests have the possibility to use 76 barrier-free hiking trails and promenades all over the province. Next to the offers in the cities, Sand in Taufers/Campo Tures offers the most accessible opportunities (10 trails and promenades). Fifty-two accessible spa and sport activities, including pools, sport venues and gyms are also present in South Tyrol, as are 36 accessible playgrounds for children. Other activities that are included in these numbers and which were not explicitly mentioned are accessible cinemas, theatres, castles, and cultural centres.

Conclusions and outlook

The year 2022 marked a significant turning point for the tourism sector in South Tyrol, as it finally fully rebounded from the disruptions caused by the Covid-19 pandemic. The impressive recovery was evident in the record-breaking numbers of arrivals and stays, surpassing even the pre-pandemic levels of 2019. This resurgence can be attributed to the resilience and adaptability of the region's tourism industry, which saw changes in accommodation trends, an increase in diverse lodging options, and a return of key market segments. Key findings across various dimensions underscored the positive trends in the South Tyrol tourism landscape. Seasonality patterns, although altered temporarily by travel restrictions, realigned in 2022 to resemble the pre-pandemic distribution. Employment in the accommodation and food service sector rebounded, with a (slowly) growing emphasis on female leadership and gender equality. Also, the economic benefits exhibited clear signs of recovery with a significant increase in earnings and occupancy rates, signalling a resurgence of traveller confidence.

These developments described in this year's STOST report are clear signs of a successful recovery from the Covid-19 restrictions. However, in the wake of the pandemic, a new challenge for tourism development in South Tyrol is arising, which is linked to emerging debates on overtourism and the pressures that tourist activity puts on both social and natural resources. This becomes evident when looking at the tourism intensity, which reached an all-time high in 2022. It is also reflected in rising differences in minimum rent prices between highly and less touristic destinations, which makes tourism a potential driver for inflation. Furthermore, an increasing environmental impact can be linked to the growth of the tourism industry as well as the trend towards more luxurious hotel facilities, as seen in the developments regarding energy and water consumption and waste generation. Against this backdrop, governance initiatives demonstrated a growing commitment to sustainability, as evidenced by the rising participation in certification schemes and the success of initiatives like the "Red Rooster" branding.

Despite these positive signs, the challenge to align tourism development in South Tyrol with social and ecological boundaries is now bigger and more urgent than ever. In this context, it is essential to envision and experiment with new strategies and ideas for a tourism that is not dependent on quantitative growth, with a stronger focus on the needs of the local population and the integrity of the natural environment. The lessons learned from the challenges posed by the pandemic have reinforced the importance of resilience and adaptability. In addition, it has become ever clearer that slow, incremental steps in isolated policy fields will not suffice to adequately address the huge challenges related to global environmental changes (including climate change and biodiversity loss). Against this background, the study of societal transformations has become more and more established in recent years. Associated theoretical approaches emphasise the complex and non-linear nature of societal change, while political-strategic approaches to transformation stress the need to fundamentally rethink currently predominant structures, practices, and imaginaries. The insights gained by this emerging research field have important implications for the monitoring activities of INSTO observatories, and have briefly been touched upon in this year's report. In the coming years, this transformation perspective will be further elaborated and integrated in a comprehensive way in the monitoring activities of STOST.

Generally, continuing efforts to integrate sustainability into all facets of tourism, from infrastructure and operations to visitor experiences, will be crucial. Collaboration between stakeholders, ongoing monitoring and evaluation, and the implementation of innovative solutions can guide South Tyrol towards a model of tourism that not only thrives economically but also safeguards its unique cultural and natural heritage for generations to come.

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