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Measuring Overtourism

Indicators for overtourism: Challenges and opportunities.

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Management Summary

In the course of global tourism growth, more and more destinations are struggling with overtourism. In order to be able to implement effective control measures, the specific situations and the development must be constantly monitored. This study aims at exploring the phenomenon of overtourism by analyzing selected cases of destinations where there are indications of overtourism. The main research question is: What are the challenges to consider when measuring overtourism?

The study was implemented with nine universities from all over the world. A comparative case study approach had been chosen. This design allowed a decentralized implementation of the research with a standardized methodology.

Based on existing literature and in exchange with the university partners involved, an indicator framework was developed that had been applied in all the destinations selected by the authors of the case studies. Afterwards, a cross-comparison analysis of all case studies was conducted in order to test the informative value of the indicators and to derive similarities, differences and challenges.

The study examined the following nine tourism destinations in nine countries with different backgrounds and tourism situations: Byron Bay (Australia), Lucerne (Switzerland), Ohrid (Macedonia), Queenstown (New Zealand), Santorini (Greece), São Paulo State Coast (Brazil), Sylt (Germany), Venice (Italy) and Vienna (Austria).

The application of the framework in the case studies and the experimenting with different indicators allowed deriving the following main challenges when measuring overtourism:

1. Heterogeneity: Depending on the destination, overtourism manifests differently. The actual problems within the destination might differ and indicators have to be adapted accordingly.

2. Aggregation: Mot sets of indicators work with general indicators on a much-aggregated level in order to be able to compare data between different destinations. This “top-down” approach often does not reflect the temporal or spatial distribution of visitor flows.

3. Validity of single indicators: It is difficult to find indicators that solely measure overtourism. Indicators have to be put into relation to the destinations capacity. Only a mix of different indicators can provide a comprehensive picture.

4. Data availability: Data availability was often mentioned as a central challenge when applying the framework for the analysis. Some of the data is not monitored, not available for the perimeter requested or just not up-to-date. Furthermore, since data is often not available, new forms of data sources are to be discovered.

5. Data reliability: The study showed that default settings and algorithm based search functions might distort data gained from platforms such as TripAdvisor, Airbnb, etc.

6. Dynamic: Monitoring systems often lag behind, because they do not consider new trends and players entering the market. Furthermore, looking at the development of tourism demand over time and considering seasonality is vital. Certain aspects only become visible when monitored over time.

7. Spectrum: Growth in domestic tourism and day visitors are often overlooked and/or underestimated. Usually, there is no reliable way to count day visitors and estimations have to be based on vague assumptions.

8. Non-consideration of residents: Often, too little attention is paid to the residents' perception and social issues of overtourism. Since in many places it is the local population and local infrastructure that cope with uncontrolled mass tourism, hence indicators about their perception should be incorporated.

Considering the challenges identified, the following recommendations could be deduced:

1. Identify key problems: To recognize the problem is a crucial pre-requisite to solve the actual problem and plan for it. As each destination is unique, specific indicators should be determined at a local/regional level.

2. Choose the right set of indicators: There are no single indicators that can measure overtourism. Only a set of indicators including qualitative, disaggregated, indirect and site-specific problem-based indicators leads to the desired results. Furthermore, indicators always have to be put into relation to the destinations capacity.

3. Work with what you have: Data availability seems to be the main hurdle for a comprehensive overtourism monitoring. When data collection is too complex or expensive, it is recommended to work with estimations. They can help to get an idea of the situation.

4. Make use of new tools and data sources: The insufficient data situation requires the examination of new data collection possibilities and data sources such as global online platforms, mobile phone tracking systems, image analytical tools or reviews in social networks.

5. Choose data sources carefully: When destinations are to be compared, the use of global platforms seems to be an obvious choice. Nevertheless, the study showed that data obtained from such platforms has to be analyzed carefully, since it might be distorted significantly by default settings and algorithm based search functions.

6. Take a dynamic approach: Monitoring systems have to adapt to changes in the destination, e.g. when new players are entering the market or new problems are arising. Furthermore, some developments are only displayed when looking at a certain period of time. Only a dynamic approach enables to monitor impacts over time and to consider new trends and developments.

7. Extend the spectrum: There are several groups of tourists usually underestimated by official statistics. Therefore, it is crucial to include domestic and day visitors and to find indicators that allow getting an idea on the volume and the type of these tourists in the destination.

8. Focus on the residents perspective: The analysis of the cases showed that by analyzing indicators of overtourism, the perspective of the residents is often given insufficient attention. The perception of overtourism is crucial for the discussion about the development of tourism. Data on tourist volume has to be linked to data on the satisfaction of residents.

In addition, a framework for monitoring overtourism is proposed together with relevant criteria to be considered when developing an overtourism monitoring system in a destination.

1. Introduction

In the course of global tourism growth, more and more destinations are struggling with overtourism. According to the UNWTO, the definition of overtourism is "the impact of tourism on a destination, or parts thereof, that excessively influences perceived quality of life of citizens and/or quality of visitor experiences in a negative way" (World Tourism Organization [UNWTO], Centre of Expertise Leisure, Tourism & Hospitality, NHTV Breda University of Applied Sciences, & NHL Stenden University of Applied Sciences, 2018, p. 6).

Even though the problems that arise are usually not new, many authorities and tourism businesses seem to be overwhelmed by the situation. The question arises as to how tourism development can be steered and managed. In order to be able to implement effective control measures, the specific situations must be analyzed and the development constantly monitored. The data situation is often thin and comprehensive monitoring is complex. Defining meaningful indicators is a major challenge, not least because the situations in the destinations are so different. The question is: how much tourism is too much tourism?

This study aims at exploring the phenomenon of overtourism by analyzing selected cases of destinations where there are indications of overtourism. The main research question is formulated as follows:

What are the challenges to consider when measuring overtourism?

To deepen the understanding about the measurement of the overtourism phenomenon and the indicators that can be used to do so, the following sub-questions were developed:

- What indicators exist to measure overtourism?
- How can indicators help to determine the phenomenon of overtourism?
- What could be interesting indicators that are easy to manage?

Overtourism is a collective term for many different forms of tourism problems. Therefore, no single indicator is able to describe the phenomenon comprehensively. The goal of the study is to analyze the development of tourism by applying and discussing different indicators. The comparison of the cases should allow testing whether these indicators lead to meaningful results and deriving principles and guidelines for the measurement and early detection of overtourism.

The study has been implemented within the university network of the World Tourism Forum Lucerne (WTFL). Partner universities of WTFL conducted a common decentralized study with a standardized methodology. The WTFL is a two-day forum taking place biannually in Lucerne (Switzerland) and brings together CEOs, Ministers, Academia, Finance, Start-Ups, Next Generation and Young Talents of the travel, tourism and hospitality industry to shape a more sustainable future. This report is a subsequent edition of the report published in 2017 by Lucerne University of Applied Sciences and Arts and the WTFL partner universities named: "Tourism destinations under pressure. Challenges and innovative solutions (Weber et al., 2017)

2. Methodology

2.1 Comparative case study

For the study, a comparative case study approach has been chosen. Case studies are a useful and appropriate method, when complex phenomena should be investigated. In the special project setting with universities involved all around the globe, a comparative case study design allows a decentralized implementation of the research with a standardized methodology.

The following research steps have been implemented:

1) Desk research
2) Case study:
    a. Applying a set of existing indicators in a destination
    b. Proposing and applying other/new indicators
    c. Analyzing good practices of monitoring
3) Critical reflection and derivation of challenges
4) Recommendations

Based on an extensive desk research, existing literature and previous studies have been analyzed. This allowed establishing a set of indicators to be applied in the case studies.

Comparative case studies emphasize comparison within and across contexts. They involve the analysis and synthesis of the similarities, differences and patterns across two or more cases that share a common focus or goal. Therefore, each university selected an interesting case - preferably in its own country – that allowed illustrating the phenomenon of overtourism and evaluating different indicators. Ideally, the cases were destinations (cities) with indications of overtourism that allow deriving interesting lessons learned for other destinations.

The structure of the research process was as follows:

1. Literature review
2. Collective discussion of concept and specification of research questions
3. Development of a framework for the analysis
4. Selection of the cases by each partner university involved
5. Individual data collection and implementation of study
6. Analysis of the data and cross-comparison of the case studies
7. Drawing conclusions and preparing the final report

Based on an extensive literature review (1), research questions were determined and specified (2). The indicator framework for the analysis had been developed in cooperation with the universities involved (3). After finalizing the framework, all participating universities selected a case study (4) and collected data based on the framework (5). After submitting the case reports, a cross-comparison analysis of the cases had been conducted (6) in order to be able to derive conclusions and recommendations (7).

1. Literature review

The literature review fostered a greater understanding of existing theories and approaches to measure tourism, sustainable tourism and overtourism. The analysis of the literature and the sets of indicators used in previous studies built the basis for the development of the framework.

2. Collective discussion of concept and specification of research questions

Based on the literature review and in cooperation with the project team and the participating university partners of the WTFL the research question was determined.

3. Development of a framework for the analysis

The framework for the analysis was developed based on existing literature and in exchange with the university partners involved. The goal was to ensure a consistent approach and the comparability of the different cases. The framework served as a common guideline for the analysis. It consists of the following categories that are presented in detail in section 2.2.

- Description of the case
- General indicators (28)
- Experimental indicators (18)
- WTTC indicators (10)
- Additional indicators
- Conclusions: Reflection on the Process
- References

4. Selection of the cases

Since the aim of the study was to derive challenges occurring when measuring overtourism in different context and experimenting with indicators, the representativeness and comparability of the cases analyzed was not the first priority. The rationale for the selection of the cases was linked to the research questions and to the central object of investigation. Each university was free to choose a case at discretion. The cases were selected according to the following criteria:

- Tourism destination (city or populated area) in country of partner university (if possible)
- Not more than one case study per participating country to guarantee variety
- Phenomenon of overtourism occurs in destination (or at single places/attractions)
- Accessibility to data, existing studies, literature, etc.
- Suitability with regard to research questions

5. Individual data collection and implementation of study

The authors of each case study collected data based on the indicator framework. To complete the case study sheet, different sources were taken into account such as literature, websites of statistical offices or authorities, existing reports and studies, articles in journals as well as newspaper reports and general statistical data. Collected data for all cases was documented, analyzed and commented.

The completed case study sheets were submitted to the project team at the Institute of Tourism (Lucerne University of Applied Sciences and Arts) to be integrated for further analysis.

6. Analysis of the data and cross-comparison of the case studies

Based on the commented case study sheets, a cross-comparison analysis of all case studies was conducted in a quantitative as well as qualitative way. In order to be able to compare the values of the different cases, all numbers were transferred to a spreadsheet. Data was evaluated and graphs were generated to test the informative value of the indicators and to see whether there are interesting patterns or if anything stands out. In addition to that, all the comments to the indicators as well as all sections on case description and conclusions had been analyzed systematically to derive similarities, differences and challenges.

7. Drawing conclusions and preparing the final report

Based on the study's research questions, the case reports were analyzed and conclusions were drawn. The cross-comparison allowed to determine the relevant challenges and to derive general recommendations.

The description of the cases were included for all the cases. An (uncommented) overview of the indicators of all cases are presented in the appendix. The results of the comparison of the different indicators are presented in section 5. Based on these, the most common challenges were identified (see section 6.1), recommendations derived (see section 6.2), a framework for the monitoring proposed (see section 6.3) and some general guidelines to tackle overtourism developed (see section 6.4).

2.2 Measurement Framework

To ensure the comparability of the different cases analyzed, a common framework for the analysis of the case studies has been developed. The framework consists of several sections in order to meet the requirements of the high complexity of measuring the phenomenon of overtourism. The framework is structured in the following sections.

2.2.1 Description of the Case

As a starting point, all cases are briefly described. The aim of this first section is to understand the cases' context, the current tourism development and the challenges the corresponding destinations are confronted with.

2.2.2 General Indicators

In a second section, a set of general indicators aims at capturing basic destination-related data to calculate density indicators and to set specific indicators into relation with each other.

Metric	**Definition** (Description of indicator)
Destination area	Area of destination (km2)
Area of tourist centre	Area of tourist centre (city centre) (km2)
Inhabitants in destination	Number of inhabitants in destination
Inhabitants in tourist centre	Number of inhabitants in tourist centre
Population development	Increase or decrease in local population from 2012 - 2017
Hotels	Number of Hotels
Hotel rooms	Number of Hotel rooms
Hotel beds	Number of Hotel beds
Tourist arrivals	Absolute value of the number of tourist arrivals in destination (2017)
Arrivals growth	Growth in tourist arrivals (%) from 2012 to 2017
International and domestic arrivals	Share of international tourist arrivals
Overnights 2017	Total overnights per year
Development of overnight stays	Development of overnight stays from 2012 - 2017
Overnights in low season	Overnights in low season
Overnights in peak month	Overnights in peak month
Overnights in lowest month	Overnights in lowest month
Overnight visitor high season	Number of months in 2017 with overnight visitor number above average
International and domestic overnights	Share of international overnights
Day visitors 2017	Total day visitors per year (estimated)
Employment in Destination	Tourism share of employment (%) in destination (as percent of total)

Table 1: General indicators of the WTFL 2019 study

The participating partner universities were requested to capture a value for each indicator, in case these values were available. Moreover, the data source for each indicator had to be indicated to prove the data quality and enable the comparison of the use of different data sources between the cases. In addition, for each indicator comments, explanations, learnings and limitations could be recorded.

