9TH REPORT ON THE STATE OF THE ALPS



ALPINE TOWNS

Key to sustainable development in the Alpine region

Part 1: Facts, Maps and Scientific Debates



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1. Alpine towns and the settlement system

1.1. Finding: Alpine towns and their relevance 'beyond size'

Settlements evolve into towns and cities through urbanisation processes and rising numbers of inhabitants. Alpine towns must deal with a variety of issues: the demography of the Alps reflects that of the European population in general, which is ageing and stabilising while the global population is growing (EEA 2019: Cluster 1). The diversification of lifestyles implies new work patterns and career paths. These trends result in a new demand for infrastructure and real estate in the development of towns and cities. A shift in health and social concerns demands a new approach to the provision of essential services such as medical care, mobility infrastructure, and retail offer (ESPON Alps 2050; ESPON Prophecy).

In the Alpine context, urbanisation is a complex and often controversial topic. The first step is to determine how a town can be defined. Given the predominantly rural character of the Alps and the importance of its geomorphology, common definitions based on minimum numbers of inhabitants are not appropriate (cf. Dematteis 1974, Bartaletti 2014). Only very few towns within the Alpine Convention area would be considered if a minimum threshold of 100,000 inhabitants were used (see Fig. 1). Out of a total population of about 14 million in the Alps, only 900,000 live in these towns (ca. 6.5%). If we add towns with populations of more than 50,000 inhabitants, the total comes to about 1.4 million people, or 10% of the Alpine population.

| > 100.000 INHABITA | NTS | > 50.000 INHABITANTS | | |
|--------------------|---------|----------------------|--------|--|
| Grenoble | 160.649 | Klagenfurt | 97.880 | |
| Salzburg | 148.420 | Luzern | 81.295 | |
| Innsbruck | 126.965 | Kempten | 66.947 | |
| Annecy | 125.694 | Lugano | 63.583 | |
| Trento | 117.304 | Rosenheim | 61.844 | |
| Maribor | 112.325 | Villach | 60.500 | |
| Bolzano/Bozen | 106.110 | Chambéry | 59.697 | |

Fig. 1: Large Alpine cities, located within the Alpine Convention perimeter (Data: Eurostat 2015).

Most countries with Alpine territories classify settlements with a population of more than 10,000 as cities or towns (e.g. Stadtgemeinde in Austria; in other countries often in combination with indicators of labour market, tourism or services). Since most settlements are smaller, mapping towns with this threshold would result in many 'empty' spaces within the mountainous areas. Still, it would be a mistake to think of the Alpine region as completely rural. Instead, there is a 'scaling issue' specific to the Alpine region, particularly in mountainous areas. Small settlements often perform important functions such as economic and political decision-making and providing educational, medical, cultural and retail services. The high number of medium-sized and even small towns play an important role in the region's spatial organisation. Therefore, for this Report on the State of the Alps (RSA), we will use the following definition of Alpine towns: Alpine towns are defined as settlements having a minimum population of 5,000, and a population of at least 3,000 if they are not located right next to a larger town¹. Using this definition, there are now 8.5 million people in our analysis, or 60% of the population within the Alpine Convention perimeter, spread across a total of 780 Alpine towns. Our definition of Alpine towns combines population size and – with the inclusion of stand-alone 3,000-person towns – the functional role of the town. By combining demography and accessibility data, this approach is similar to the Functional Urban Areas (FUAs), a term used in many international studies (ESPON, OECD, etc.).

Fig. 2 provides a cartographic overview of the Alpine towns in this report.

Even if the definition of Alpine towns is rather broad, we can see distinct spatial patterns. The Alpine perimeter is surrounded by an urban fringe. Even including the under-5,000 population settlements, the inner-Alpine area has considerably fewer towns. However, the large valleys and geomorphological formations have some urbanised corridors, including the Inn, Eisack/Isarco, Mur, Piave, Rhine, and Durance valleys.

¹ Indicator / methodology: Fig. 2 shows the Alpine settlement system based on a population size and accessibility definition of Alpine towns. The population data refer to the LAU database of ESPON Alps 2050. Alpine towns are defined as settlements with a population of more than 5,000 within the Alpine Convention Perimeter. In addition, calculations of accessibility by car were performed using an API of the Open Route Service (based on OSM data, openrouteservice.org at HeiGIT). The map shows travel times of 5, 10 and 15 minutes around the individual settlements. Settlements with a population between 3,000 and 5,000 are considered Alpine towns if i) the settlement is more than 15 minutes' drive from a settlement of more than 5,000 inhabitants or, ii) the settlement is less than 15 minutes' drive from another settlement of fewer than 5,000 inhabitants but it has more inhabitants than the settlement nearby or has access to the railway. The map uses yellow to show the accessibility isochrones of Alpine towns with more than 5,000 inhabitants. The accessibility of the included Alpine towns that have under 5,000 inhabitants is shown in green colour logic to emphasise the relevance of the small settlements. According to this analysis, the Alpine settlement system consists of 780 Alpine towns, with 161 of them having fewer than 5,000 inhabitants. Maribor and Lecco are not part of the Alpine Convention Perimeter but are included as Alpine towns. This is due to their proximity to mountainous areas and their role in various Alpine town networks (in particular, Alpine Town of the Year). The geodata on 'urbanised areas outside the Alps' refer to the 'Morphological Urban Areas' classification (data source: ESPON project M4D, IGEAT).



Fig. 2: Alpine towns – definition and mapping

The orientation along valleys is a typical feature of the Alpine settlement system. Since construction on steep hillsides is often dangerous and expensive, the morphology of settlements in inner-Alpine contexts is of a more linear orientation. The settlements along the valleys often grow together over time. This linear and network structure is an important element for efficient land-use patterns. At the same time, it is important that urban sprawl along valleys does not lead to construction zones with no character. The challenge here is to organise multi-functionality while maintaining quality of life.

Focusing on population size can be misleading in the Alpine context. Outside the Alps, settlements of under 20,000 inhabitants often play a rather limited role in metropolitan regions, seen as mono-functional suburbia for instance. Things are different in the Alpine region: many small towns provide key functions for large catchment areas of surrounding regions. They are often involved in global economic networks, and their reputation is impressive. Alpine towns not only often play a bigger role than comparably sized towns outside the Alps, but they also frequently have multiple roles.

The context differs across the Alps depending on the spatial embedding: a number of towns stand out due to their tourism importance (e.g. Kitzbühel, Oberstdorf or Cortina d'Ampezzo with only a few thousand inhabitants but worldwide renown). However, they also play a vital role in delivering essential services in the regional context. Whereas medical, retail and cultural services can be partially linked to visitor demand, this is not the case with education infrastructure. Furthermore, a number of small towns have an exceptional role due to the political context: Davos, for example, has become a famous venue for the annual World Economic Forum, attracting international attention; Vaduz/ Schaan and Monaco serve as political and economic capitals. But even beyond these specific tourist and political 'hotspots', relevance beyond size is a common feature of Alpine towns. Many of them host universities (e.g. Leoben), headquarters of 'hidden champion' enterprises (e.g. Reutte, Plansee) and they all have to provide a broad range of education, mobility and healthcare services, etc.

Even if the 'roles beyond size' have yet to be empirically quantified, it is more than plausible that there is a multiplication of functions in the Alpine context. In terms of media reputation, economic and political relevance as well as provision of services, most Alpine towns with just a few thousand inhabitants are comparable to peri-Alpine towns of far greater size. If it is assumed that Alpine towns carry ten times as many functions as peri-Alpine cities ('factor-10 argument'), this has political implications: the high level of importance and vital role of Alpine towns despite their small size means that small-scale functions for sustainable spatial development in the Alpine context must be taken seriously.

1.2. Debate (a): Urbanisation in the Alps – potential or threat?

The findings of this study show that Alpine towns are specific territories. They are unique in size and function and, in many ways, they are 'front-runners': sections further on in this report will show that many Alpine towns are much ahead of the EU average in socio-economic terms, and the tourism sector is exceptional. Furthermore, due to the rapid pace of climate change, Alpine towns must take the lead in climate adaptation. The political geography also leads to a high concentration and strong dynamic of territorial cooperation. These positionings of Alpine towns are both challenges and opportunities.

The key question is what kind of urbanisation and settlement system is the most appropriate and sustainable for the Alpine region. Urbanisation in the Alpine context must distinguish between two perspectives: the internal perspective focuses on the role of towns and cities within the Alps, and the external perspective reflects on the role of the surrounding metropolises in close proximity to the Alps (e.g. Zurich, Munich, Turin, Ljubljana).

Starting with the internal perspective, the debate is complex. On the one hand, urbanisation can be primarily viewed as a threat to the Alps' fragile natural and cultural heritage. Urbanisation is often discussed in a critical way when the focus is on urban growth, often linked to sprawl and soil sealing as well as aesthetic degradation (Bätzing 2015).