2.2.3 Experimental Indicators

The third section contains various experimental indicators, which allowed capturing indications of 'touristification' and overtourism.

As for the general indicators, each indicator could be specified with a particular value, the source of the data of this value as well as with comments, explanations, learnings and limitations. Especially the last information was of great value for this study, as the comments about the indicators uncovered challenges and limitations of these experimental indicators.

Metric	**Definition** (Description of indicator)
Visitors in main attractions	Total numbers of visitors in top 5 (according to TripAdvisor) fee-based attractions
	Numbers of visitors in top 5 (according to TripAdvisor) fee-based attractions in highest month
	Numbers of visitors in top 5 (according to TripAdvisor) fee-based attractions in lowest month
	Number of attractions with visitor restrictions (time slots, guest limits, etc.) from 5 top attractions.
Bike rentals	Absolute number of bike rental businesses in the city center
	Share of foreigners who rent bikes (e.g. use of foreign address or credit card)
Airbnb accommodations	Number of Airbnb listings in the destination (at a specific date during the survey period)
TripAdvisor re-views relating to overcrowding	Share of reviews that address issues related to overcrowding among TripAdvisor's top 10 attractions (%) Keywords: overcrowded, too many people, crowds, long wait, no room, others (please indicate in comment section).
Coffee price ratio	Difference in the average coffee price in the tourism center and the coffee price in the outskirts at a selected date during the survey period. Average price in top 5 restaurants (TripAdvisor Coffee & Tea) in tourism center and 5 randomly selected restaurants outside the center.
Beer price ratio	Difference in the beer price in the tourism center and the beer price in the outskirts at a selected date during the survey period. Average price in top 5 restaurants (TripAdvisor Bars & Pubs) in tourism center and 5 randomly selected restaurants outside the center.
Media coverage about local over-tourism issues	Amount of articles about local overtourism issues in two most important newspapers from 2012 -2017
Reader's letters	Number of reader's letters about overtourism in the two most important newspapers from 2012-2017

Restaurants	Number of restaurants providing a menu in other languages than the local language among the TripAdvisor's 5 top restaurants
	Number of restaurants having pictures in their menu among the TripAdvisor's 5 top restaurants
Tourist transportation	Number of providers of transport aimed at tourists (e.g. tourist trains, Segway tours or hop on/hop off busses)
Regulations for the hotel sector and/or the sharing economy	Existence of regulation for Hotels, Airbnb, Uber and/or others (e.g., visitor limits, restriction in number of nights per flat, etc.) *Assessment from 1 (not regulated) - 5 (strongly regulated)*

Table 2: Experimental indicators of the WTFL 2019 study

2.2.4 WTTC Indicators

The fourth section of the framework contains the nine metrics developed by McKinsey & Company and World Travel & Tourism Council (2017), which are contained in Table 7. The aim of this section was to test whether the indicators from this study are applicable to further (smaller) destinations. In addition, challenges and limitations of these indicators were to be analyzed.

In line with the general and experimental indicators, also the indicators developed by McKinsey & Company and World Travel & Tourism Council required the specification of a value, the source of the data of this value and the recording of comments, explanations, learnings and limitations.

2.2.5 Additional Indicators

Apart from collecting data for the prescribed indicators, all participating universities were requested to capture own site-specific indicators, which were appropriate to cover the situation of their specific destination case. These indicators contributed to the collection of indicators and could show limitations of the framework and/or particular needs for specific tourism environments.

2.2.6 Conclusions: Reflection on the Process

As a last step, the participating universities were requested to answer the following questions about their specific case:

- What are your main conclusions from the experience made with regard to measuring overtourism?
- What are the main challenges/limitations identified?
- Are there any interesting approaches or best practices you know of?
- What are your recommendations for the industry or authorities with regard to the monitoring of overtourism?
- Further remarks, comments and learnings

The answers to these questions helped for deriving conclusions and limitations from the process. Moreover, they supported the collection of best practices as well as lessons learned and could serve as a basis for further research in the field of measuring the phenomenon of overtourism through specific indicators.

3. The Phenomenon of Overtourism

Since 2016, the new term 'overtourism' has emerged in various news media and tourism trade journal articles and has caught the attention of tourism-related research. Overtourism, which sometimes is also referred to as overcrowding or visitor pressure, summarizes the various negative impacts that are caused by or related to tourism mainly in city contexts but also in nature destinations, such as national parks or islands. In their report commissioned by the European Parliament's Committee on Transport and Tourism (TRAN), Peeters et al. (2018, p. 22) established a definition which describes overtourism as "the situation in which the impact of tourism, at certain times and in certain locations, exceeds physical, ecological, social, economic, psychological, and/or political capacity thresholds" (Peeters et al., 2018, p. 15).

Despite the recent upcoming of the term 'overtourism', the underlying phenomenon is not new. The danger of 'tourism overkill' was already identified in 1979 by Rosenow and Pulsipher, who attributed this phenomenon to three main factors:

1. Too many tourists, at least in certain times
2. Too much adverse visitor impact
3. Too much physical impact of the visitor economy

In line with their finding that overcrowding of tourism destinations is not solely attributable to exuberantly high visitor numbers, later research has confirmed the importance of factors such as visitor behavior, timing, concentration, location, experience with tourism and local etiquette (Lindberg, McCool, & Stankey, 1997; Postma, 2013). Furthermore, the infrastructure and the capacity of being able to deal with large amounts of tourism are important factors that can mitigate or enhance negative impacts (Weber et al., 2017).

Further to that, the term 'touristification' describes the transformation and adaptation of a destination to the increasing use of tourist. This has not necessarily to do with quantitative numbers of tourists arriving, but with the change of character and meaning of a certain place.

As many popular destinations are struggling with this phenomenon, research was conducted to gain an understanding of the triggering factors, the manifestations of overtourism and potential strategies to support affected destinations or even to prevent its occurrence.

3.1 Factors enhancing the phenomenon of overtourism

The factors that contribute to the occurrence of overtourism are multifaceted and emerge in various areas within destinations. Koens, Postma, and Papp (2018, p. 5) trace overtourism to "an accumulation of different impacts and perceptions that relate both to tourist behavior as well as actions by, and encounters with stakeholders as well as changes to the social, economic and physical environment."

Several studies have identified drivers and factors that contribute to overtourism. A selection of these factors is summarized in Table 1:

HOTREC (2018, p. 2)	1. Increased affordability and accessibility of travel
	2. Overall growth in international arrivals
	3. Leveraging of private residences for tourist accommodations
	4. 'McDisney-isation' of destinations
	5. Bucket-list tourism
	1. Travel is more accessible and affordable
	2. Consumers are prioritizing travel and leisure experiences

Jordan, Pastras, and & Psarros (2018, p. 4)	3. Tourism sector has traditionally been focused on volume over other objectives
	4. International tourism arrivals in Europe are growing
	5. Social media is driving consumer awareness and inspiration to travel
	6. Urbanization is putting pressure on urban space
	7. Bucket-list tourism encourages concentration around specific sites
	8. Gentrification is raising prices in city centers and new neighborhoods
	9. Private residences across cities are being used for tourist accommodation
	10. Large groups (esp. cruise & touring passengers) concentrate visitors strongly
Goodwin (2017, pp. 5–7)	1. The falling cost of travel
	2. Disintermediation and P2P platforms are creating problems in the housing market, forcing up rent, displacing those on low incomes and creating disturbance in residential neighborhoods
	3. The public realm is free, but maintenance and repair costs have to be met by local tax-payers
	4. Distribution strategies increase tourism impacts in less-visited neighborhoods
	5. Cities are experiencing binge drinking and hen and stag parties
	6. Seasonality bunches tourism concentrates numbers
	7. Tourism creates jobs, but they are often relatively low paid
	8. New originating markets entail substantial numbers of additional tourists travelling internationally and domestically
	9. Honeypots (i.e. successfully marketed, established destinations) attract more tourists
	10. Destination marketing organizations go on marketing the established honeypots as they are less expensive to market and success is more assured
	11. Nowadays transport is larger scale than in the past
Weber et al. (2017, p. 3)	1. Lack of facilities (restrooms, shade, shelter, public water, parking, cash withdrawal, traffic, public transport, etc.)
	2. Sensitive environment (UNESCO-sites, fragile eco-systems, reefs, etc.)
	3. Social disparity (cultural conflicts, low income levels, high unemployment, low tourism awareness, etc.)
	4. Diversity of stakeholders (many players, many different interests, etc.)
	5. High dependency on tourism
	6. Seasonality & type of tourism (day tourists, second homes, event tourists, etc.)
	7. Concentration of capital (unequal distribution of benefits)
	8. Existing pressure through other sectors (air pollution, noise, traffic, overcrowding during events, rivalry between sectors, etc.)
	9. Bad governance (lack of strategic approach, lack of inspection measures and penal systems, unqualified staff, insufficient coordination of stakeholders, low transparency, repression, etc.)

Table 3: Factors enhancing overtourism

These factors demonstrate that the causes of overtourism are very diverse and complex. While Weber et al. (2017), Goodwin (2017) and Jordan et al. (2018) depict them in more detail, HOTREC (2018), the umbrella Association of Hotels, Restaurants and Cafes in Europe, describes the roots of overtourism in a more general way.

The compiled causes can be broadly assigned to the following major areas: inadequate destination planning and management, which encompasses deficient infrastructure, growth of tourism and new players entering the industry as well as inappropriate tourist behavior.

3.2 Manifestations of overtourism

The manifestations of overtourism are manifold and differ from one destination to another. Even though their sequences slightly differ, the determined manifestations of overtourism are quite similar, which can be seen in Table 2:

HOTREC (2018)	1. Increased congestion
	2. Infrastructure under pressure
	3. Degradation in the quality of life of local residents
	4. Rising costs of living
	5. Impact on built and natural environment
Jordan et al. (2018, p. 5)	1. Increased congestion
	2. Infrastructure under pressure
	3. Increased energy demand and pollution
	4. Nuisance behavior by visitors
	5. Damage to historical sites and monuments
	6. Loss of identity and authenticity (e.g. local shops)
	7. Rising cost of living for local residents
	8. Environmental degradation
	9. Rising inequality among local residents
	10. Backlash by local residents
Koens et al. (2018, p. 5)	1. Overcrowding in city's public spaces
	2. Pervasiveness of visitor impact due to inappropriate behavior
	3. Physical touristification of city centers and other often-visited areas
	4. Residents pushed out of residential areas due to Airbnb and similar platforms
	5. Pressure on local environment
Weber et al. (2017, p. 3)	1. Low visitor satisfaction
	2. Bad governance
	3. Environmental impacts
	4. Concentration of benefits
	5. Reduced quality of life (Insufficient involvement, Poor working conditions, High prices, Low level of tourism awareness, Inappropriate visitor behavior, Crime)
	6. Capacity problems
	7. Overuse of infrastructure
	8. Inadequate implementation of strategies
Milano (2017, p. 5, 2018, p. 554)	1. Congestion of public spaces
	2. The privatization of public spaces
	3. The growth of cruise tourism and the consequential seasonal congestion
	4. The rise in housing prices
	5. The loss of residents' purchasing power
	6. The unbalanced number of locals compared to visitors
	7. Commercial gentrification
	8. Environmental deterioration, including waste, noise, air quality and water quality issues
McKinsey & Company and World Travel & Tourism Council (2017, pp. 17–19)	1. Alienated local residents
	2. Degraded tourist experience
	3. Overloaded infrastructure
	4. Damage to nature
	5. Threats to culture and heritage

Table 4: Manifestations of overtourism

Apart from negative impacts on the built and natural environment within destinations, overtourism pressures the local population through restrictions in their everyday life as well as through price increases and rise of living expenses. Eventually, it negatively influences the tourism experience and endangers the existence of the destination in the long term.

Because of the various issues affecting the local population that arise from the overtourism phenomenon, the term tourismphobia has emerged. Martins (2018, p. 5) defines tourismphobia "as a dislike or hatred against tourists independently of their ethnic or social origin, race, religion, gender, sexual orientation or other discrimination." Therefore, policy makers have to deal not only with adapting and optimizing the destinations' infrastructure but also with incensed residents, who reject to accept the negative impacts that tourism imposes on them in their living environment.

3.3 Strategies to alleviate the effects of overtourism

In addition to identifying the factors that favor the occurrence of overtourism and specifying the manifestations of this phenomenon, some researchers, such as Martins (2018) and Milano (2017), have determined an increase in the development and implementation of action plans of destinations to avoid overtourism, anti-tourism manifestations and tourismphobia. In this respect, several contributions aim at collating these strategies to support destinations, which are confronted with the overtourism phenomenon (see Table 5).

HOTREC (2018)	1. Tourism activity must be accurately governed
	2. Consider applying sensible thresholds on visitor capacity
	3. Ease the pressure, spread the demand
	4. Help every visitor to become a responsible visitor
	5. Dialogue & consultation go a long way
Jordan et al. (2018, pp. 8–29)	1. Strategy formation, city planning and zoning
	2. Forming partnerships
	3. Smart marketing
	4. On-the-ground visitor management
	5. Technological solutions
	6. Public education
	7. Managing the collaborative economy
	8. Taxes, caps and limitations
	9. Measurement and monitoring
	10. Dialogue and consultation
UNWTO, CELTH, NHTV Breda and NHL Stenden (2018)	1. Promote the dispersal of visitors within the city and beyond
	2. Promote time-based dispersal of visitors
	3. Stimulate new visitor itineraries and attractions
	4. Review and adapt regulation
	5. Enhance visitors' segmentation
	6. Ensure local communities benefit from tourism
	7. Create city experiences that benefit both residents and visitors
	8. Improve city infrastructure and facilities
	9. Communicate with and engage local stakeholders
	10. Communicate with and engage visitors
	11. Set monitoring and response measures
Koens and Postma (2017, pp. 16–23)	1. Spreading visitors around the city and beyond
	2. Time-based rerouting
	3. Creating itineraries
	4. Regulation
	5. Visitor segmentation
	6. Make residents benefit from the visitor economy
	7. Create city experiences that benefit both visitors and local residents

	8. Improve city infrastructure and facilities
	9. Communicating with and involving visitors
	10. Communicating with and involving local stakeholders
McKinsey & Company and World Travel & Tourism Council (2017, pp. 40–49)	1. Smooth visitors over time - Establish arrival limits - Deploy reservation and ticketing systems - Use technology to nudge visitors in real time - Extend seasons and shift the focus of promotions
	2. Spread visitors across sites - Promote less-visited attractions - Develop new routes and attractions
	3. Adjust pricing to balance supply and demand - Implement specific taxes and fees - Charge the "actual" cost - Shift to variable or tiered pricing
	4. Regulate accommodation supply
	5. Limit access and activities
Weber et al. (2017, pp. 194–195)	1. Policies & regulations
	2. Economic incentives
	3. Social capacity building (Community engagement, Participation & involvement, Awareness raising & training)
	4. Environmental measures
	5. Attraction management and product development
	6. Infrastructure facilities
	7. Tourism management (Strategic planning, Monitoring & evaluation, Certifications & concepts, Marketing & de-marketing)
	8. Visitor management (Visitor guidance, Temporal distribution, Spatial distribution)

Table 5: Overtourism alleviation strategies

Jordan et al. (2018) propose ten tools for a more effective management of tourism growth by destination development, management and marketing organizations. In their position paper, HOTREC (2018) frames its five recommendations for policy and decision-makers in a more generic way, giving inputs on how to mitigate or prevent overtourism. To provide policy and decision-makers with practice-oriented approaches, McKinsey & Company and World Travel & Tourism Council (2017) developed five tactics comprising of several specific actions, Koens and Postma (2017) rely their ten strategies on 65 methods to manage visitor pressure. These strategies have been slightly adapted and expanded by UNWTO et al. (2018). Based on case studies from all over the world, Weber et al. (2017) developed eight categories with subcategories for approaches to face challenges of overtourism.

Preveden, Mirkovic, Gratzer, and Schenk (2018, pp. 11–14) determined seven interventions to cope with overtourism, divided into proactive and reactive approaches and feature suggested timeframes:

Time frame	**Proactive Approaches**	**Reactive Approaches**
Long term	1. Alignment of city tourism strategy with city development strategy	
Mid term	2. Implementation of infrastructural measures in low-tourism areas	5. Regulation of capacity
	3. Upgrading of guest segments in a targeted way	6. Active management of the sharing economy
Short term	4. Targeting various segments and distributing guests across the city and seasons	7. Limitation of access (Entry tickets, slot allocation, flexible pricing)

Table 6: Alleviation strategies proposed by Preveden et al. (2018)

Additionally, Preveden et al. (2018, pp. 14–15) developed a four-step strategy to support city destinations in the prevention and mitigation of overtourism and the development of a sustainable tourism plan. A comprehensive self-assessment of the current state of overtourism in the destination constitutes the first step. The second step includes the development of concrete initiatives as well as the establishment of a roadmap containing responsibilities and milestones. The third step comprises the implementation of these initiatives and the monitoring of their effects. The implemented initiatives are then iterated and fine-tuned in a fourth step. The authors emphasize the importance of the cooperation and commitment of stakeholders, such as residents, city managers, tourism players and tourism representatives, which they determine as the driving force behind their four-step strategy.

In order to determine the vulnerability to overtourism, Peeters et al. (2018, p. 79) provide regions and destinations with a checklist containing 10 questions to assess their overtourism risk:

- Is your destination less than 30 km from an airport?
- Is your destination less than 15 km from a cruise port?
- Is your destination less than 20 km from a World Heritage Site?
- Do you use a volume growth-oriented (e.g. tourist arrival numbers, bed-nights) set of indicators to evaluate the success of your destination, excluding opportunities for optimization (e.g. spending per day, livability for residents)?
- Is your marketing strategy focused on medium and long-haul, rather than closer markets?
- Are residents sentiments ignored in destination development?
- Do you ignore social media (for both residents and visitors) discussing overcrowding, negatively discussing tourists and other indicators for overtourism?
- Are Airbnb and similar sharing-economy accommodations unregulated nor monitored?
- Are Airbnb and similar sharing-economy accommodations excluded from (tourism) taxes as paid by hotels, B&B and other contemporary accommodation types?
- Do stakeholders from air transportation and/or cruise ports have a decisive influence on your tourism management and planning?

The authors (2018, p. 79) argue that the higher the number of positive answers to these questions, the higher the risk and the more urgent the need to further investigate the situation and take measures.

3.4 Theoretical foundations to approach the phenomenon of overtourism

According to Goodwin (2017) overtourism is a classic case of the tragedy of the commons. Many places and experiences in destinations are public goods, which are characterized by two fundamental properties. First, their consumption is non-rival, which implies that the consumption of one person does not prevent others from consumption, but it may ruin or degrade the experience if there are too many consumers at a time. Second, public goods are non-excludable unless a local authority decides to charge for admission. These two conditions foster free rider behaviors of visitors and tour companies, and the corresponding costs are imposed on the local taxpayers. To make the most out of the funding provided by the local population, continued tourism planning and management is required to secure visitor dispersal and reduce congestion. Martins (2018, p. 4) states that "tourism planning can be seen as a dynamic, systemic, participatory and continuous process that has in view the determination of the destination's objectives, strategies and actions." Hence, for destinations to be able to develop appropriate tourism plans that can cope with overtourism and prevent tourismphobia, the magnitude of overtourism has to be determined. For this reason, several theories were consulted that are briefly introduced in the following subchapters.

3.4.1 Tourism Carrying Capacity

One of the most widely associated theories with the phenomenon of overtourism is the Tourism Carrying Capacity, which was applied by several recent studies (González-Guerrero, Olivares Robles, Valdez Pérez, Morales Ibarra, & Castañeda Martínez, 2016; Marsiglio, 2017; Navarro Jurado et al., 2012; Navarro Jurado, Damian, & Fernández-Morales, 2013; Sharma, 2016). The United Nations UNWTO (1981, p. 4) defined carrying capacity as "the maximum number of people that may visit a tourist destination at the same time without causing destruction of the physical, economic or socio-cultural environment and an unacceptable decrease in tourist satisfaction". The multidimensional nature of the Tourism Carrying Capacity is also emphasized by Garrigós Simón, Narangajavana, and Marqués (2004), who state that environmental, economic, psychological and perceptual factors need to be considered, depending on the respective concerns of the stakeholders involved. In that respect also Milano (2017, p. 35) highlights the fact that Tourism Carrying Capacity not only examines the number of visitors, but also includes important variables, such as the distribution of visitors in the area, their activities, their behavior and the state of tourism infrastructure. Peeters et al. (2018, p. 26) differentiate five types of capacities, which have to be considered to provide sustainable tourism development within destinations. According to them, the development of sustainable tourism involves the destination's ecological-environmental capacity, physical-facility capacity, social-perceptual capacity, economic carrying capacity and psychological capacity.

As the concept of tourism carrying capacity has been criticized, several alternative planning frameworks were developed. According to McCool and Lime (2001, p. 384) these frameworks include the Limits of Acceptable Change (LAC) (McCool, 1994; Stankey, Cole, Lucas, Petersen, & Frissell, 1985), Visitor Impact Management (VIM) (Graefe, Kuss, & Vaske, 1990), Visitor Experience and Resource Protection (US Department of the Interior, 1997), Visitor Activity Management Planning (VAMP) (Nilsen & Grant, 1998) and the Tourism Optimization Management Model (TOMM) (Manidis Roberts Consultants, 1997). Although these frameworks are mainly focused on natural tourism environments, some of them can also be adapted to urban environments. Referring to this, Goodwin (2017, p. 8) underlines the importance of the LAC framework, which aims at comparing the condition of a destination "based on the previous experience of visitors and locals in each generation."

3.4.2 Tourism Irritation Index and Tourism Area Life Cycle (TALC)

Two popular stage-related models have strongly marked the research investigating residents' attitude to tourism: the Tourism Irritation Index (also known as Irridex) and the Tourism Area Life Cycle (TALC).

The Tourism Irritation Index developed by Doxey (1975, cited in Papathanassis, 2017; Heuwinkel, 2019) describes in four phases how the sentiments of locals towards tourists evolve. In the first phase, the local population encounters tourists with euphoria. As tourism development progresses, locals increasingly sense apathy in a second phase. The third phase is characterized by growing annoyance and in the fourth phase the sentiment toward tourists turns into antagonism.

The Tourism Area Life Cycle was developed by Butler (1980) to describe the evolution of tourist areas based upon the product cycle concept, passing through several stages from exploration through involvement, development, consolidation and stagnation to decline or rejuvenation. Goodwin (2017) emphasizes the fact that most contributions about TALC address the challenges of decline, instead of highlighting the challenges of success. According to him (2017, pp. 8–9), "there is much of relevance in this literature in understanding the negative impacts of tourism, and their effects on the community and the natural and cultural environment particularly." Also Milano (2017) shares this view, as he proposes TALC as one of three theories that may foster the understanding of the intolerance towards the tourism model prevailing in many urban destinations.

In their longitudinal study of 140 articles published in the scientific journals Annals of Tourism Research (ATR), Journal of Travel Research (JTR) and Tourism Management (TR) from 1984 to 2010, Nunkoo, Smith, and Ramkissoon (2013, p. 12) detected that 11% of the articles investigating residents' attitudes of tourism utilized the Irridex model and 18% made use of the Tourist Area Life Cycle (TALC). As the authors claim, "the premise of these articles rests on the assumption that different levels of tourism development connote different levels of capacity threshold for the host community, where higher levels of tourism development are accompanied by higher perceptions of the negative impacts of tourism." However, Akis, Peristianis, and Warner (1996) consider both models as too simplistic to allow the provision of a comprehensive understanding of residents' attitudes to tourism.

3.5 Measuring Overtourism

The research area of tourism impact studies has developed since the Second World War. While the initial research between 1960 and 1970 focused on the positive economic impacts of tourism, the studies in the 1970s and 1980s shifted their emphasis to tourism's negative impacts on destinations' social, cultural and natural environment. In the 1980s and 1990s, the research interest has evolved towards an integration of the economic perspective with the social and environmental one (Postma & Schmuecker, 2017).

As the previous chapters have shown, many causes of overtourism were detected, which can be broadly summarized in two major areas (i.e. inadequate destination planning and management, and inappropriate tourist behavior). Moreover, various strategies and methods were collated to mitigate the negative impacts of the substantial growth in tourism, such as overcrowding and tourismphobia. Nevertheless, the question 'How much tourism is too much tourism?' still remains unanswered.