On the other hand, urbanisation can also be seen as a chance for an efficient spatial organisation, providing a good quality of life. Towns and cities are important hubs for the provision of services, including schools, medical care, culture and retail. The accessibility of these services is the key element for the Alpine population's good quality of life, prosperity levels and lifestyles across all age groups (ESPON Alps 2050). In this respect, the principle of 'decentralised concentration' describes the aim to cover the territory in an effective way. 'Concentration' refers to the necessity to bundle spatial dynamics in selected places, while 'decentralised' indicates that this concentration should be focused on the most metropolitan places. Providing a good spatial infrastructure without fuelling sprawl is the underlying idea. From this perspective, the Alpine settlement system is the basis of spatial efficiency. Supporting the functions of towns of different size and along axes allows for an efficient organisation of transport modes, energy consumption and economic flows. Developing this system contributes to an equitable organisation of life.

Secondly, the external perspective also comes with multifaceted arguments. The proximity to the larger metropolitan areas surrounding the Alps contains opportunities and threats. Fast accessibility to important markets, consumers, and infrastructures certainly offers potential. The socio-economic success of the Alpine region – compared to other mountain areas in Europe and beyond – relies strongly on the strong spatial integration with the peri-Alpine settlement system (ESPON Alps 2050, Bußjäger & Chilla 2017). The short distances to metropolitan labour and consumer markets and the integration in large-scale transport infrastructure provides the potential for economic prospering (Mayer & Job 2014). Places that are not integrated in the international networks tend to suffer from outmigration and economic stagnation. For the more integrated towns, the obvious threat lies in the over-exploitation from peri-Alpine demand (e.g. transport, leisure and tourism). The ecosystem services might end up being overused, particularly as regards biodiversity, climate change and soil functions. Furthermore, the Alpine cultural landscape, including its towns, might be reduced to aesthetic clichés as residual Alpine elements or replaced by purely tourist infrastructure. The key challenge here is to establish a spatial integration approach that provides an equitable socio-economic balance with high ecological efficiency (e.g. AURG 2019). Some authors stress the risk that Alpine regions and towns might be reduced to simple supplementary functions ("Ergänzungsraum") as external, metropolitan hubs (Bätzing 2015), together with new disparities such as Alpine gentrification (Perlik 2011). Others stress the potential in "increasing mutual dependences" of inner- and peri-Alpine areas that call for the organisation of increased Alpine centrality (Dematteis 2018: 11). The goal here is to combine endogenous potentials with the smart exploitation of international integration in this context.

It is clear that sustainable spatial development in the Alpine context must balance numerous aspects. This report aims to contribute to this process by delivering current facts about, insights into, and cartographic inspiration for Alpine towns.

1.3. Debate (b): Quality of life in Alpine towns – how Alpine-specific?

The debate on quality of life is currently high on the agenda of spatial development in Europe (ESPON QoL 2020). It first came up in the 1970s, underlining development factors beyond pure economic growth and standards of living. It includes material, social (neighbourhood, communication), and environmental qualities, leading to a life that is 'good' both subjectively and objectively, resulting in a certain level of "luck or happiness, satisfaction and healthiness" (Borsdorf 1999: 165). Intuitively, the concept is very plausible, but it is not easy to define or even measure. Some aspects (security, absence of diseases) are more obvious than others (leisure facilities, landscape quality).

The Alpine region is often associated with a high quality of life that has the potential to attract people as a labour force, as 'new highlanders' (see the chapter above), or as tourists (Mayer & Meili 2016). Even if the general potential is obviously large, the question remains as to what kind of qualities are specific to the Alps and to what extent Alpine-specific qualities are seen as positive (see for the Slovenian case: ESPON 2021).

Simplifying the discussion to a certain extent, the Alpine context comes with a certain 'leverage' effect on quality of life: the morphological situation is the basis of the attractive landscape with its panoramic views, fascinating landscape contrasts and outdoor facilities. Living in Alpine towns means living close to many natural and cultural assets and attractions. However, this morphology hampers accessibility and, as a result, the density of essential services is often lower than in non-mountainous contexts (ESPON Alps 2050). Furthermore, the morphological situation very much limits settlement space, which, in combination with high land demand by owners of second homes and tourism businesses, leads to (very) high real estate prices.

Whether the positive or the negative facets dominate the quality of life in Alpine towns depends on three aspects. First, individual preferences differ widely, reflecting personal priorities and lifestyles (for the debate on amenity migration, see chapter 2.5). Second, socio-economic status is important. Affluent people have more opportunities to make the most of the territorial contexts than poorer people, and established local people tend to have more options than non-native relocators (Borsdorf 1999, Keller 2009). In addition, age, family situation and gender play an important role. The Alpine region with its rather small settlements is embedded in a rural context. Depending on socio-economic status,

this context can be perceived differently. Childcare facilities can be more important to new inhabitants than to members of long-established families; traditional values can be perceived as an authentic regional asset, an exclusionary practise or even as outdated relic (cf. Bätzing 2009); personal proximity can be viewed as a good social network or as inquisitive; double income households tend to fit more easily in urban labour markets; and so forth (cf. Ströbele 2017).

Third, the political handling of territorial assets is important for their role in quality of life. Social housing, noise protection measures, programmes for the promotion and funding of local cultural initiatives, and venues etc. can help to avoid polarisation and social frictions.

As a result, the potential for a high quality of life is certainly particularly high in the Alpine context. However, this potential does not automatically unfold and has to face the risks of gentrification and polarisation. If the objective is to safeguard the quality of life for the established population, attract skilled people, and ensure societal integration, all at the same time, then the challenges are considerable. The urban quality and culture need to be developed carefully.

2. Demography

2.1. Finding (a): The link between urbanisation and location

With regard to demographic development in Alpine towns, the opening question reflects the extent to which urbanisation is a current trend in the Alps. Here, we understand urbanisation as the rising importance of cities and towns in quantitative terms. There are several possible answers to this question, depending on the spatial focus of the data analysis (cf. Fig. 3).



Fig. 3: Population change 2010-2019 in Alpine and peri-Alpine areas (indexed: 2010=100)².

² **Indicator / methodology:** The graphs in Fig. 3 show the indexed population trends from 2010 to 2019 for different territorial and morphological affiliations. There are two spatial dimensions in this figure: the Alpine area consisting of the Alpine Convention area and the peri-Alpine area consisting of EUSALP minus the Alpine Convention area. Additionally, two definitions were used for the degree of urbanisation: in the inner Alpine perimeter, a distinction was made between Alpine towns and rural Alpine areas using the definition from this Report on the State of the Alps. In the peri-Alpine area, the Eurostat classification DEGURBA was used to define different degrees of urbanisation and to show their development. The population level from 2010 was selected as the set initial value for indexing. A value below 100 on the vertical axis indicates negative population change (population decrease); a value rise above 100 indicates a positive population development (population growth).

If we refer to the fact that the number of inhabitants in Alpine towns has risen over recent years, the answer is 'yes', the overall Alpine region is currently undergoing a process of urbanisation. Over the last decade, the population growth in Alpine towns has been almost 4% (from 2010 to 2019).

However, the answer is less clear if we compare the towns to other Alpine territories. The overall demographic development of the Alpine region is positive, showing a growth rate of just over 3%, whereas the rural areas grew by just under 3%. As Alpine towns have grown slightly more rapidly than the rural areas, this can be seen as a moderate sign of urbanisation.

If we apply the external perspective, we have to relate the development of Alpine towns to the metropolitan areas surrounding the Alps. Generally speaking, all territorial categories have developed in a more positive way than the EU 27 average. On the macro-regional scale, the following pattern is evident: whereas peri-Alpine agglomerations have clearly grown more strongly (more than 5%), the rural peri-Alpine areas have had a weaker growth trend (ca. 2.5%).

What is found is that, despite the Alpine region having had positive demographic developments, including the average values for rural areas, urbanisation processes are only moderate. However, as the development paths on the fine scale are very heterogeneous, we must go into further detail.

2.2. Finding (b): The link between settlement size and development trends

The literature on Alpine development tends to assume that smaller settlements develop less positively than larger ones (e.g. Borsdorf 2007, Perlik et al. 2001, RSA5). However, the demographic statistics for the last decade show that such a correlation is currently not dominant. Growth and stagnation can be found in all Alpine towns of all size categories, although demographic decline is only found in towns of fewer than 50,000 inhabitants. However, there are clear differences between the development trends of towns depending on national affiliation. It is worth taking a closer look at the different national contexts of Alpine towns.





Fig. 4 visualises the progressive demographic developments, with significant differences depending on national affiliation:

- Alpine towns in Switzerland, Liechtenstein and Monaco show a strong population increase with a steep curve and high index values.
- Alpine towns in France, Germany, and Austria also show a population increase, but with a less steep curve.
- The Italian and Slovenian Alpine towns show stagnating values and a temporarily decreasing curve.

Fig. 5 zooms into the situation of Alpine towns in all countries, differentiating the demographic development in relation to the size of towns. The horizontal x-axis shows

³ **Indicator / methodology:** The graphs in Fig. 4 show the indexed population trends from 2008 to 2019 for all Alpine towns (over 3,000/5,000 inhabitants; for the definition see Fig. 1) differentiated by nation-state. The population numbers from 2008 are the initial value for indexing. A value below 100 on the vertical axis indicates negative population change (population decrease); a value above 100 indicates a positive population development (population growth).

the population numbers in a logarithmic scale (50 means 50,000 inhabitants, 100 means 100,000 inhabitants, etc.). The further a dot is positioned on the right side, the larger the town; the higher the dot is positioned, the stronger its growth.



Fig. 5 Population development in Alpine towns by country – the zoomed in perspective⁴

⁴ **Indicator/methodology:** The scatter plots of are based on the same methodology as Fig. 4. Additionally, Fig. 5 shows a differentiation according to nation-states and a trend line for each nation-state. The Alpine towns represented in grey are not part of the respective country.

Again, we observe obvious differences depending on national affiliations:

- The average Alpine town size in all countries is between 10,000 and 12,000 inhabitants, except for Liechtenstein with an average of approximately 5,000 for its four towns and Monaco with only one city of approximately 39,000 inhabitants.
- Demographic trends in Alpine towns comprise loss or low growth in Austria, Italy and Slovenia, whereas the German and French towns show fairly balanced development. The towns in Switzerland, Liechtenstein and Monaco show a clear growth in population.
- The variation of development (size of the 'clouds') is clearly larger in France and Switzerland than in the other countries. In these cases, the 'clouds' are larger than in Austria and Germany, where they are more compact.
- It is interesting to note a more general correlation: The larger the town, the lower the amplitude of population change. This can be explained by the fact that single elements (e.g. a new development area or the closure of a production site) have relatively less influence since large towns contain numerous further dynamics. Furthermore, in Germany, Austria, Italy, and Slovenia, the larger towns show a more positive trend than the smaller ones. Conversely, in Switzerland, France, and Liechtenstein, the larger towns develop less positively than the smaller ones.

These findings confirm the overall picture from the RSA on demographic development (RSA5) that underlines complexity and heterogeneity as the most obvious characteristics of Alpine demographic development. At this point, we can add that a) the Alpine area is undergoing a modest process of urbanisation and b) the development paths depend to a relatively high extent on national affiliation.

2.3. Finding (c): The link between settlement size and the populations' age

Ageing is a key challenge in demographic change. The older the population, the more critical the future prospects: medical care and age-based living space in valley locations is of increasing importance and the share of the working population tends to diminish, putting pressure on labour markets (Borsdorf 2007). Furthermore, a currently elderly population can be a sign of future population decline. It is true that an ageing society must not be seen in a purely negative light: 'silver agers' can be very active members in their local communities and their purchasing power is often substantial. Still, a strong overrepresentation of the older age groups is a challenge for towns (cf. Bausch et al. 2014). The ageing index for Alpine towns is shown in Fig. 6.

Younger people tend to be more mobile for purposes of education, career development and family needs, and they are more likely to have young children. Given this, it could be questioned why the large university towns (e.g. Innsbruck or Grenoble) are not amongst the youngest towns. An important reason is that larger settlements can be very attractive not only for young but also for elderly people (from inside and outside the Alps) due to their better offer of social infrastructure and cultural activities⁵ (Alpine Space Programme 2013).



Fig. 6 Ageing Index in Alpine towns (2015)⁶

The towns with the highest ageing index are often located on the southern fringe of the Alps, especially in Italy. Most countries have towns with a high index in less accessible, inner-Alpine contexts, but inner-Alpine towns are not necessarily older than peri-Alpine ones.

⁵ The fact that students are not all registered as residents of university towns also plays a role, even if this cannot be quantified.

⁶ **Indicator / methodology:** Fig. 6 shows the relation between the number of persons over 65 years and the number of persons under 15 years old (dot colour) as well as the population in 2015 (dot size) for every city within the Alpine settlement system (LAU). The lower the ageing index, the higher the proportion of young people in the total population. For example, the red dot means that there are 1 to 50 people over 65 for every 100 persons under 15. The higher the ageing index, the more the Alpine town is under pressure from ageing effects.

There are some towns with unexpectedly low ('young') values: despite being an almost isolated town on the Italian-Swiss border, Livigno has a value under 50, which can mainly be explained by its special taxation regime. Other small towns with many younger people are in the catchment areas around the larger towns of Geneva, Salzburg, Innsbruck, Ljubljana and also Vorarlberg, explained by the dynamic processes of suburbanisation, i.e. the shift of housing and industry demand beyond the perimeter of the core cities.

To conclude, this finding shows a certain north-south gradient, with lower ('younger') values in the north. Overall, we can summarise that the situation and prospects of Alpine towns are mostly influenced by national affiliation and the north or south location, rather than by the size of the town or the location in the mountainous area.

2.4. Finding (d): The link between altitude and socio-economic development

Settlements located in mountainous areas have to face particular challenges. Geomorphologic barriers hamper accessibility that consequently makes economic integration and the supply of essential services more difficult. Demographic analyses in recent years have shown that growth is found in the broad corridors at low altitude (e.g. Bätzing et al. 1996, ESPON Alps 2050; see chapter 1.1). The question is to what extent the altitude above sea level as such is an explanatory factor. Fig. 7 shows the positioning of Alpine towns in relation to altitude, demographic development and national affiliation.

It is true that the geomorphological context matters, as shown for different periods and sub-regions (e.g. Lichtenberger 1979, Bender & Haller 2017). Geomorphological context comprises a series of aspects, including absolute altitude above sea level (as shown in the figure), but also relative altitude (e.g. altitude range within different towns) and distance to steep areas. Nevertheless, and as with findings from previous chapters, the relevance of national affiliation clearly overrides the geomorphological positioning.

A scatter plot may only be an exploratory tool for data analysis, but it provides solid evidence that there is no correlation between altitude and socio-economic development. It is still true that proximity to large valleys is a positive factor which cannot be seen in this graphic. However, national affiliation, which is visualised in form of the coloured clouds, is of major importance.

It is worth mentioning that GDP trends, which have been analysed in parallel, show very similar patterns as these graphs.



Fig. 7 Altitude and population change for Alpine towns⁷

⁷ **Indicator / methodology:** Fig. 7 shows population development between 2010 and 2015 as a percentage on the horizontal axis and the altitude above sea level on the vertical axis. Additionally, each point denotes the position of one Alpine town in the grid. The figure shows a differentiation according to countries, illustrated by the different colours. The Alpine towns represented in grey are not part of the respective country.

2.5. Debate: amenity orientation as a potential and a threat

Demographic development is the result of natural development (births, deaths) and migration. The latter component is most important in quantitative terms: in- and out-migration are decisive factors for demographic development and, thus, for regional development in general. In recent years, the debate on the Alpine region has focused on the increasing importance of lifestyle-oriented migration. This kind of migration is not predominantly triggered by labour market opportunities but rather by personal choices due to the attractiveness of the landscape, leisure opportunities, and personal preferences (Bender & Haller 2017).

There are several aspects to this amenity approach. A second home, which is often based on longstanding holiday habits, is a first step towards a multi-local lifestyle. Later on, the second home may become the primary or even the only residence. Particularly in regions of outmigration, this can have important potential, both in rural regions and in urban areas (Perlik 2011, Ullmann 1954, Moss 2006). "Second homes can be interpreted as an indicator for an ongoing conversion process of the Alpine Region towards a space for leisure and tourism. Multi-local lifestyles can be considered a major opportunity for the Alps if new inhabitants are willing to take responsibility for both regions and their development" (Sonderegger & Bätzing 2013: abstract).

At the same time, these relatively new patterns come with considerable risks: second homes tend to be inefficient components of towns as they are, by definition, only in parttime use. Even if the amenity migrants live entirely in the Alpine area, their role in the typically traditional setting must be developed carefully. The lifestyle of the "new highlanders" (Bender & Kanitscheider 2012, Löffler et al. 2014) often does not mesh well with existing cultures, and gentrification due to prosperous in-migration can polarise communities (Perlik 2011).

This debate must be viewed in the context of rising house prices in many markets. This trend applies to many European cities, but the attractiveness of many Alpine regions as tourist destinations fuels the dynamic. This trend has recently been increased by sharing economy models such as Airbnb (cf. Domènech et al. 2019).

In practise, the question is not predominantly if amenity oriented in-migration offers potential or is a threat, but rather how to develop the potential and avoid negative implications. This question needs to be handled very sensitively according to the specific local situations. The political question of whether amenity orientation is a risk or an opportunity depends on the local situation (demographic trend, building structure, etc.). In towns with property market tensions, second homes tend to be a critical element; in towns with a high vacancy rate, their potential is mostly far greater. From a labour market perspective, highlighting Alpine amenities can make a difference in attracting a skilled labour force even internationally. A place-based development approach for Alpine towns has to consider the amenity orientation, but in a specific and differentiated way (Bender & Borsdorf 2014).