To find out, whether and to what extent a destination is affected by overtourism, the potential stress that tourism might impose on a destination has to be measured with the aid of diverse indicators. According to Postma and Schmuecker (2017, pp. 153–154), there is a research gap and a lack of comparable indicators and metrics to measure visitor pressure. To determine the existence and degree of overtourism exclusively based on visitor numbers falls short, because there is no exact value that distinguishes a healthy destination from an overtourism-afflicted destination. Also Goodwin (2017, p. 10) criticizes that international arrivals has become the most respected indicator of the health of the tourism sector, while the growth in domestic tourism and day visitors are often overlooked. He claims that international arrivals is the wrong metric for managing tourism. According to him, more attention should be given to visitor spend as well as visitor and resident satisfaction.

In recent times, some studies have developed overtourism measurement systems. In their report about the management of overcrowding in tourism destinations, McKinsey & Company and the World Travel & Tourism Council (2017, p. 21) have compiled a diagnostic tool containing nine metrics to quantify tourism and potentially indicate overcrowding. The first two are related to the importance of tourism and the remaining seven address the main challenges caused by overcrowding:

	Metric	**Definition**
Overall context	Importance of tourism	Tourism share of GDP and employment (%)
	Arrivals growth	Growth in tourist arrivals (% CAGR)
Alienated local residents	Density of tourism	Number of visitors per square kilometer (#)
	Tourism intensity	Number of visitors per resident (#)
Degraded tourist experience	Negative TripAdvisor reviews	Share of "poor" or "terrible" reviews among top attractions (%)
Overloaded infrastructure	Arrival seasonality	Difference in arriving-flight seats between high and low month (ratio)
	Attraction concentration	Share of reviews limited to top 5 attractions (%)
Damage to nature	Air pollution	Annual mean PM10 particulate concentration (micrograms per cubic meter)
Threats to culture and heritage	Historic site prevalence	Share of top 20 TripAdvisor attractions that are historic sites (%)

Table 7: Nine Core Metrics Developed by McKinsey & Company and WTTC (2017)

In their research commissioned by the TRAN Committee, Peeters et al. (2018) investigated the NUTS 2 regions level. According to Eurostat (2018), NUTS stands for 'Nomenclature of Territorial Units for Statistics' and constitutes a hierarchical system for the division of the economic territory of the EU. The European Union is divided into three levels (NUTS 1, NUTS 2 and NUTS 3), which are defined by prescribed population thresholds. The NUTS 2 level represents the regions with a population between 800,000 and 3 million inhabitants containing a total of 281 regions (European Council, 2003). Peeters et al. (2018, pp. 74–75) proposed the following list of indicators to assess the risk of overtourism in 41 case studies:

Metric	**Definition**
Tourism share GDP	%
Growth of number of bed-nights	%/year
Tourism density	Bed-nights/km^2
Tourism density	Bed-nights/resident
Air transport seasonality 2016	Ratio between highest and lowest monthly arrivals by air transport)
Growth of air transport	2016 over 2015; %
World heritage site closeness	Number within 30km
Cruise harbor closeness	Number within 10km
Airport closeness	Arrivals within 50km
Airbnb average shortest distance to booking.com addresses	km
Airbnb share of booking.com plus Airbnb	%
Air transport intensity	Air passengers/bed-night
Number of UNESCO World Heritage Sites	Number
Combined intensity growth score	

Table 8: Indicators developed by Peeters et al. (2018)

Two of their indicators, tourism share of GDP and air transport seasonality, are congruent with the indicators proposed by McKinsey & Company and World Travel & Tourism Council (2017). The findings of the study of Peeters et al. suggest that the following five indicators are most relevant for assessing overtourism (2018, p. 16):

- tourism density (bed-nights per km^2) and intensity (bed-nights per resident);
- the share of Airbnb bed capacity of the combined Airbnb and booking.com bed capacity;
- the share of tourism in regional Gross Domestic Product (GDP);
- air travel intensity (arrivals by air divided by number of residents); and
- closeness to airport, cruise ports and UNESCO World Heritage Sites.

Another overtourism measurement system was applied by Preveden et al. (2018). Based on a previous study investigating the tourism development in cities by means of seven performance indicators (growth in overnight stays, number of overnight stays in relation to number of inhabitants, growth in bed capacity, value creation, internationality, accessibility and number of conferences) (Preveden, 2015), they developed a matrix clustering 52 European cities premised on two key measures. The first criterion they used is the number of overnight stays (per year) in relation to the number of inhabitants, which corresponds to the tourism density. The second criterion is revenue per available (hotel)

room, a measure to determine the value creation through tourism. The authors used the matrix to categorize the investigated cities into six clusters:

- unused potential (44%; low revenue and low tourism density);
- shining stars (17%; medium revenue and medium tourism density);
- under pressure (15%; medium to high revenue and high tourism density);
- sustainable quality (8%; high revenue and low tourism density);
- peak performance (8%; medium to high revenue and high tourism density); and
- mass trap (8%; low revenue and high tourism density).

Even though their approach allows a comparative overview of overtourism levels in European cities, some limitations have to be highlighted. First, it ignores the substantial number of day tourists many city destinations are confronted with. Second, this approach is solely based on two indicators, which creates difficulties to selectively differentiate between the six clusters. This becomes especially obvious when considering the 'under pressure' and 'peak performance' clusters.

Since the manifestations of overtourism depend a lot on the local environment, overtourism is a phenomenon that is mainly investigated by case studies. This approach allows dealing with the diverse characteristics of this phenomenon. However, the heterogeneity of its occurrence makes it difficult to draw general conclusions. A selection of recently published studies and contributions about overtourism in urban contexts have highlighted the following destinations amongst others:

- Amsterdam (HOTREC, 2018; Koens & Postma, 2017)
- Barcelona (HOTREC, 2018; Koens & Postma, 2017; Milano, 2017)
- Berlin (Koens & Postma, 2017; Milano, 2017)
- Cinque Terre (HOTREC, 2018)
- Copenhagen (Koens & Postma, 2017)
- Lisbon (Koens & Postma, 2017)
- Munich (Koens & Postma, 2017)
- Santorini (HOTREC, 2018)
- Venice (HOTREC, 2018; Milano, 2017)

Some recent studies have developed measurement frameworks to determine the existence and degree of overtourism and therefore have applied their metrics to several destinations allowing the comparison of multiple cases. In this context, McKinsey & Company and World Travel & Tourism Council (2017) applied their metrics to measure overcrowding to 68 cities, among them Barcelona (Spain), Buenos Aires (Argentina), Chongqing (China) and New York City (United States), which were covered in more detail. The study investigating the phenomenon of overtourism in the EU conducted by Peeters et al. (2018) conducted 41 case studies. Preveden et al. (2018) analyzed 52 European city break destinations through the comparison of tourism density and value creation.

Within the overtourism research field, especially the social impacts of tourism were intensively examined in the last decades. According to McGehee and Andereck (2004), residents' attitudes to tourism belong to the most well-studied areas in tourism. However, Nunkoo et al. (2013) observed that research studies vary considerably regarding their theoretical bases and methodological approaches. They state (2013, p. 6) that "knowledge in this area is characterized by area-specific discussions, case studies or one-off research." This tendency is also traceable in more recent studies concerning the social carrying capacity of tourism destinations, such as in the studies about Amsterdam (Gerritsma & Vork, 2017), Barcelona (Martins, 2018), Berlin-Kreuzberg (Füller & Michel, 2014), Bersalú (Muler Gonzalez, Coromina, & Galí, 2018) and Dubai (Zaidan & Kovacs, 2017). Furthermore, Walmsley (2017) examined the relationship between overtourism and employment.

4. Cases

This chapter gives an overview on the cases analyzed. It provides a short description of the situation at the specific cases that should allow understanding the context, the current tourism development as well as the challenges the destinations face. Conclusions on specific and general challenges when measuring overtourism drawn by the authors of the case studies are presented in this chapter. An (uncommented) overview of the indicators is included in the appendix.

The study examined nine tourism destinations in nine different countries with different backgrounds and tourism situations (see Figure 1). They all have in common that there are indications of overtourism. For all of these cases – except for the São Paulo State Coast - the indicator framework has been applied and commented. The cases analysed are:

1. Byron Bay in Australia
2. Lucerne in Switzerland
3. Ohrid in Macedonia
4. Queenstown in New Zealand
5. Santorini in Greece
6. São Paulo State Coast in Brazil
7. Sylt in Germany
8. Venice in Italy
9. Vienna in Austria

Figure 1: Destinations analyzed in the study

Disclaimer: Responsibility for the information and views expressed in the case studies lies with the authors of the case studies. Some values presented are based on estimations or unofficial data sources. The quality or content of the data presented in the case studies could not always be double-checked.

4.1 Byron Bay (Australia)

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Description of the case	
Short description of the case	With a history of over 100 years as a domestic and international tourism destination, located approximately 200 kilometers south of the Australian city of Brisbane and 800 kilometers north of Sydney, Byron Shire is situated within the Northern Rivers region that extends from the Queensland border at Tweed Heads, south to Grafton and inland to the upper reaches of the Clarence River (Byron Shire Tourism Management Plan). Besides the big number of natural drawcards like the World Heritage-listed rainforests, an extensive coastal region that provides excellent bathing and surf beaches, unspoilt hinterland, tropical agriculture, the Shire includes relaxed and diverse cultural communities as well as innovative enterprises (Lawrence, 2005). Within the Shire, the destination of Byron Bay represents the touristic centre of the region that attracts significant numbers of domestic and daytrip visitors (90% of visitors go to Byron Bay, (TRA, 2014). Byron Bay is also well established as a popular destination for surfers and international backpackers. In addition to its natural assets, Byron Shire is also known for its artistic and cultural diversity and creative industries. A dedicated 'Arts and Industry' estate was established in Byron Bay in the 1980s that offers a diverse range of businesses with many actively pursuing tourists. Events and festivals hosted across the Shire - particularly the Easter Bluesfest and Splendour in the Grass - also contribute to the national and international reputation of the region as a cultural and entertainment destination (Byron Shire Tourism Management Plan). Daytrip visitors explored the area from the early 1900s and camping and caravanning holidays became popular from the 1930s. In the 1970s, the region began to change with the arrival of people who introduced an alternative culture based around a surf lifestyle. The 1970s also saw the development of the first motels in addition to the caravan and camping grounds. The first backpacker hostel opened in the central business district of Byron Bay in 1983 - represented the start of a new age for tourism in Byron Bay (Wray, 2009). From the 1980s to mid-1990s tourism and development activity within the region, in particular Byron Bay, increased rapidly. The rapid growth in tourism numbers (international backpackers discovered the region too) was accompanied by the substantial construction and development of backpacker hostels, up-market accommodation, bed and breakfast establishments as well as entertainment venues and nightclubs. In the meantime, other industries that had supported the local economy including timber, dairying, agriculture, whaling and meat processing declined (Byron Shire Tourism Management Plan). Today, tourism is recognised as an important contributor to the region's

	economic development. It is estimated that 1,885 000 tourists visited Byron Shire in 2017 with an expenditure of $656 million (TRA, 2018).
Main challenges	The rapid increase in visitation and corresponding development resulted in an infrastructure crisis in the 2000s. The lack of capacity in the sewage treatment works to cope with the increased visitors, the perceived inappropriateness of some developments as well as parking problems and traffic congestion led to increased concern from residents and Council about the direction of tourism development and the need for a coordinated and strategic approach to tourism management within the Shire. Articles appeared in the Sydney newspapers advising tourists that Byron's "love affair with tourists" was over (see Kennedy, 2002).
Tourism data available	Wray, M. (2009). Policy communities, Networks and Issues Cycles in Tourism Destination Systems. Journal of Sustainable Tourism, (17) 6, 673-690. Tourism Research Australia: https://www.tra.gov.au/search.aspx?ModuleID=518&keywords=Byron%20Shire&multiSite=False https://profile.id.com.au/byron Demographic Resources Byron Shire Council: https://economy.id.com.au/byron/tourism-visitor-summary Byron Shire Tourism Management Plan (2008-2018) Byron Shire Council Community Strategic Plan 2027 Meyer M. (2017). A common set of indicators measuring the positive and negative impacts caused by tourism in the Carpathians. Ninth Meeting of the Carpathian Convention Working Group on Sustainable Tourism (CC-WG Tourism). September, 12-14, 2017, Brasov Visitor Profile and Satisfaction Report: https://www.destinationnsw.com.au/wp-content/uploads/2014/05/Byron.pdf