Even though the issue of amenity migration is of high relevance for many Alpine towns, it is important to emphasise that motivation for in- and outmigration is not limited to amenity aspects – quite the opposite is true. The most important drivers of mobility are education, family change, and professional development (Geist & McManus 2008) which

are not Alpine-specific in a strict sense. But in times of skilled labour shortages in the economic centres and of strong outmigration from some Alpine places, amenity migration is an important facet of Alpine-specific development drivers.

3. Environment

3.1. Finding (a): Water consumption

Climate change poses a significant threat to the Alpine regions and their inhabitants. The ramifications on multiple levels (economy, health, etc.) are not restricted to Alpine towns but apply to the entire region. Water supply is a particularly pressing issue: due to topography, rainfall and glaciers, the Alps serve as the water reservoir for large parts of Europe. Drinking water supply, industrial production, agricultural productivity, hydropower and other uses all require consistent availability of Alpine water. This is not only true for the Alpine region but also has implications far beyond – large parts of Bavaria, Lombardy etc. depend on these Alpine ecosystem services (Chilla & Streifeneder 2018). Climate change puts these functions under pressure, as glaciers are receding and precipitation regimes are constantly changing (cf. Mastrotheodoros et al. 2020). Thus, reduced quantities of water and limited reliability of water supply will be a major issue in the coming decades. The competition for water, often between Alpine and peri-Alpine territories, will become a major part of "increasing scarcity of and global competition for resources" (EEA 2019).

Alpine towns occupy a particular position in this context since they are neither major water suppliers (which are found in the inner-Alpine rural territories) nor the dominant consumers (which are the large agricultural and metropolitan actors in the lowlands). Nonetheless, as they are often in close proximity to water supplies, their consumption patterns matter.

Fig. 8 shows the current situation on the basis of the so-called water use index, describing the share of water extraction from the water available. The map shows several Alpine towns that are already affected by water shortage, or at risk of being affected in the near future, mainly concentrated in industrial agglomerations such as Grenoble, Annecy or Vienna, and in/around Bolzano/Bozen where the agricultural sector is a heavy water consumer. The southern Alpine towns (especially in France and Italy) with their drier climates are more likely to undergo water shortages than the northern towns. This is particularly true of inner-Alpine dry valleys such as the Aosta Valley in north-western Italy, already affected by significant water stress (e.g. Obojes et al. 2018).



Fig. 8 Water use index⁸

3.2. Finding (b): Temperature rise

Climate change is a multi-dimensional dynamic affecting precipitation regimes, biodiversity patterns, natural hazards etc. However, the most prominent topic is rising temperatures. Fig. 9 shows that the Alpine region is having a higher temperature rise than peri-Alpine areas, or at least that its temperature changes at an earlier stage. Alpine towns are located in all categories of temperature rise prognosis. But the majority are expected to see temperature rises far higher than the European average. This is espe-

⁸ **Indicator / methodology:** Fig 8 shows the percentage of water extraction from available water. The water use index indicates whether the use of water resources in Alpine towns is sustainable or if water shortage is occurring. Water withdrawal is considered sustainable if it does not exceed 20% (threshold for water stress) of the available water supply. When water withdrawal reaches 40%, it is called water stress, and even, at 60%, significant water stress. Two datasets from the AlpES WebGIS are the basis for this analysis: the average annual amount of surface water available during the period 1801 to 2014, and the annual average water consumption of each settlement unit in the study area during the period 2010 to 2013. Both datasets were based on NUTS2 data, which have been downscaled to municipality level (LAU) with reference to population and tourism data.

cially true for Italian and French territories in the south-west of the Alpine Convention perimeter. Many Swiss towns are also likely to be severely impacted.

Returning to Fig. 8 showing the water use index, we can observe a clear parallel: in both maps, the south-western areas are disproportionately affected. Temperature rise is strongly affecting those areas and towns that are already experiencing scarcity of water. These findings clearly confirm that Alpine towns will be severely impacted by climate change. Water management regimes, energy management and urban planning that aims to prevent heat islands (green and blue infrastructure) will all have a vital role to play in adaptation efforts. It is interesting to note that many of the towns experiencing increased heat stress also have a high ageing index (see chapter 2.3). This constellation further emphasises the importance of the medical dimension in climate adaptation strategies.



Fig. 9 Projected changes in surface temperature 2021-20509

⁹ **Indicator / methodology:** Fig. 9 shows the projected changes in annual near surface temperature in the Alpine area in °C. This raster layer presents the projected variation of near surface temperature between the period 2021-2050 and the reference period 1971-2000. The variation in near surface temperature is obtained as the average of EUROCORDEX rcp45 ensemble scenarios. The layer was accessed through WMS services at http://www.atlas.alpconv.org/geoserver/ows?service=wms&version=1.3.0&request=GetCapabilities.

The situation of Monaco, the only Alpine town situated directly on a coast, is worth considering. Monaco would be severely affected by sea level rise, which might reach more than a metre by the end of the 21st century (Jevrejeva et al. 2019, Le Cozannet et al. 2019, Carillo et al. 2012). This particular case too underlines the forerunner position of Alpine towns in terms of climate change adaptation.

3.3. Debate (a): Environmental change as an impulse for development?

The current climatic and environmental dynamic is of paradigmatic relevance worldwide. The Alpine region is particularly affected. For example, owing to the morphological situation, temperature rises at a considerably faster rate than in other regions. The much-mentioned goals of 1.5°C and even 2.0°C, which are important arguments in the climate change debate, have already been passed in some Alpine regions. The trend of "accelerating climate change and increasingly severe consequences" (EEA 2019, Cluster 2) is particularly evident in the Alpine area. Steep topography entails an exceptionally higher risk of disasters including floods and landslides (cf. RSA7 on natural hazard risk management).

The focus on temperature rise and water use intensity in the previous sections is just an example. This illustrates typical patterns of many environmental changes in the particular topographic situation. Whether referring to air quality, biodiversity change or noise pollution, mountainous areas tend to be more affected than others. The Alpine region and its towns are clearly forerunners in terms of environmental change as they are affected earlier and more severely. The extent to which this particular situation can lead to positive development impulses is a fundamental question. There is certainly no reason for glossing over the dramatic dynamics of climate and environmental change. However, it is important to explore all possibilities and options, e.g. through the synergetic effects and multiple benefits of nature-based solutions.

Finding solutions might provide market options and business opportunities, allowing for innovative governance approaches. This might lead to first-mover advantages in the Alpine region (cf. Ambec & Lanoie 2008: 51). Energy and water markets are the most prominent examples in this respect. At the same time, adaptation strategies come with economic risks since 'path dependencies' and regional contexts can hamper successful transformation (cf. Aghion et al. 2019). Finding the right balance in this major transformation process is of great importance for Alpine towns.

The key notion in the context of climate change adaptation is the adaptation capacity that, firstly, "affects a system's vulnerability through modulating exposure and sensitivity" (Engle 2011). Secondly, with concepts of reactive and anticipatory adaption, more or less successful positions can be reached. Water governance (Hill 2013), spatial planning (Kruse & Pütz 2014) or forest management (Irauscheck et al. 2017) are just examples contributing to an overall adaptation approach (EEA 2020).

Alpine towns, i.e. their societies and economies, must develop an adaptation capacity that enables them to address threats such as water scarcity, heat stress, and pressure on carbon-based industries etc. At the same time, the opportunities coming with climate change need to be understood early and used properly, like innovation-based economies. Adaptation capacity is an umbrella term that needs clarification and concretisation.

Institutions and governance structures have to be developed in a place-based and innovative manner. Whereas some towns might develop their green economy potential, others will capitalise on the tourism opportunities emerging from deteriorating conditions in lowland destinations. Innovation in governance and technological solutions can help in a variety of ways.

3.4. Debate (b): How to deal with land demand?

One of the most pressing issues on the contemporary agenda of spatial development is land demand. It is a key topic throughout Europe, but the Alpine context is particular. The main reason is that the proportion of habitable land in mountainous areas is substantially lower than in peri-Alpine areas. Construction is typically hampered by the steep slopes, and the risk of landslides and avalanches further limits the settlement areas. Even small rivers can mean a high risk of flooding so risk management along the valleys is also critical, and the risks are increasing as climate change worsens. The fine-scale mosaic of important natural heritage has to be considered in terms of protected sites and prioritisation in planning procedures.

This must be viewed against the backdrop of the Alpine area's socio-economic prospering, which has resulted in population growth in many regions and towns. Thus, high real estate prices and a limited availability of land for settlement and economic development are urgent matters in many Alpine towns.