Conclusions: Reflection on the process	
What are your main conclusions from the experience made with regard to measuring overtourism?	Some of the data required is not monitored in small cities of coastal destinations. Tourist Density Ratio in the case of Byron was one of the most straight forward indicators to emphasize on the impacts of tourists.
What are the main challenges/limitations identified?	The indicators used are mainly concentrating on city based tourist activities, and on visitors accommodated in hotels. Whereas as in the case of Byron, in 2017; backpacker accommodations 553 overnights and other accommodation types 1571, whereas hotel or similar overnight were 555. In some parts of regional Australia,

	backpackers make up more than half of all international visitors and visitor nights, thus number of bed spaces available in total could be also an important indicator. Considering available data caution should be taken when interpreting some of the data due to sample sizes of less than 50 people surveyed. Looking at alcohol prices based on TripAdvisor top venues has its own limitations in countries like Australia, where not all venues are fully licensed.
Are there any interesting approaches or best practices you know of?	The core indicators used in the "Carpathian approach" (Meyer, 2017) can be more easily identified and analyzed in the case of Byron.
What are your recommendations for the industry or authorities with regard to the monitoring of overtourism?	There is unlikely to be a one size fits all approach when attempting to monitor or identify the indicators of overtourism. Popular tourism destinations that lie within regional areas may not present the same indicators or 'symptoms' of overtourism as major cities. Coastal locations may also present diverse indicators as ocean based activities that take tourists off shore and away from major urban areas result in less congestion and perhaps better dispersal of tourists. Regional locations may also serve as a 'hub and spoke' type destination that facilitates the dispersal of tourists to surrounding locations over the period of their stay – hence while arrival numbers or overnight numbers are high, this may not necessarily be reliable indicator of overtourism. Big data resources such as mobile phone tracking systems that are becoming common place in tourism research are possibly the most reliable resources available to us at the current time for tourist tracking and monitoring overtourism.
Further remarks, comments and learnings	Tourist behaviour and the kinds of tourists that are attracted to a destination should also be considered when assessing the impact that tourism has on a destination. Some tourists leave larger 'footprints' than others, careful consideration of how a destination is positioned and the market it likely appeals to is advised for destinations are seeking solutions to overcrowding and negative guest / host interactions. Product development that leads to enhanced visitor dispersal to fringe destinations and transport infrastructure that supports is also recommended. This will not only reduce congestion at popular sites but also enable more equitable distribution of tourist expenditure. Tour companies and package tour operators should be encouraged to promote 'off the beaten track' experiences as part of their itineraries that complement visits to popular sites. Local government policy and planning decisions around destination development should also consider limiting the number of tourist accommodation facilities around popular sites and reward tourism investment that encourages better tourist dispersal.

4.2 Lucerne (Switzerland)

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Description of the case	
Short description of the case	Lucerne is a medium-sized city with about 80.000 inhabitants. Its central location in Switzerland, the proximity to lake and mountains and its historic old-town with its famous sights (such as chapel bridge and lions monument) makes Lucerne a must-see for many tourists. It is said that Lucerne coalesces all typical attributes of Switzerland: if one has seen Lucerne, one has seen what Switzerland is all about. Tourism therefore has a long and influencing history, with first tourists arriving from England as early as in the 18th century. More recently, tourists from overseas have discovered Lucerne and in particular, guests from Asia are increasingly visiting the city. Because of its convenient location between attractive tourist hotspots within Switzerland (such as Zurich and Interlaken) and Europe (such as Paris and Venice), most tourists are visiting Lucerne on passing through on their round trip. This leads to a particular mode of travel, which is typically characterized by large guided groups in tour coaches with a relatively short length of stay within the destination. For many tourists, the main driver for visiting the region is the Swiss luxury watch shopping experience, for which Switzerland and Lucerne in particular is famous for.
Main challenges	Public discussion on tourism development in Lucerne is as old as tourism itself. However, controversial stances have been increasing in the last years. This is exemplary shown by a public vote in September 2017, where an existing coach parking has been banned from its central location. In addition, a parliamentary vote is asking the City Government for a so-called "Vison 2030", which has to indicate the strategic development of the tourism industry. The debate entangles various tourism and non-tourism stakeholders and is covered extensively in the local media. Main aspect of the tourism critique is addressing tour coaches and the intensive traffic at some neuralgic spots. Further to that, the debate also includes intercultural aspects, such as distinctive visitor behaviors. As an increasing number of tourists are sourcing from new and emerging markets, misunderstandings between hosts and guests may occur. Another point of critique is the uneven distribution of tourism spending. Most of the value creation goes to a few luxury watch retailers, who lure large tourism group with attractive price incentives. Whereas traditional tourism businesses such as hotels and restaurants suffer from reluctant spending behavior, due to the limited time spent within the destination.
Tourism data available	Many studies on tourism, traffic and economic value added exist for the city of Lucerne. Most of these studies though are not conducted on a regular basis, which does not allow comparison over time. Moreover some of the studies are commissioned by specific interest group and therefore do not necessarily have a neutral point of view.

	Objective statistics from federal government are mainly covering the bed nights. This only partly helps to understand the scope of the current issues of tourism in Lucerne and it is urged therefore, to establish a more accurate and comprehensive measurement of tourism flows.

Conclusions: Reflection on the process	
What are your main conclusions from the experience made with regard to measuring overtourism?	The metrics "Growth in tourist arrivals" and "Development of overnights" significantly show that tourist arrivals in Lucerne city have increased since 2012. The metric "International and Domestic Arrivals" displays that the share of international tourist arrivals has increased, but the number of domestic arrivals have decreased. Considering the number of tourists, July is the strongest and February is the weakest month for the city. However, this pattern cannot be observed at the fee-based main attractions. The statistics also show that despite of the increasing number of tourists in Lucerne the number of visitors at the fee-based main attractions did not grow significantly. These statistics could be investigated by further research as well as the question, which sectors really profit from the rising number of tourists. Correspondingly, to the rising number of tourists, also the number of hotels and Airbnb accommodations has increased in Lucerne in the last years. The exact pattern of these statistics could be also examined in a further research. In Canton Lucerne Airbnb is not separately regulated yet, and the discussions about the exact regulations are in progress. Until a decision, the Swiss tenancy law is valid for this business sector. During the research, it revealed that Trip Advisor has different websites, depending on the language and country. Therefore it was decided, that the results of this study will be based on the website www. tripadvisor.com. Among the Trip Advisor reviews there were reviews that contained the expression "no crowd", so this expression has been additionally examined and listed at the attractions. The metric "Coffee price ratio" and "Bier price ratio" significantly display that in the tourist centre the coffee prices are higher, but the bier prices are not.
What are the main challenges/limitations identified?	It would be interesting to investigate the metrics "Reviews in Trip Advisor", "Media Coverage" and "Reader`s letters" for the last 5-10 years, but unfortunately the data is not available online. Furthermore, some data for specific metrics were available only for Switzerland or Canton Luzern, not for Lucerne city (see comments at the metrics).
What are your recommendations for the industry or authorities	Maybe it would be helpful to investigate the trends of some metrics, which could display the development of a destination:

with regard to the monitoring of overtourism?	For example analyze the followings for the last 5-10 years: Growth of inhabitants in tourist centre (in case of Lucerne, between 2010-2017 the number of inhabitants of Altstadt/Wey has increased from 2,125 to 2,345, and the share of foreign inhabitants have grown from 27.9% to 35.9%. This is an interesting statistic in case of overtourism.) Growth the number of hotels, hotel rooms, hotel beds Growth of international and domestic tourist arrivals Development of overnights stays in peak season and in low season Growth of share of international and domestic overnights Development of day visitors Tourism share of employment (%) in destination Growth of visitors at main attractions per year, in peak and in low season Growth of bike rentals Growth of Airbnb accommodations Growth of coffee and bier prices (has to be compared with other consumer prices and inflation) Growth of importance of tourism Growth of density of tourism Growth of tourism intensity Growth of air pollution Growth of tourist transportation

4.3 Ohrid (Republic of Macedonia)

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Description of the case	
Short description of the case	Situated in south-western part of the Republic of Macedonia, Ohrid like other developed tourist destinations base its tourism development on the abundance of natural and cultural values that represent a significant potential for its tourist offer. Its development is mainly because of the uniqueness of Ohrid Lake, the National park Galicica, and cultural values. The city of Ohrid was an artistic center of fresco paintings, which are ranked among the finest achievements of European fine art of that time. No anthology of medieval art is conceivable today without the 11th century frescoes from the cathedral church St. Sophia or those from the 13th century in St. Clement church or without the icons from the Ohrid collection. According to Sir Herbert Read (1961), the churches of Ohrid provide unique proof that between Byzantine ecclesiastical art, Ravenna and Sicily, on the one hand, and the Italian Renaissance, on the other, there was no void. Ohrid is a notable bridge in European art. Tourism development in this destination is very closely related to the favorable conditions because of the diversity and spatial distribution of natural and cultural heritage in such a small area, particularly in the old part of the city. An important part of this heritage is valorized through tourism. The proper inclusion in tourist offer contributes to its enrichment and achieving competitive advantage to other country's destinations, and broader within the region. It is most developed tourist destination of the country, and well known in the region. Its tourist offer is based on inclusion of such values as components of summer- lake tourism and cultural tourism. Within the last few years, there are initiated activities towards rural tourism development in surrounding rural area (Velestovo, Elshani, Kuratica) as added tourist offer within different tourism products, and active tourism as alternative forms of tourism.
Main challenges	As the most developed tourist destination not only in Southwest Region, but in Macedonia, Ohrid is included in almost each travel agency' or tour operator' offer, whether for domestic or international tourist market, which beside the benefits from being recognizable destination of the country, it produce need for continuous maintaining of competitive tourist offer and quality services. In many cases it is offered within the Balkan Tours (for example: https://www.bookmundi.com/dubrovnik/balkans-in-two-weeks-9008; www.tours4fun.com/balkan-trek-9-day-tour.html), which enables higher visibility as regional international destination.

	Even though promoted and visited as cultural and summer destination, it faces many problems during the summer period (July-August) when this destination faces many problems due to high concentration of visits. Different problems are addressed to current situation and most of them are related to overcrowding in the central area of the city, beaches, roads, restaurants, cafés, and cultural sites. Therefore, the main challenges are to overcome "bottlenecks" reflected from high tourist concentration in certain periods and situations that come out from. Also the increase and improve of stakeholders' dedication to sustainable tourism development, and spatial and time diversification of tourist offer is challenge. Although the main stakeholders are aware of these problems, still when it comes to these issues there are no concrete measures or activities that will contribute to overcome them. It is more than necessary to do much more to overcome this situation. On other side, as heritage city, Ohrid faces many challenges for its future tourism development related to the question of how to maintain the balance between tourism development and heritage protection.
Tourism data available	Ohrid recorded 275.613 tourist arrivals in 2017, with approximate participation of 28 % in total registered visits of the country - 998.841, and 63% in lake tourist resorts of the country (State Statistical Office, 2018). According to data about tourist arrivals, and tourist nights for Ohrid, there is evident increase within the period 2008-2017, and in the structure of foreign visitors the most present are those from Albania, Bulgaria, Croatia, Greece, Netherland, Serbia, Slovenia and Turkey, with no main changes in the structure for the last decade. http://makstat.stat.gov.mk/PXWeb/pxweb/mk/MakStat/?rxid=46ee0f64-2992-4b45-a2d9-cb4e5f7ec5ef Main data Source: State statistical office of Republic of Macedonia, http://www.stat.gov.mk/
Further remarks	Tourism development has physical, economic, social and environmental impacts on destination that resulted with increased tourist arrivals and nights, increased structure of tourists, increased financial income for municipality, improved living standard of the citizens that offer private accommodation, but also increased problems with transport, parking, noise, overcrowding.

Conclusions: Reflection on the process	
What are your main conclusions from the experience made with regard to measuring overtourism?	The problems with overcrowding, particularly in the peak season (July-August) becomes more evident in Ohrid, because it is not just an issue for the big cities, but for many tourist destinations with size like Ohrid as well. Although it is not so obvious as it is for example in Dubrovnik, yet the first signs are evident. However, the destination, like many others, is still focused mostly on the benefits from tourism growth, and very little to the impacts from overtourism, even though the problems become more evident compared to the benefits.

	The "too many" as expression for the number of visitors during certain period of time is relative, for which the data indicates that the alarm is already turned on. It is obvious that local residents, businesses, and tourist become aware of this situation. The identified additional site-indicators show some real problems that are already important alert.
What are the main challenges/limitations identified?	- Problems with accessibility to the sites - Lack of adequate public infrastructure - Lack of tourist transportation - Very low awareness for overtourism - Unbalanced distribution of tourists within the destination, with highest concentration in Old Town
Are there any interesting approaches or best practices you know of?	- A more responsible approach to managing tourism by all stakeholders can help to solve problems with overtourism issues - Increased responsibility of local government for responsible tourism development - https://www.weforum.org/agenda/2017/09/what-can-we-do-about-overtourism/ - https://www.milespartnership.com/blog/toolkit-overtourism
What are your recommendations for the industry or authorities with regard to the monitoring of overtourism?	- Consult the best practices - Find "own way" how to deal with overtourism - Identify the main challenges associated with overcrowding - Find/develop the most appropriate solutions

4.4 Queenstown (New Zealand)

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Description of the case	
Short description of the case	**Geography/Spatiality** Queenstown is located in the south-west of New Zealand's South Island, in the Otago region. The town is built on an islet along at the edge of glacial Lake Wakatipu, and surrounded by the mountain peaks of the country's Southern Alps. Mountains, lakes, rivers and ice dominate the Queenstown Lakes District landscape; the town centre interfaces with Lake Wakatipu, providing unrestricted views across it, and of the mountains that surround it. Queenstown is known as the 'crown jewel' of NZ's tourism industry (QLDC, 2018b) The town centre is characterised by its lakeside location, narrow streets, connecting pedestrian alleyways and buildings of historical character. Building heights in the area are generally low, between 1-4 stories. Queenstown's grid street layout provides view corridors to the mountain and lake, the streetscape view is varied and welcoming, with street furniture, plantings and outdoor dining areas contributing to its charm. The city's small size and scale enable easy pedestrian access (LandLAB, 2018). Numerous businesses exist within the town centre's 12 hectares; retail, visitor and residential accommodation, restaurants, bars and recreation contribute to the city's diversity. Tourism-oriented services and commercial accommodation are located at the town's central core, while the newly established shopping centres in Frankton provide the home-goods and national chains oriented towards the permanent population exist in the peripheral and suburban areas. Water based transport connects the town with Frankton, Kelvin Heights, and the airport. **Context of Growth and History of Development** Queenstown has operated as a base for pioneers throughout its history, from explorers and farmers to gold prospectors and domestic travellers. The town's original inhabitants were Polynesian hunters, arriving around 1200 AD. The Maori people came later, in search of food, stone, fibre and Moa (large, flightless, native birds hunted to extinction) (LandLAB, 2018). The Maori people set up a camp in what is now Queenstown gardens, however by the time of the first European arrivals, this was uninhabited (ibid). European arrivals began around the time of the region's gold rush, in the 1860s. River gold mining produced large quantities in the Arrow River in 1862, and settlements of potential miners sprang up in Queenstown and nearby

Arrowtown. For the first half of the 20th century Queenstown was a small town with fewer than 1000 residents. In the summertime the town experienced a small trickle of holidaymakers drawn to the region's famous walking tracks (Ben Lomond peak was particularly popular). By 1947, a tow rope was established for skiing at nearby Coronet Peak, opening up the town to a year-round flow of visitors. By the 1870s, commercial jet boating rides had been introduced on Lake Wakatipu. By the early 1980s, Queenstown's population increased to around 3,500, and in 1988, the world's first commercial bungee jumping began at the Kawarau Bridge. Both national and international tourism flourished, particularly following the popularity of the *Lord of the Rings* movies in the early 2000s. The city experienced a brief economic downturn during the global recession, but following the 2011 Christchurch earthquake, a redistribution of tourists to the Queenstown was evidenced in the significant growth in airport arrivals and overnight stays (CODC, 2013). Since then, the city's tourism and visitor numbers have continued to escalate. In 2016, Queenstown Lakes hosted 1.17 million international visitors and one in every ten international guest nights spent in New Zealand is spent in Queenstown (QLDC, 2018b).

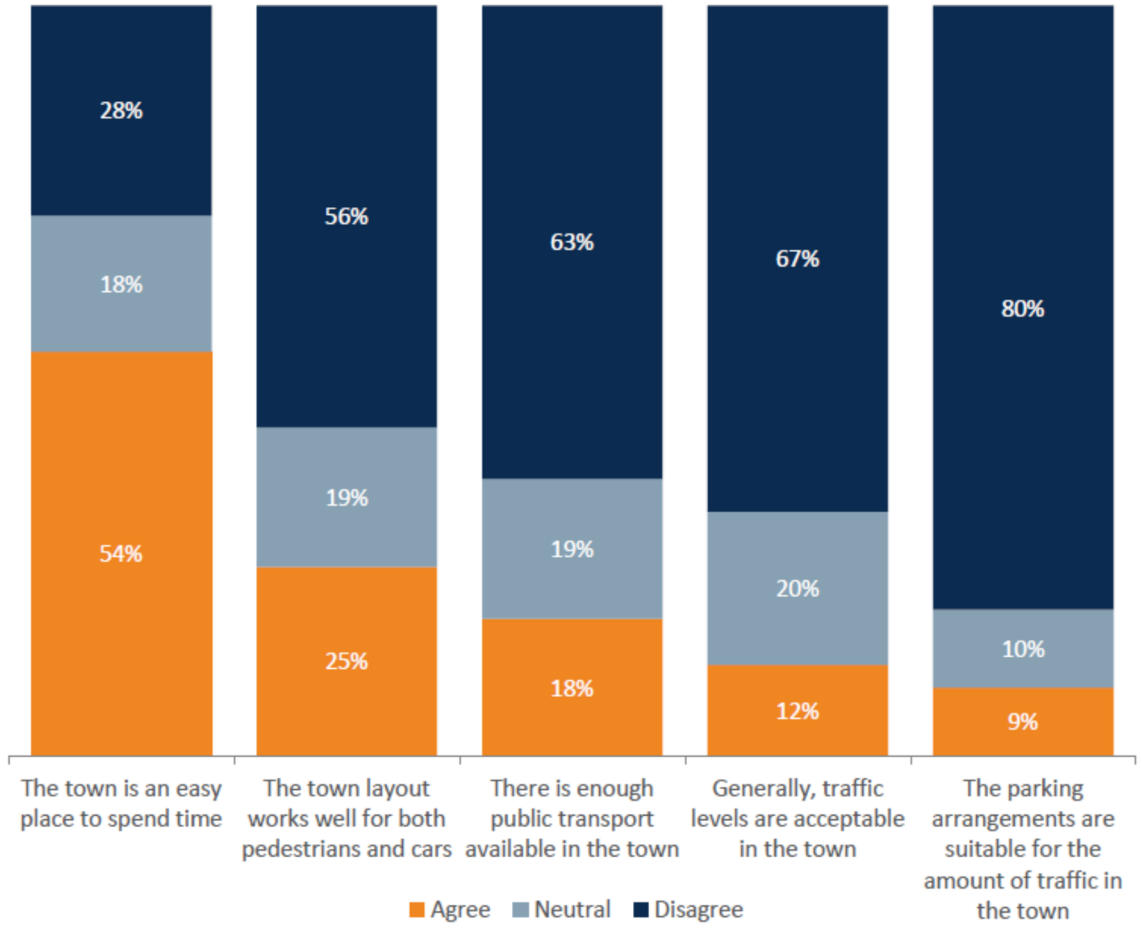
Tourism Segments: 'The Adventure Capital of the World'

Queenstown's title as the 'adventure tourism capital of the world' is well-deserved. Bungee jumping, (including the world's first commercial bungee venture by AJ Hackett off the Kawarau Bridge) white-water rafting, river surfing, canyon swinging, jet boating, heli-skiing, snowboarding, ski-trekking, alpine trekking, horseback riding, rock-climbing, zip lining, mountaineering, paragliding, skydiving, kayaking, canyoning, and mountain biking are only some of the popular local adventure tourism activities (Queenstown New Zealand, 2019). Other regional tourist activities include wine tourism (Central Otago's Pinot Noir is globally renowned), wellness tourism, nature & wildlife tourism (such as native bird parks), and fishing & hunting tourism (ibid). Additionally, Queenstown town centre offers a large variety of shopping, dining, and nightlife attractions, as per any major international destination. Queenstown Lakes Tourism Annual Spend in March 2017 was $2.5 billion, contributing over 8% of the national total. Visitors who come to New Zealand because of Queenstown spend a total of $1.44-$1.74 billion nationally. This contributes $1.3-$1.6 billion to New Zealand's overall GDP, and generates 9,600-11,629 jobs in the South Island. International tourists who visit Queenstown spend more than three times what another tourist, who does not visit Queenstown, will spend (QLDC, 2018b).

Current Tourism

The Queenstown Lakes District is currently home to an estimated 39,200 residents (Stats NZ, 2018a). This district has been the fastest growing territorial authority in the country for the past three years (Stats NZ, 2018b). Visitor numbers on a typical day can increase the population to 70,000, and during peak season, swell to approximately 110,000 (LandLAB, 2018). This number makes Queenstown New Zealand's 8th largest urban centre (Stats.govt.nz, 2018). Peak day populations are forecast to hit 150,000 by 2024, and international visitor arrivals to New Zealand

	are estimated to hit 4.6 million in 2023, an increase of 39% from 2.5 million in 2016 (QLDC, 2018b). For every local, Queenstown has 34 visitors to the district, which puts immense pressure on the environment and local infrastructure, creating a massive gap between the ratepayers who fund Queenstown's infrastructure, and the international visitors who benefit from it. No other town in New Zealand has such as significant imbalance between locals and visitors; this is projected to worsen in the coming years. The 2018 QLDC Quality of Life survey identified tourists, specifically too many tourists and their impact on the area, as a significant issue for more than half of the community (Versus Research, 2018a). When asked what would improve their quality of life, less tourists, less growth, more affordable housing, less traffic, more parking, more infrastructure, less plane noise and safer roads were the main focus of responses (ibid). The exceptional growth the area has experienced in recent years has led to residents feeling that their quality of life has decreased, that housing is a major concern, and that the cost of living in the area has risen to an unaffordable level. These are some of the major challenged that the town faces, and will be examined in more depth in the following sections of this case study.
Main challenges	**Main Challenges** The main challenges for the town have been the strains on local infrastructure resulting from the increase in travellers. This can been seen in Queenstown's issues (and resentment of) traffic and parking, housing, airport expansion and freedom camping problems. **Traffic & Parking** The town centre of Queenstown is fast approaching its limits in terms of traffic. State Highway 6a, between Frankton and Queenstown town centre is currently operating at 88% of its theoretical capacity of 28,500 vehicles per day, a figure that is expected to reach 100% by 2026 (LandLAB, 2018). With only one major route into town, the lack of viable options to easily access the town centre creates congestion and frustration for visitors, and stops residents from frequenting town. The significant growth in visitors, residents and vehicles, has increased trip unreliability and worsened traveller experience. The existing public transport system is affected by the traffic congestion, which in turn impacts its reliability and ease of use. Currently less than 2% of individuals traveling to the town centre use the Queenstown bus system (LandLAB, 2018). The current public transportation is widely acknowledged in surveys as inconvenient and unreliable; it cannot compete with the private car, which in turn intensifies traffic congestion. The 2018 QLDC Quality of Life survey illustrated the levels of dissatisfaction with parking and traffic levels, with responses of greater than 85% disagreeing that parking arrangements were suitable for the amount of traffic in the town. 56% of respondents disagreed that the town layout works well for both pedestrians and cars, 63% disagreed that there was enough public transport in the town, and 67% disagreed that traffic levels were acceptable in the town (Versus Research, 2018a).



(Versus Research, 2018b)

Queenstown Airport

Queenstown airport has become the third busiest international airport in New Zealand, despite Queenstown having less than 1% of the country's total population (QLDC, 2018b). Since 2005, visitor numbers through QT

airport up by over 200%, reaching over 2.22 million in the year ending Nov. 2018 (Queenstown Airport, 2018). Sustained growth is forecast for QT airport. Without airport capacity or noise restriction constraint, total passenger movements could reach 3.2 million by 2025 and 7.1 million by 2040 (Otago Regional Council Land Transport Plans, 2018). Queenstown airport is currently drafting a Master Plan to accommodate the expected growth. This plan has been subject to intense community scrutiny, specifically as it aims to extend the airport's aircraft noise boundaries. The Queenstown Airport Corporation reported receiving nearly 1,500 online survey responses from the community during its 5-week consult on the proposed noise changes, (the proposed changes would affect the acceptable noise levels of thousands of Queenstown homes, four schools, and a hospital) (Jamieson, 2018). The community outcry against the proposal has been covered significantly in both local and national news.

Visitor Accommodation & Housing Costs

Hotel occupancy rates in recent years have hit record highs, showing that the destination is shifting from a seasonal destination to a year-round attraction. Demand for hotel rooms is forecast to outstrip the supply by 2025. An additional 1,700 rooms are estimated to required, while only 1,364 are expected; a shortfall of 336 rooms (LandLAB, 2018). The QLDC reports a total of 240 hotel rooms currently under construction, a further 588 with consent but not yet under construction, and another 2,000 undergoing the consents process (QLDC, 2018b). An additional point of accommodation contention in the region is the prevalence of Airbnb. Infometrics and Airbnb data estimate that nearly 1,000,000 guest nights were spent in New Zealand in the year ending March 2017, of which 200,000 were in Queenstown-Lakes (Patterson, 2017). As of 2017, Airbnb accounted for an estimated 19% of Queenstown-Lakes visitor accommodation (Williams, 2017). Airbnb and Statistics NZ data show that Queenstown offered 2,000 Airbnb rental units in the year ending March 2017 – a staggering 10% of the total 20,000 dwellings in the district (Patterson, 2017). With house prices being driven up by international investors in Queenstown's contemporary "property gold rush," local residents are struggling to find affordable housing. Those homes which do become available are immediately purchased by investors only to be listed as short-term accommodation. Queenstown has become the most unaffordable place to buy a home in New Zealand, in addition to the most expensive area to rent a property. The 2018 Residents and Ratepayers survey found that 86% of survey respondents expect housing costs to be a barrier to their long-term commitment to Queenstown (Versus Research, 2018b). As of September 2018, the median home price in Queenstown 2018 was over $1 million, and the average rent per week was $616 - the only place in New Zealand to hit over $600 (Hartley, 2018).