At the same time, soil sealing, land take and urban sprawl are critical developments in many Alpine towns. This is true for highly attractive tourist regions where chalets and similar constructions contribute to sprawl (Pia 2019), but also for urbanised places and corridors (Obkircher 2017, Hasslacher et al. 2018, Ransberger & Seher 2021).

The objective of minimising and avoiding land take is relevant throughout the political multi-level system, starting with the SDGs and the EU goals and on to a series of national or regional goals (e.g. EU goal of "zero net land take by 2050"). The Alpine Climate Target System 2050 (ACTS 2016) also aims at minimised land take.

While the Alpine region cannot simply stop developing, alternative development paths are under discussion. Optimised spatial structures, efficient land-use patterns, multi-functional land use, and renaturation measures must be combined in a smart way (ARL 2022). Alpine towns play a key role in this context. If the objective is decentralised concentration, then the towns are the core focus.

This is not only a technical debate on how to organise planning, but it addresses the general position of towns. As we have seen in the demographic analyses, the demographic situation in the Alps is characterised by a very diverse picture (Alpine Convention RSA5, 2015: 139). Whereas some towns are characterised by outmigration, ageing and shrinkage, many others are young and dynamic or even 'boom towns'. This mosaic is part of the European demographic situation that faces an overall stable or declining and ageing population in the coming decades, whilst global trends, especially in Asia, show growth and are dynamic (EEA 2019).

In times of crisis and in weak regions, towns play a stabilising role, providing minimum standards of essential services and aiming at cohesion, at least in the long run. Downward spirals have to be avoided wherever possible. In stronger times and regions, cities have a "primary role in pushing forward societal change, harbouring the circulation of ideas and encouraging the experimentation of social and technological innovations and changes in values, lifestyles and approaches to governance" (EEA 2019). Integration of increasingly heterogeneous groups – in terms of lifestyles and regional origins – becomes a key challenge.

The relationship between urban and rural settlements is fundamental in the contexts of both growth and shrinkage, and is the subject of heated debate. On the one hand, the concentration argument underlines the necessity to focus dynamics on urban settlements in order to achieve the most efficient spatial organisation that takes advantage of economies of scale and prevents chaotic sprawl. From this perspective, hospitals, business parks, commercial zones and new housing areas should be restricted to the most urbanised parts of a region.

Decentralisation arguments, on the other hand, emphasise the necessity to have an even dynamic also outside of urbanised areas (Humer 2018, Möck & Küpper 2020, Seidenberger 2010, Vaz & Matos 2015). In-migration and economic dynamics are vital to rural settlements and might even depend more on political support than the urbanised areas.

The challenge for regional development and spatial planning is to balance these arguments in terms of 'decentralised concentration'. The goal is to allow for dynamic development while also avoiding land take and soil sealing both outside and inside the urban areas. In this context, towns are important poles that help to avoid sprawl and ensure dynamics outside of metropolitan areas.

4. Economy

4.1. Finding (a): Employment

The labour market is one of the most crucial functions provided by towns and cities. Typically, they also offer workplaces for many inhabitants from the surrounding rural areas, and they have a higher degree of specialisation and differentiation. As most technological and business innovations originate in urban contexts, Alpine towns have a key role to play in territorial development in general. Fig. 10 provides an overview of labour market centrality, i.e. the ratio of employees per inhabitant. The higher the number (the deeper the green), the greater the importance of the labour market for the surrounding region.



Fig. 10 Employees per inhabitants 2015¹⁰

¹⁰ **Indicator / methodology:** Fig. 10 shows the employees at workplace per 1,000 inhabitants in 2015 for every Alpine town. High values indicate a high labour market centrality and a high number of incoming commuters.

It is interesting to note that many of the towns with high centrality are located in the inner parts of the Alps. This is true for towns of the Inn Valley and the Ticino, but also for a series of further towns. Apart from this, we see typical commuting patterns linked to Monaco, Luzern, Torino and Vaduz. Vice versa, in the larger surroundings of peri-Alpine metropolises, towns tend to have a rather negative ratio, especially those close to the Munich and Milan area.

This map also confirms that larger cities are not necessarily those with the more important function as they are often surrounded by strong suburban economies. In the inner-Alpine area, cities with 5,000 to 50,000 inhabitants tend to have the highest numbers.

Fig. 11 provides a dynamic perspective by showing employment change over the years 2012-18.



Fig. 11 Employment change 2012-2018¹¹

¹¹ **Indicator / methodology:** The colour gradient in Fig. 11 shows the percent change in employment between 2012 and 2018 for all towns within the Alpine Convention perimeter. Blue colours mark a positive employment change, whereas brown colours point out an employment decrease. The dataset shows the development of the number of employees at the workplace for the years 2012 to 2018.

The pattern is noticeably different from the previous map. Most Alpine towns show a positive employment trend, but this trend is accompanied by a north-south gradient. With a few exceptions, the northern Alpine towns develop in a clearly positive way, whereas the southern Alpine situation is more critical. The labour market in many French, Italian, and Slovenian towns is deteriorating, indicating a declining function as a labour market. This correlates in many cases with higher ageing indices as regional in-migration tends to be lower.

The smaller cities have the highest variation, i.e. the values cover a broad range of values. Single local occurrences like the closure or opening of a large place of work have more influence in smaller towns. However, the development of the labour market is mostly determined by local circumstances and national affiliation rather than by size. This argument is reflected in more detail in Fig. 12. It relates the labour market trend in the towns (y-axis) to the size of the towns. It is interesting to note that the urban systems in federal contexts see a more positive trend in smaller towns (AT, DE, CH) than those with a more centralised system (FR, IT).

The graphs provide the values for each Alpine town, but the interpretation of these patterns must also consider the relationships between these towns as well as the relationships between towns and their rural surroundings.

In terms of metropolitan functions, it is true that the larger the town, the higher the proportion of specialised and highly qualified activities. Moreover, the more specialised the economy, the larger the networks organised in an international and global manner (financial sector, specialised productions like cable cars, medical health, etc.).

At regional level, Alpine towns can play an essential brokering role. This means that the rural areas around towns are not merely the labour market catchment areas in a one-way-relationship. Instead, spill-over effects in terms of innovations, business foundations, and spin-offs are part of the dynamic. Furthermore, hidden champions and other important businesses along the value chain are well integrated, and this should also be true for small-scale and circular economies between towns and rural territories.



Fig. 12 Employment development in Alpine towns by country – the zoom-in perspective¹²

¹² **Indicator / methodology:** The scatter plots of Fig. 12 show the employment change between 2012 and 2018 on the vertical axis and the number of inhabitants on the horizontal axis. Every dot represents an Alpine town (LAU scale). The different colours differentiate the national affiliations. The cities of the different affiliations are marked in a certain colour and the coloured box shows the respective average values for the Alpine towns of each country.

4.2. Finding (b): University locations

For a variety of reasons, university sites are important in territorial development. First of all, they provide an important service in higher education which is a precondition for equal opportunities and territorial cohesion in the territory. Moreover, university campuses serve as hubs of public research, which leads to innovation and economic growth in the long run, frequently with regional spill-over benefits. Education-related migration and the economic dynamic related to university research tend to lead to positive demographic trends. Last but not least, university towns tend to have a distinct atmosphere and a 'young' cultural offering. In short, the presence of a university must be seen as a valuable asset for the development of their host towns and the region involved.



Fig. 13 University locations & number of students¹³

¹³ **Indicator / methodology:** Fig. 13 shows the university locations and the number of students within the Alpine Convention perimeter. The larger the red circle, the more students there are at the respective university location in the Alpine towns. The locations were extracted from the OSM database for each country using the Overpass Query Wizard (tag: amenity=university). The results were cleaned and validated by desktop research and by feedback from the RSA 9 stakeholders. The latest number of students is based on information on university homepages.

Fig. 13 shows the university locations and the number of students enrolled. Some of the major university cities, such as Salzburg and Klagenfurt, are located on the fringe of the Alpine region. Grenoble, Innsbruck, and Trento are the largest towns in the inner-Alpine context. Switzerland, Austria and Germany have decentralised patterns of university locations that also involve smaller Alpine towns. However, large portions of the Alpine region have no university and must rely on the larger cities. Critical mass and available resources are important considerations here, and the economies of large cities tend to have a higher degree of specialisation and a higher share of academic staff.

This relates to the 'factor-10-argument' in the first chapter (relevance of Alpine towns beyond size): the role and importance of Alpine towns is linked to much smaller population sizes than in peri- or non-Alpine towns. As discussed earlier, economic strength, public prominence and reputation can all be significant, even in small towns. The mapping of universities, however, does not seem to fit this pattern. Here, the link between city size and university locations seems rather more conventional, but there are exceptions like the universities in Leoben, Vaduz or Aosta. A number of Alpine towns are located quite far from the nearest university. Creating regional branches could be a good way to better use the potential of universities for regional development.