Freedom Camping (Smiler, 2018)

New Zealand tourism has a rich history of freedom camping, or free camping, the practice of putting up tents or parking campervans in areas no designated for camping (New Zealand Tourism Guide, 2019). The number of freedom campers has increased from 51,832 in 2009 to 118,436 in 2017, a rise of 228% (Smiler, 2018). The

	average freedom camper spends 50 nights in the country, up from 43 in 2009, and spends on average $4,839 (Smiler, 2018). Tension around the impact of freedom campers on the environment has risen as tourist numbers have grown in recent years. There is a negative perception of freedom campers; primarily due to improper disposal of litter and human waste. The lack of regulation and enforcement of existing freedom camping regulations (such as camping vehicles requiring their own toilets) plagues the tourism industry and New Zealand government. The 2018 QLDC ratepayers and residents survey shows that satisfaction ratings with Freedom Camping enforcement have decreased significantly since 2015 (Stats NZ, 2018). Unsatisfied ratings have increased 19% since 2015, and satisfied ratings have decreased 15% over the same period, leaving only 22% of respondent satisfied with freedom camping enforcement and a full 49% unsatisfied (Stats NZ, 2018). The QLDC 2018 Quality of Life Survey respondents identified illegal freedom camping and dangerous driving as the most significant problems within the town, with 72% of respondents identifying each as a moderate to significant community problem (Versus Research, 2018a). These were followed by litter and dumping rubbish (67%), and aviation noise (46%) (ibid).
Tourism data available	- General Guide to Using Your Residential Property for Paying Guests. (2017). [ebook] Queenstown: QLDC. Available at: http://pragmaticplanning.co.nz/wp-content/uploads/2018/01/QLDC-Guide-to-Short-Term-Accommodation.pdf [Accessed 08 Jan. 2019]. - CODC (2013). *Towards Better Tourism Outcomes for Central Otago 2013-2019*. [ebook] Tourism Central Otago. Available at: https://www.codc.govt.nz/SiteCollectionDocuments/Strategies/Community/Towards%20Better%20Tourism%20Outcomes%20for%20Central%20Otago%202014_2019.pdf [Accessed 19 Jan. 2019]. - Hartley, S. (2018). *Resort's affordability still worst in country*. [online] Otago Daily Times Online News. Available at: https://www.odt.co.nz/business/resort%E2%80%99s-affordability-still-worst-country [Accessed 30 Dec. 2018]. - Heyes, R. (2018). *Statement of Evidence of Robert Heyes on Behalf of Queenstown Lakes District Council*. Visitor Accommodation: Economics. [online] Queenstown: Simpson Grierson Barristers & Soliciters. Available at: https://www.qldc.govt.nz/assets/Uploads/Planning/District-Plan/PDP-Stage-2/Stream-15-Section-42A/S2239- - LandLAB (2018). *Queenstown Town Centre Spatial Framework 14.06.2018*. [ebook] Queenstown, NZ: QLDC. Available at: https://www.qldc.govt.nz/assets/Uploads/Your-Council/Projects/QT-Town-Centre-Master-Plan/TCSF-Part-1-introduction.pdf [Accessed 11 Dec. 2018]. - Otago Daily Times Online News. (2015). *Queenstown top NZ destination in travel list*. [online] Available at: https://www.odt.co.nz/regions/queenstown-lakes/queenstown-top-nz-destination-travel-list [Accessed 19 Jan. 2019]. - QLDC (2018a). *Queenstown Town Centre Masterplan*. [ebook] Queenstown Lakes District Council. Available at: https://www.qldc.govt.nz/assets/Uploads/QLDC-Town-Centre-Proposal-Story-Booklet-Nov18-WEB.pdf [Accessed 21.01.19] - QLDC (2018b). *Sustaining Tourism Growth In Queenstown Final Report*. [ebook] Queenstown, NZ: QLDC. Available at: https://www.qldc.govt.nz/assets/Uploads/1803-Sustaining-Tourism-Growth-in-Queenstown-Final-Report.pdf [Accessed 1. Dec. 2018]. - Queenstown Airport Passenger History. (2018). [ebook] Queenstown, NZ: Queenstown Airport. Available at: https://www.queenstownairport.co.nz/assets/documents/ZQN-annual-Passengers-2005-to-2017.pdf [Accessed 1.12.18]. - Queenstown Airport. (2018). Queenstown Airport - Monthly Passenger Traffic November 2018 [ebook] Queenstown: Queenstown Airport. Available at: https://www.queenstownairport.co.nz/assets/documents/ZQN-Passenger-Stats-November-2018.pdf [Accessed 07 Jan. 2019]. - Smiler, J. (2018). *State of the Tourism Industry 2017*. [ebook] Petone: WelTec School of Hospitality Tourism Research. Available at: https://tia.org.nz/assets/Uploads/State-of-the-Tourism-Industry-2017-final.pdf [Accessed 21 Dec. 2018].

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Conclusions: Reflection on the process	
What are your main conclusions from the experience made with regard to measuring overtourism?	The measurement of overtourism is a complex and individualized process, specific to each destination affected. The data and indicators, which provide the strongest indication of overtourism in Queenstown, are unlikely to be widely applicable across heterogeneous destinations, due to the unique local geography, stakeholders (including this diverse host community), governance and policies, sociocultural values, as well as unique regional infrastructure and superstructure.
What are the main challenges/limitations identified?	The main challenges and limitations of the Queenstown case study concerned the availability of data. Recent data were often not available. Although New Zealand is globally recognized as providing high quality, up-to-date data, the researchers still struggled to find adequate data to address certain elements of the case study indicators. Examples include: Population. Estimates of regional and local population were based on the most recent census, which occurred in 2013. The next census (2018) is due to be released in May of 2019, and will provide a much more comprehensive understanding of the growth of the region. Until this data is released, all of the population forecasts and estimates are based on outdated data, which preceded significant increases in tourism and population growth in this region. Spatial boundaries. The physical 'Queenstown region' is not uniformly defined and the Queenstown Lakes District (QLD) includes areas, which are not subject to the same issues or pressures as the central town of Queenstown. Data exists which examines the QLD, but the area beyond the town centre and surrounding neighbourhoods are not spatially distinguished as specific sub-regions by the QLD Council. Additional data are needed in order to clearly demarcate what comprises the area of 'Queenstown' versus the larger district as the issues encountered in these areas can vary greatly in relation to specific tourism pressures/impacts.

	Length of stay. Additional data are needed regarding the length of visitors' stay in this destination. Tourists who are visiting for longer than 2 weeks (as is common in New Zealand) have different needs/motivations than day tourists, and impact the destination differently. Visitor Numbers. The destination does not lend itself to measuring day tourists (excursionists). Spatially, there is no reliable way to 'count' day visitors to Queenstown. They may travel freely by road or air and they do not encounter any sort of automatic metric or established visitor count upon entering or existing Queenstown. Therefore, only the roughest estimates of day visitors can be provided. Accommodation numbers. The numbers provided herein are based on estimates from both traditional commercial accommodations and sharing economy short-term accommodation providers (e.g., Airbnb) using data offered to other researchers. Given that Queenstown currently has an accommodation shortage and relies heavily on providers such as Airbnb to accommodate visitors, it would be beneficial to have access to more uniform, transparent data using metrics from providers such as Airbnb in order to develop an accurate picture of the state of short-stay accommodation in this destination. Finally, certain aspects of the case study (specifically concerning the readers' letters of the top two newspapers from 2012-2017) were infeasible to collect for the current case study due to time and access issues. In future, this indicator could be investigated given adequate access to regional newspapers' virtual data (rather than microfilm, which is the only option provided currently) and additional time and funding to support the time-intensive nature of gathering comprehensive data on this indicator.
Are there any interesting approaches or best practices you know of?	Queenstown Lakes District Council's (QLDC) approach to the region's rapid growth has included a variety of community consultation initiatives and data gathering metrics, which the researchers consider to be best practice in that they are establishing baseline social and environmental indicators in the region. A number of publications examining the state of tourism in the region, the town's vision for its long-term 'Masterplan', and reports examining resident's quality of life (QLDC's inaugural QOL Survey 2018) have been commissioned and released in recent years. Through these publications, the QLDC can establish baselines for future comparison and measurement. These are essential starting points from which to develop and monitor meaningful community-focused policies and practices, and their impacts over the long-term.
What are your recommendations for the industry or authorities with regard to the monitoring of overtourism?	Our primary recommendation is to define the key stakeholders and identify the most important and meaningful indicators for that specific destination. As each destination is unique, we strongly recommend that indicators be determined at a local/regional level using a 'bottom-up', rather than 'top-down' approach. This could be supported by: (1) the development of general frameworks and examples that destinations could draw upon to inform their decision-making, which would include key categories of indicators and sample criteria; and

	(2) the development of a guide for destination communities regarding how to go about identifying and establishing quality indicators, without strictly determining the indicators themselves (i.e., a guide to the process rather than the outcomes). These might be some of the best ways to support unique communities and their needs on a larger scale without trying to uniformly impose set indicators for diverse destinations. These approaches could be used to develop specific baselines for social and environmental standards in a destination and for continued monitoring over time. We recommend that, at a minimum, this monitoring should include: 1) Social baselines. This includes, but is not limited to: quality of life of impacted stakeholders, the visitor experience, the destination image, social exclusion, changes in place identity, local tensions, perceptions of overcrowding, inappropriate social behaviours, and psychological (ill-being) issues related to overtourism. 2) The built environment. This includes, but is not limited to: cost of regional infrastructure upkeep, price of real estate (relative to average income), economic inequalities, living conditions of residents, impacts of short-term accommodation options (e.g., Airbnb) on residential housing markets, and traffic density and safety statistics. 3) Environmental standards. This includes, but is not limited to: collaborations between local council and environmental researchers to create a task force to examines the impact of tourism on the region's water quality, pollution, waste, native flora and fauna (e.g., in NZ, wild bird populations in particular), farming run-off, erosion, new land developments, and noise in protected/conservation areas. 4) Openness to recommendations and publication of new data that emerges as the destination changes and evolves. 5) Agreement on acceptable levels of change across key indicators and clear frameworks for immediate actions and strategies, and responsible parties, in response to thresholds being breached or concerning trends. 6) Clear framework for regular (e.g., quarterly, annually) review of all indicators in a holistic manner (e.g. looking at all data together, rather than in piece-meal fashion). Ensuring that all data is 'normalised' in relation to that destination, rather than discussing it in absolute terms (e.g., rather than visitors numbers, examining ratio of visitors to residents; rather than absolute cost of housing examining this in relation to average incomes, etc.). We recommend that all indicators be evaluated in this way to provide adequate context for interpretation, as well as potential comparisons with other destinations.