4.3. Finding (c): Public transport accessibility

In the Alpine context, accessibility is a significant factor, and Alpine towns play a key role as they serve as (sub) regional hubs. Their role is to provide access via high-ranking infrastructure (railway, highway) and ensure multi-modal interfaces.

Organising attractive public transport, particularly by rail, is a worthwhile endeavour given the morphology and the decentralised settlement patterns (Ravazzoli et al. 2017). However, rail systems are major investments that rely on national systems, and this means that the presence of the numerous national borders hampers the development of the Alpine rail system (cf. ARPAF cross-border 2018). Nevertheless, if more sustainable mobility is the goal, inner-Alpine rail connections will have to play a key role, even if it is necessary to supplement them with additional modes (bus, car, soft mobility).

Fig. 14 illustrates the current situation – and the overall picture confirms the barrier effects of topography and national borders. The best connections tend to be domestic (e.g. Bolzano/Bozen-Trento, Martigny-Brig) and/or along important valleys (e.g. Rosenheim-Innsbruck, Dornbirn-Chur). Rail accessibility is rather low in some sections of Slovenia and France for instance, due to specific topography, lack of critical mass in rural areas and path dependencies of political priorities. However, large-scale accessibility (e.g. the French TGV network involving Annecy and Alberville) is often excellent, but the intraregional links can be problematic. It is important to note that this accessibility mapping is restricted to towns within the Alpine Convention perimeter. For example, if the metropolitan railway stations in Vienna and Ljubljana were included, the picture would look different (cf. ESPON Alps 2050, p. 61). However, good metropolitan inter-linkages cannot entirely offset intraregional accessibility issues.

The role of Alpine towns in a sustainable, multimodal transport system will need to be developed in the coming decades. Clearly, the current innovations in terms of smart technology and new business models will mostly be anchored to towns (internet of trans-

portation, drones, sharing models, autonomous driving, etc.). Nevertheless, addressing the more traditional barriers, such as cross-border transport solutions, multi-modal interfaces, linking high-speed and regional mobility, and so forth, must remain a top priority.



Fig. 14 Space-time-lines, rail passenger transport¹⁴

¹⁴ **Indicator / methodology:** The 'space-time-lines' in Fig. 14 show the quality of rail connections between Alpine towns. Passenger transport via rail is analysed reflecting the speed (referring to air distance) and frequency of linkages (both directions). The fastest rail link between central stations is used to calculate the time. The data was collected via the Deutsche Bahn travel service website. The requests refer to Wednesday 22 September 2021 from 4 a.m. (a normal working day). The line's width denotes the number of connections and the colour of the lines illustrates the speed of the fastest connection (both calculated as an average of both directions). A dashed line indicates that one change is necessary for the connection, and a dotted line means two changes are required.

4.4. Finding (d): Tourism capacity

The current situation is depicted in Fig. 15 by visualising tourist capacity, i.e. the number of bed places per inhabitant. The picture shows a complex pattern: some of the highest numbers are located in the inner-Alpine area, largely for winter sports (e.g. Cortina d'Ampezzo), but there are also several towns on the northern fringe of the Alps with high values. It is important to mention that these statistics do not capture day tourism, which is an important factor, especially for Alpine towns, and particularly those located near peri-Alpine metropolitan regions.



Fig. 15 Tourism capacity 2015¹⁵

¹⁵ **Indicator / methodology:** Fig. 15 shows the tourism capacity based on the formula "bed places / inhabitants 2015". It should be noted that the different countries use different approaches for counting bed places. Slovenia and Italy: "permanent beds" (without extra beds or couches); Liechtenstein: hotel industry ("Hotellerie"); Switzerland: hotels and spa facilities; France: hostel beds, holiday residence, villages vacances (holiday villages) and an estimated number of hotel beds (number of rooms x2); Austria: hotels and similar establishments, including commercial accommodations; Germany, Bavaria: bed places without camping places.

The tourism sector is very important in the Alpine region (Pechlaner 2019). Nature and outdoor related tourism tend to prevail over urban tourism: skiing, mountaineering, health tourism etc. tend to be more popular than trips and vacations focused on urban culture, sites, and architecture (Teissl 2020). Large cities like Innsbruck or Bolzano/Bozen are obvious exceptions, but the tourism potential of small and medium-sized cities receives less attention. Alpine towns tend to be somewhat in the 'shadow' of landscape and mountaineering destinations. Many Alpine towns serve as a link between rural and urban areas whilst hosting tourists who spend time (and money) in both geographical categories. Developing this role of a 'broker', i.e. linking urban and rural spaces, will be an important future challenge. Alpine towns that are currently used as 'base stations' for outdoor tourists could expand their cultural offer and their special profile to more than just cuisine and the hotel business. Those towns that act merely as 'tunnels' between major points of interests will continue to work on improving their visibility on the map for the current tourist flows that are mostly just passing through.

4.5. Debate: Digitalisation as a potential and a challenge

For at least two reasons, digitalisation is important for Alpine towns. Firstly, the topography entails a relatively high amount of effort for providing services. Digitalisation can help to improve the offer and reduce the effort required. This is particularly true for rural and mountainous areas, but also involves towns when it comes to more specialised offers. Good examples are efficient public administration offers (e-government), mobility-on-demand models, medical care, education and many more. The scientific discourse has recently concentrated on digitalisation in land-use planning (Hersperger et al. 2021).

Secondly, digitalisation is a critical component of economic dynamics in general. As mentioned earlier, the Alpine region is on a successful path of technological innovation. Continuing on this path necessitates a serious approach to digitalisation. It is true that "Europe is lagging behind the United States and China in ICT related innovation" (EEA 2019: 8); also the Alpine region, with its high share of manufacturing industries, must rise to this challenge. The issue is not just to catch up with digitalisation processes, but also to participate in an economically attractive way. Many digitalisation processes have resulted in platform economy effects that risk leading to monopoly structures (cf. the case of Amazon). Innovative business models must be used to capture regional value in a decentralised manner. In general, the Alpine settlement system, with its relatively small towns and villages, can benefit particularly from the digital bridging of critical distances (e.g. mobility apps, last-mile logistics for regional food). An economic digitalisation dynamic would also include classical start-ups based on apps (Outdooractive in Immenstadt, one of the internationally leading app providers in the outdoor sector, is an established example). Industry 4.0 is an important innovative concept that includes digital connectivity of things and services in the manufacturing process as well as artificial intelligence. It is true that Industry 4.0 is not Alpine specific per se, but given the importance of productive SMEs in the Alpine context, its relevance is obviously high. The situation is similar for 'smart farming': given the importance of small-scale agricultural patterns, the potentials of digital elements for sustainable farming are obvious but not easy to implement. More generally speaking, digitalisation can boost diversification processes. Integration in large economic networks is much easier in digital formats.

Most Alpine regions provide tools for monitoring the roll-out of digitalisation infrastructure¹⁶. It is evident that Alpine towns play an important role as regional hubs because their infrastructure is generally superior to that of the surrounding areas. The dangers of a 'digital divide' also apply in the Alpine context, and this must be carefully balanced with the potentials of digitalisation. The concept digital divide refers to the fact that although certain places and groups of people benefit greatly from digitalisation, others do not (to the same extent). This risk of rising disparities can be linked to different levels (Scheerder et al. 2017). On the first level, the differences in technical internet access are the focus. The second level divide reflects on variations in skills and usage of digital facilities. Here it is important to ensure education and training in digitalisation in order to avoid the gap becoming wider. The third level covers the differences in digitalisation outcomes, the use of economic potentials and the increase in provision of essential services in the long run.

The notion of digital divide should not be interpreted in a purely binary way but rather as a progressive scale of gaining or losing from digitalisation trends. While large cities with good accessibility and a high level of education find it easier to benefit from digitalisation, it is somewhat harder for smaller towns. Technical facilities, innovation orientation, and critical mass are just some of the key words that address the prerequisites for a favourable trend in this context. Creating 'smart cities' is also a multidimensional task in the Alpine region (cf. Azevedo Guedes et al. 2018). Firstly, the small-scale character of the Alpine settlement system presents significant challenges in terms of 'critical mass'. Secondly, specific Alpine topics, such as the high importance of tourism, mobility challenges, or last-mile logistics in local food provision (bridging accessibility gaps), can be seen as a particular potential.

¹⁶ For Germany: http://www.bmvi.de/DE/Themen/Digitales/Breitbandausbau/Breitbandatlas-Karte/start. html, for Austria: https://breitbandatlas.gv.at, for Switzerland: https://www.bakom.admin.ch/bakom/de/ home/telekommunikation/atlas.html

5. Global positioning

5.1. Finding (a): Population share

As discussed earlier in this report, Alpine towns play a significant role despite their relatively small size. This is particularly true in the regional context where they serve as important socio-economic hubs for a wider area. Furthermore, they have to deal with global dynamics – economic and geopolitical shifts raise fundamental questions for Europe in general.

Population development is an important indicator to understand the current global shifts. The demographic development in the Alpine regions and cities, as shown in Fig. 16, is far below the global average trend. This is characterised by continuous growth, owing particularly to non-European growth.



Fig. 16 Population change 2008-2019 (indexed: 2008=100)¹⁷

¹⁷ **Indicator / methodology:** Fig. 16 illustrates the indexed change in population between 2008 and 2019. Different levels are contrasted to compare the positioning of Alpine towns in the global context: global, European and regional (Alpine Convention). With an emphasis on Alpine towns, an additional distinction was made between towns and rural areas within the Alpine Convention perimeter based on the definition in chapter 1. Switzerland has a special role here: being a member of the Alpine Convention, it is included in the Alpine data but not in the European statistics.

It is striking that the Alpine territories are growing much faster than the overall European trend, but are still far slower than the global trend. Even though Alpine towns have seen a more positive trend recently, the differences within the Alpine region – urban, rural, etc. – are not very significant.

The political relevance of demographic trends stems from the fact that young and expanding societies can have advantages in terms of economic dynamic and geopolitical assertiveness, when compared to ageing societies. Recent decades have demonstrated that European territories must reflect on their position vis-à-vis the Asian and BRIC dynamics, and also with regard to Arabian and African developments. It is obvious that the general shifts will have an impact on the Alpine region's positioning in the long run. For Alpine towns, maintaining prosperity and balancing international and regional economies is a major challenge. In this respect, there are a number of positive and negative scenarios. In a negative scenario, attractive European regions like the Alps could be reduced to global tourist functions, with a 'Disneyfication', i.e. a focus on clichéd elements (cf. Kunzmann 1996). In a more positive light, the development of the decentralised and innovative economy may pave the way for their position to be strengthened.

5.2. Finding (b): Economic share

In terms of the economy, the picture is less clear, although it displays similar patterns as the demographic development. Fig. 17 shows economic development as measured by GDP growth. Since the financial crisis of 2008, GDP has been steadily increasing within the EU and the Alpine Convention perimeter, with slightly higher economic growth in the Alpine region than in the rest of the EU.

This picture is also a consequence of global catching-up processes. Mature (and wealthy) economies usually show a slowing GDP growth in the long run. However, given the remarkable development in Asia, as well as portions of South America, the Alpine region's economic positioning and competitiveness must be 're-invented' over the coming years and decades: which productive and service-oriented economic sectors will be the drivers for innovation dynamics? What balance of international and regional economies ensures prosperity? At the same time, the role of non-European actors will most probably gain importance in the Alpine region. This is already evident in tourism flows, but it is also true for foreign direct investments across many economic sectors.



Fig. 17 Gross domestic product change 2008-2018 (indexed: 2008=100)¹⁸

5.3. Debate: What role for Alpine towns in times of global shifts?

The current global dynamic is characterised by "power shifts in the global economy and geopolitical landscape [...] from mature economies to emerging ones", and the "accelerating technological change" (EEA 2019: 83) puts high pressure on many regions. For Europe – and particularly for the Alpine region – this is highly relevant as the current prosperity is far above global average values, and the integration in the global economy is high. The global power shifts also raise questions for the future development of the Alpine region. A simple 'think big strategy' cannot be the answer given the region's fine-scale spatial structure with rather small settlements, hindered accessibility and limited critical mass. The successful path of recent decades, based on endogenous development, innovation, and positive path dependencies, must be transposed into future contexts. The economic 'drop height' is considerable.

On the one hand, the Alpine region has a history of being a rather weak and lagging region, due to its territorial structure and the often limited political attention it receives compared to peri-Alpine, urbanised regions. The socio-economic success in recent de-

¹⁸ **Indicator / methodology:** Fig. 17 illustrates the indexed Gross Domestic Product change between 2008 and 2018. For the positioning of the Alpine towns in the global context, different levels are compared: global, European and regional (Alpine Convention).

cades in many parts of the Alps is an historic exception, and today includes many rural regions and small settlements. On the economic side, many metrics for innovation, R&D spending and economic growth are above average (cf. ESPON Alps 2050). Successful dynamics have an Alpine-specific background in a number of fields. This includes the presence of hidden champions in the industries of cableways and outdoor equipment, and also in production sectors that use hydropower. The high shares of (summer and winter) tourism as well as the prominent presence of agriculture are specific to the Alps, and the dynamic in the wood and timber sector should also be mentioned here. Of course, not all success is Alpine-specific, as the IT sector in many Alpine towns or the financial sector in Ticino demonstrate. Nonetheless, as shown by export flows and the appeal to tourists, the Alpine region's success is based on a unique linkage of traditional, endogenous potentials that are integrated into international economic functioning (cf. Capello & Cerisola 2019).

The need for sustainable solutions, on the other hand, is particularly acute in the Alpine region. The call for green and circular economies might be even louder in the Alpine region than outside. This is due to the region's high vulnerability, which can be interpreted as a call to be a pioneer and leader in the green economic transition (RSA6).

This situation may pose a dilemma that could overburden the Alpine region with its small-scale structure and morphological specificities. At the same time, the specific situation might be seen as a catalyst for innovation. Earlier than in other regions, the pressure for sustainable solutions is high. This could lead to 'early-mover advantages' and help to turn the Alpine specificity into a strength.

The data situation does not allow a filtering down to the level of the towns, although their importance in dynamic development is clear. Towns are an important part of an efficient spatial organisation. They need to be hubs of innovation and platforms of education, training, and exchange, helping to achieve innovation and truly smart specialisation (cf. Rivas 2016).

6. Governance

6.1. Finding (a): Cooperation patterns INTERREG Alpine Space

Governance in the Alpine region has many facets, due to the numerous national political territories and administrative cultures that come together in this region (ESPON Alps 2050). National borders are 'contact zones' where different political systems and cultures meet, posing challenges to cross-border coordination in general, and especially for questions of spatial development. The different mandates of municipalities or regions on either side of the borders is an important issue. For example, the competences of French municipalities are different from those of Swiss municipalities, and Slovenian regions are hardly to be compared with those of Italy. Cross-border and transnational governance tools are important in this context, complementing traditional governmental instruments. Furthermore, governance across borders not only involves public representatives but also the stakeholders and civil societies of the Alpine territories. Democratic participation and media discourse are more focused on national perimeters. Nevertheless, transnational exchanges on topics that are similar in Alpine towns regardless of national affiliation are promising.

The INTERREG Alpine Space programme is perhaps the most prominent and visible type of cooperation. Fig. 18 provides an overview of the most recent activities and shows the spatial distribution of the lead and project partners. The spatial dimension of the project networks depends on the overall project density in each thematic assignment¹⁹.

¹⁹ **Indicator / methodology:** Fig. 18 is based on INTERREG related data, provided by the KEEP database. The KEEP database is an opensource website where a variety of information about the different INTERREG programmes is available in tables, graphs or maps. For this map, the project information concerning the INTERREG B Alpine Space Programme was processed and visualised in different thematic network maps. The thematic differentiation is based on the assignments of the programme itself and was then bundled into overarching topics. Every project can address up to three different thematic assignments, so multiple nominations are possible.



Fig. 18 Cooperation networks in thematic differentiation of the INTERREG Alpine Space programme

The map differentiates the thematic topics of the cooperation patterns:

- **Economy, research & knowledge:** Many lead and project partners are located outside of the Alpine Convention perimeter with major poles in Lyon, Stuttgart, Venice and Slovenian towns. The high project intensity is accompanied by a relatively loose connection to the inner-Alpine area.
- **Spatial planning:** This project category particularly involves large cities as lead partners, which is due to the location of governmental institutions or agencies and also specialised expertise. Many partners are located within the Alpine Convention perimeter, but mainly in the regions of the transit axes. In short: high project intensity is associated with a more urbanised anchorage.
- **Environment:** In this category, the lead partners are concentrated in peri-Alpine metropolitan areas (Munich, Vienna, Ljubljana, Lyon, Turin, Milan) and on the Innsbruck-Bolzano/Bozen axis. The project partners are spread across the inner- and peri-Alpine region. The project intensity is generally high.
- **Governance:** The location of lead partners is more concentrated in Italy, Germany and Slovenia, and less in Switzerland and Austria; no lead-partner is located in France in this category. The networks focus on the inner parts of the Alpine area, and the overall project intensity is on an intermediate level.
- **Health & social services:** We see a clear concentration along the fringes of the Alpine Convention perimeter, thus a rather urban pattern. The overall project intensity is not very high.
- **Mobility:** Mobility projects tend to be located outside the Alpine convention perimeter and concentrate on peri-Alpine metropolitan centres (Munich, Milan, Turin, Lyon, Vienna).
- **Culture & arts:** This topic has a rather low project intensity. The spatial pattern focuses on the inner-Alpine area and especially on the southern parts.
- **Tourism:** Surprisingly, this project thematic has a low project intensity with a spatial pattern that does not correspond to the general economic patterns. Even though the tourism sector is considered a key economic field for many places, this does not lead to a high project activity. Possible explanations might be the high level of prosperity in many tourist regions and the business competition in this field. However, it is worth mentioning that there are networked activities independent from INTERREG (e.g. Alpine pearls, Best of the Alps).

More generally speaking, the maps of cooperation intensity along the different thematic topics demonstrates, firstly, the importance of the larger Alpine Space perimeter of this funding period: it seems to be crucial to involve both inner- and peri-Alpine places. Secondly, the role of larger cities and towns for cooperation is obviously essential. This is due to the presence of governmental institutions, research institutions and enterprises with specialised expertise.

6.2. Finding (b): City networks

Fig. 19 shows another facet of Alpine town governance, focusing on three functionalities. While the organisation 'Alpine Town of the Year' covers almost the entire Alpine Convention area on a macro level, the towns of 'Alliance in the Alps' are concentrated in selected regions. Some of them are particularly concentrated in southern Bavaria, around Liechtenstein, in Slovenia and in South Tyrol. With Annecy, Bad Aussee, Bad Reichenhall, Chambéry, Sonthofen and Trento, six Alpine Towns of the Year are also members of Alliance in the Alps.



Fig. 19 Inner-Alpine governance: networks of Alpine towns²⁰

²⁰ **Indicator / methodology:** Fig. 19 shows the RSA9-defined Alpine towns participating in inner-Alpine town networks. It shows towns that have been awarded the title ,Alpine Town of the Year' up to 2021, member towns of ,Alliance in the Alps' and the Mountaineering Villages within the Alpine Convention perimeter. In addition, with Innsbruck and Bolzano/Bozen, the Alpine Convention seats are included.

While all the others have significantly fewer inhabitants, with Kötschach-Mauthen (around 3,500 inhabitants) only one 'Bergsteigerdorf' (Mountaineering Village) is considered as an Alpine town. By contrast, the network of 23 Alpine Town of the Year in the Alpine Convention perimeter has about 932,000 inhabitants. Almost all of them have more than 10,000 inhabitants, with the exceptions of Bad Aussee and Chamonix-Mont-Blanc. In the Alliance in the Alps network, only 14 out of 56 Alpine towns have more than 10,000 inhabitants. Nevertheless, with Annecy and Trento as two large Alpine towns, this network has almost 700,000 inhabitants. The map also includes the two seats of the Alpine Convention in Innsbruck and Bolzano/Bozen.

This map shows that the inner-Alpine governance format of the Alpine Town of the Year covers the Alpine area in a spatially balanced way and involves mainly towns with more 10,000 inhabitants. Alliance in the Alps is an inter-communal network of small Alpine towns with fewer than 10,000 inhabitants, which shows a spatially rather concentrated pattern. It is striking that the map shows many 'blank spaces', i.e. towns of different size that are not involved in any of these networks. This is particularly true of those towns along the fringes of the Alps, and especially those towns with 3,000 to 10,000 inhabitants.

The cooperation formats of the map could be complemented with further networks such as Urbact, Eurocity and Civitas. These European initiatives have involved at least some Alpine towns, but their cooperation is not entirely centred on the Alps.

As already discussed in chapters 1 and 4, small Alpine towns are of high functional relevance for their regional context and for the Alpine settlement system ('factor 10'). From this perspective, there is great potential for further networking among small Alpine towns, which may be facing common challenges in the future (see, for instance, Fig. 9 on temperature change within the Alpine region). Networking and institutional innovation at a micro-level can benefit from shared tacit knowledge and joint forces.

6.3. Finding (c): Cross-border integration and Alpine towns

The analyses of this report reveal that many trends and patterns are primarily influenced by a town's national affiliation (see, for instance, the chapters on demographic development or employment trends). Of course, each town's unique setting is important, including topographic altitude, degree of regional urbanisation, regional tourism intensity, etc. However, national affiliation takes precedence over these factors; it is the most important for determining which nation-state a town belongs to (cf. ESPON Alps 2050). On the one hand, this situation raises questions about territorial cohesion and integration. On the other hand, it results in a positive competing of ideas and approaches, which reflects Europe's territorial diversity.

This context is particularly important for border regions. Fig. 20 shows that many Alpine towns are located in a border region, highlighting those that are situated within a 15km buffer zone on either side of the border.



Fig. 20: Alpine towns and border regions

These Alpine towns are places where different political systems as well as economic and cultural settings meet²¹. They are increasingly being characterised by commuter, leisure and retail flows. This circumstance necessitates certain requirements in terms of transport infrastructure, provision of social services, and political cooperation. This cross-border dimension must be dealt with appropriately, taking into account the very different territorial contexts. There are at least three distinct categories in this respect: first and foremost, we have urbanised cross-border corridors with significant levels of interconnectedness. The most prominent examples are Salzburg-Freilassing, the High Rhine valley, Tessino, Geneva-Annecy and Goricia-Nova Gorica (cf. Chilla & Heugel 2019). In these cases, improvements to the sustainable mobility infrastructure and the equitable organisation of cross-border labour markets are key concerns.

The second category is very different, as morphological 'dead-end situations' like the one in Sölden are characterised by proximity to the border without high relevance of further cross-border integration. The full integration of service provision on the domestic side is in the foreground in these circumstances.

Thirdly, a number of towns are caught in 'in-between-situations', such as Reschenpass (Mals-Landeck) or Brig-Domodossola. Rather low levels of urbanisation and accessibility can mean both opportunities and threats. Accessibility and infrastructure issues are high on the agenda: how to improve accessibility, achieve sustainable mobility patterns, and profit from the location without facing tunnel effects – the challenges here are complex.

6.4. Debate: Alpine governance in a 'soft space'?

The Alpine region connects peri- and inner-Alpine areas, urban and peripheral places (Fourny 2018), and is characterised by a large number of national borders. As a result, the political geography of the Alpine settlement system is complicated. Purely government-led management approaches are unlikely to achieve sustainable development. Instead, governance approaches must work in concert with the transnational, crossborder and inter-municipal levels. This situation comes with 'soft spaces' of cooperation perimeters. The question is whether this relatively soft approach is sufficient or if a somewhat firmer approach is necessary for developments of greater consequence.

Soft spaces are vital for inter-municipal and rural-urban cooperation at regional level. Towns are often embedded in regional development axes where they act as 'power units' and mediators between the more urbanised and more rural areas. The concept of cityregions is an example of the rather flexible and fluid spatialities in settlement systems. This explains why "governance arrangements working at the rural-urban interface are often highly complex" (Oedl-Wieser et al. 2020: 1).

²¹ **Indicator / methodology:** Fig. 20 shows Alpine towns based on the same methodological framework as Fig. 2. In addition, a metric buffer was added along the national borders. The buffer zone is 15 kilometres in both directions from the border.

On a transnational level, eight nation states meet in the Alpine region, each with its own political environment, particularly in terms of the roles of mountainous areas within the nations. Political priorities, planning regimes, and urban development play different roles in each country. The Alpine Convention, the macro-regional EU Strategy for the Alpine region (EUSALP) and the INTERREG Alpine Space Programme are all important levels of concertation that offer a variety of instruments for sustainable spatial development. Furthermore, the EU legislative framework is crucial (also for Switzerland and Liechtenstein, whose legislation is largely EU compliant). Nevertheless, the Alpine region remains a 'soft space', meaning that transnational political action is heavily reliant on consensus-based governance procedures, and that implementation depends on the active participation of stakeholders. This must be viewed against the more general background that "the effectiveness of intergovernmental collaboration concerning environmental and sustainability challenges has often been questioned, in particular in relation to the non enforcement of agreed rules or commitments" (EEA 2019: 96).

There is a trend towards "increasing autonomy of cities and technologies that favour decentralised governance of systems (e.g. energy communities)" (EEA 2019: 96). This emphasises the importance of Alpine towns in achieving sustainable spatial development. Whereas towns have a strong mandate for land use and urban development policies, they are entrenched in different systems of regional planning and (inter-)national political target systems. Soft spaces and governance arrangements enable new priorities and territorial focuses without being constrained by formalised top-down structures. The Alpine Space Programme, for example, certainly benefits from the flexible geography of cooperation. Functional regions in the Alps often cross borders in different geometries: cross-border commuting zones can be found in many areas, including Salzburg, Ticino, and Terra Raetica (ARPAF Crossborder 2018).

In the end, soft spaces enable place-based solutions and creative processes. The Alpine region's long history of different, multi-layered governance patterns makes it possible to bridge gaps in political mandates and find experimental solutions. The dilemma, on the other hand, remains: soft spaces imply significant organisational effort and limited solution capability due to the need for consensus. Putting plans into action is the most difficult part.

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