4.5 Santorini (Greece)

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Description of the case	
Short description of the case	**The Island of Santorini, Municipality of Thira, Greece** Santorini is one of the most well-known romantic island destinations worldwide and a famous Greek volcanic island. It belongs to the Cyclades complex of islands and is located in the southern part of the Aegean Sea. For many years, Santorini has been known for its dramatic sunsets, breath-taking views over the volcano of Thira, the iconic white Aegean houses with the blue-coloured domed roofs, archaeological sites, churches and culinary products (such as the white grape variety of Assyrtiko, the small-shaped tomato of Santorini, local cheeses etc). The island of Santorini consists of a unique geological phenomenon, as in its current form (the island) is what resulted of a tremendous volcanic explosion, which took place around the 16th century BC. Santorini is all that is left after this explosion from the initial island of "Strongyli" (in Greek "round-shaped" and Santorini's first ever name). This has been recorded as one of the most powerful geological and volcanic explosions in the history of earth and almost 75% of the island was sunk to form today's volcanic crater (Caldera). It must be noted that due to this volcanic explosion, most of the Minoan Palaces, in the island of Crete, were completely destroyed (GNTO, 2018). Once a commercial port, although of small scale, Santorini was mostly known for its position as a connecting point for trading of agricultural products (Apostolaki, 2007). The island started to record the first visitors for tourism and recreational purposes just few years before 1960, when, at the same time, tourism began to emerge as a promising economic sector across other parts of the country. Tourism further developed in the island in the 1970s and from this point onwards, all other sectors of the local economy (agriculture, fisheries, services and construction) seem to have assisted the tourism boom. From an international, aviation inbound perspective it seems that Italy is the most important market for Santorini's tourism. Data from the Tourist Observatory of Santorini (2017) show that in 2016, 2.100 charter flights landed on the island, carrying a total of 113,033 passengers. Second most important market is the UK with

	a total number of 1.323 charter flights and 109.141 passengers, followed by Austria (475 flights / 30.475 passengers). Although the airport of Santorini is an international airport and of a capacity to welcome an increasing number of passengers every year, statistics show that the island's port is the point of arrivals for more than half of its visitors. In 2000 domestic ship arrivals accounted for 410.878 passengers (55.34% of total arrivals), 520.535 (63.79%) in 2005, 572.990 (62.53%) in 2010 and 801.669 (52.67%) in 2015. The island of Santorini is also strongly positioned in the global tourism market as the perfect wedding destination, especially among Asian and Chinese nationals. According to recent data from the Greek National Tourism Organisation (2018) the Lonely Planet guide (2018) and the Municipality of Thira (2018) it is estimated that more than 500 wedding ceremonies take place on the island on a yearly basis. Since the early stages of tourism development on the island of Santorini, there was mostly incremental planning as a response to fast paced development trends rather than a holistic strategic framework able to provide the destination with effective long-term planning. Having said that that, this is true for many destinations developing their tourism in the second half of the 20th century. In our investigations and similar to other destinations in Greece, Santorini has perceived issues with public administration structure and support from the Greek state. It is argued that the local administration and generally the responsible authorities for monitoring, developing and managing increasing tourism has fallen short in anticipating the ever-growing flows of tourists. Although in the past few years the local administration is raising its concerns on this "over-development" or even "over-tourism" not much has been done as tourism development initiatives are mostly expected to be government centric. It is evident that the local population and community in Santorini is becoming increasingly aware of the various impacts (socio-cultural, economic, environmental) and the multi-faceted consequences that tourism activities bring to the island. As these negative impacts are now starting to affect also the visitors' experience and satisfaction, local people and businesses alike are blaming not over-tourism *per se* but the lack of infrastructure, investments, weak governance and loose regulations in place by relevant authorities. This provides a chance for further research on governance issues relating to managing areas with potential over tourism issues.
Main challenges	In the past few years Santorini has been experiencing a rather "unique" situation when it comes to tourism, especially during the peak-season summer months (June-September): tourism numbers are rapidly increasing year by year, reaching 2.5 million arrivals, (83% growth over the past few years) plus day trips, in 2017 (Smith, 2018), overnight stays also sky-rocket in 2017 reaching 5.5 million (66% growth, compared to 3.3. million in 2012). Cruise tourism has contributed considerably to multiple effects of overcrowding in the island. According to GTP (2016) 790.000 cruise ship passengers visited the island in 2015 (carried by a total of 636 ships). The latter figure records an increase of 7% compared to 2014. Prakash (2018) estimated that during 2015's high season almost

	18.000 cruise visitors arrived on the island per day. However, due to recent capacity restrictions, numbers have been stabilised to around 620.570 visitors in 2017, according to data from The Greek Observer (2018), SEEN (2019). Alarming signs include the following: • spreading of visitors and tourists to areas outside the "usual" touristic spots in a quest to find accommodation, • local people renting their houses and properties through Airbnb draining the market of available residential properties, • increasing number of cruise ships docking on the island's main port to unload passengers just for few hours touring the island, • traffic and public transport congestion as well as port congestion, • complaints from the community about tourists, • physical overcrowding, especially during the hours of the sunset, when visitors are queuing-up to take a photo, • increased levels of prices
Tourism data available	Airbnb webpage, www.airbnb.com , Last accessed 10.02.2019 Apostolaki (2007), Research Project "Sustainable Development in the island of Santorini" - , Available at www.itia.ntua.gr/dafni, Last accessed 15.02.2019 Greek Statistics Authority (2019): www.statistics.gr, Last Accessed 12.01.2019 Greek Travel Pages (2019) online review of listed companies found at www.gtp.gr , Last Accessed 10.02.2019 Greek Travel Pages (2016). Santorini to Limit Cruise Traffic, Visitor Numbers. Last accessed D 12.2018, from:https://news.gtp.gr/2016/02/29/santorini-limit-cruise-traffic-visitor-numbers/ Hellenic Chamber of Hotels (2019) www. http://www.grhotels.gr/EN/Pages/default.aspx , Last Accessed 10.02.2019 Prakash, A. (2018). Santorini: Why Greek island is limiting number of tourists. Retrieved July 26, 2018, from Overtourism: impact and possible policy responses 217 https://www.news.com.au/travel/world-travel/europe/santorinis-tourism-numbers-are-growing-but-is-that-actually-a- good-thing/newsstory/058a52d0a38409f370af652ed37150b9 Santorini web portal: www.Santorini.gr,Last Accessed 10.02.2019 Santorini web portal: www.santorinipress.gr, Last Accessed 10.02.2019 Santorini web portal: www.santonews.gr, Last Accessed 10.02.2019 SEEN (2019) Association of Passenger Ship Operators, Cruise and passenger statistics: https://www.elime.gr/images/Docs/Krouaziera/2018_Stoixeia_Krouazieras_Synolika_Xoras.pdf, Last Accessed 10.02.2019

	SETE (2019) InSete Intelligence, Basic Tourism Figures of South Aegean Region, Available at: http://www.insete.gr/Portals/0/statistics/Perifereies/GR/South_Aegean_Region2017.xlsx, Last accessed 11.02.2019 SETE (2018) Study on Nautical Tourism Economic Impact http://www.insete.gr/Portals/0/meletes-INSETE/06/2018_Nautical_Tourism_Economic_Impact.pdf , Last Accessed 12.01.2019 SETE (2017) Intelligence Report http://www.insete.gr/portals/0/meletes-INSETE/01/2018_SymvolhTourismou-2017_EN-Summary.pdf SETE Statistical Bulletin No 49, January 2019 http://www.insete.gr/Portals/0/statistics/2019/Bulletin_1901.pdf Smith, H. (2018). Greece tourism at record high amid alarm over environmental cost. Last Assessed 27.12.2018, from https://www.theguardian.com/world/2018/jun/03/greece-tourism-at-record-high-amid-alarm-over-environmental-cost Smith, O. (2018). Greece tourism numbers: Europe's latest victim of "overtourism". Last Accessed 27.12.2018, from http://www.traveller.com.au/greece-tourism-numbers-europes-latest-victim-of-overtourism-h110v6 Spilanis, I (2017) *Depiction of tourism development activity and its consequences on destinations: A SWOT analysis and alternative policy scenarios*, University of the Aegean Report, Tourism Observatory of Santorini. Thira Municipality Official Web Site: https://www.thira.gov.gr/EN , Last Accessed 10.02.2019 Thira (Santorini) Municipality, Official Tourism Portal: https://mail.santorini.gr/index.php?/en/ , Last Accessed 10.02.2019 The Greek Observer. (2018). Cruise ship arrivals and passenger visits drop in 2017. Last accessed 26.01.2018, from http://thegreekobserver.com/greece/article/32380/cruise-ship-arrivals-passenger-visits-drop-2017 WTTC (2018) Travel and Tourism Economic Impact 2018 Greece, Available at https://www.wttc.org/-/media/files/reports/economic-impact-research/countries-2018/greece2018.pdf , Last accessed 12.02.2019 www.Tripadvisor.com

Conclusions: Reflection on the process	
What are your main conclusions from the experience made with regard to measuring overtourism?	According to the local community, overtourism does not exist, however, data suggest otherwise. This could be proven simply by looking at statistics or negative tourist reviews. In addition, we felt that there is inadequate comprehension of the latitude of overtourism as a term, thus, making it difficult, first to identify it and secondly to measure it. For the community of Santorini, overtourism represents a negative stereotype, denoting bad services, which is why the locals resist to recognise the problem, even fearing that this will attain a negative image and reputation for their place as a tourism destination. It would be interesting to see whether this is a re-occurring pattern in similar, small, established island destinations. Further research would be beneficial to be undertaken on the merits

	of disseminating relevant information on the meaning and context of overtourism and whether this could change of attitudes of local community towards the phenomenon.
What are the main challenges/limitations identified?	1. Over-tourism is not widely accepted or recognised as a term or as a reality among all stakeholders in the island. This is very interesting coming from a destination that has increased its markets by 83% in the last few years and was been forced to reduce the cruise passenger disembarkation by almost 35% to avoid congestion. The moment the term over-tourism was mentioned a certain tension was evident denoting that the society has not accepted this as being an issue. For the locals the problem is hardly overtourism but rather the lack of appropriate infrastructure and investments to manage the phenomenon. 2. The collection of secondary data is rather controversial. Even though there are very good efforts of various organisations, namely the University of the Aegean with the tourist observatory, or the reports from SETE as well as well refined reports from the Region of South Aegean and more, these don't always agree and are designed for general and in most cases marketing purposes. There is little contemporary data on social impact assessment which in this case would be very interesting or data that looks specifically into overtourism impacts over time. Hence a special redirection on data collection would yield more relevant results. 3. There are seemingly important infrastructure issues (especially the port) which is probably to be expected as tourism flows have risen dramatically in a short amount of time in which case such issues could be deemed as expected. This is a rather subjective issue as it requires the intervention of government authorities (at least this is the issue in Greece) and this cannot be predicted or controlled in such a study.
Are there any interesting approaches or best practices you know of?	Currently, the only remedy approach is the restriction of daily number of cruise passengers to 8.000. No other best practices have been identified to the best of our knowledge.
What are your recommendations for the industry or authorities with regard to the monitoring of overtourism?	<u>Monitoring</u> 1. It is recommended that the existing good practice of Tourism Observatory of Santorini (University of the Aegean) should also include a special provision of overtourism-specific data collection. 2. Consider the recognition of overtourism as a positive force of change, rather than an obstacle, in the existing Strategic Framework of the Region of South Aegean. To us the recognition of a problem is a crucial pre-requisite to solve the actual problem and plan for it. 3. Consider A Contingency Plan to support a Resiliency Management Framework. The reason why this spotted as important is that Santorini is officially classified as a volcanic island, which could cause all sorts of natural disaster scenarios. The overcrowding of such a destination calls for safety precautions, which could

	be another interesting planning dimension of overtourism. The collection and monitoring of reliable data should be enforced towards this end. <u>Other, relevant, proposals to consider</u> 4. Inclusive governance with enhanced communication between stakeholders. This should be facilitated by cross-sectoral government entities. This will allow for open communication, faster resolution of problems and less bureaucratic drawbacks on decision-making 5. Revisiting current zoning practices to reflect pressure-relief policies addressing overtourism 6. Coaching the local stakeholders towards sustainability as a way of life, rather than a choice for further development.

4.6 São Paulo state coast (Brazil)

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University of Sao Paulo, Brazil

Description of the case	
Short description of the case	Fifteen coastal cities in the state of Sao Paulo are the destination for more than 10 million people in high season (November through February), by road (car and buses). The cities are granted the title *estâncias turísticas* since 1947, which allow them to receive state funds for tourism development, as a legal compensation for not allowing industrial plants on their territory and, at the same time, preserve the environment and the beaches.
Main challenges	For the past 70 years, and more importantly, the last 20 years, projects presented by the cities' mayors relate to road paving and traffic signing, street lighting, sanitation and – oddly as it can be – city portals. With few exceptions, almost all the projects ignore tourism and the effects of demand increase in peak season. Poor management evidences abound – and every year the headlines on major newspapers and TV stress the road congestion rates, water restriction, closed beaches due to pollution, violence and public health issues as crowded hospitals and virus contamination. Beaches are the main leisure destination for Brazilians, regardless of economic classes, and this behaviour is observable since 1940s.
Tourism data available	Information on tourism for the state of Sao Paulo on city or regional level is rare. Except for data collected by the national statistics office, local databases do not exist or, when they do, it is impossible to access the data collection method allowing comparison. Reliable data sources are, however, those related to urbanization, public expenditures and economic profiles of the cities. As Brazilian society evolves, and technology is accessible, data collected by phone companies and similar industries may give us a better understanding of how tourism affects the region.
Further remarks	It is impossible to use, correctly, the term overtourism in Brazil. There is not a single case where the volume of tourists exceeded the carrying capacity of the destination. Political authorities and hotel representatives are, however, using it irresponsibly to create animosity towards the home sharing digital platforms and other digital enterprises investing in Brazil.

Conclusions: Reflection on the process	
What are your main conclusions from the experience made with regard to measuring overtourism?	As stated before, there is no overtourism in Brazil and the chances for this phenomenon to happen here are low. However, the poor management and lack of professionalism managing tourism destinations bring similar consequences to beach cities in Sao Paulo state. As soon as new approaches to measuring tourism positive and negative impacts come to life, it will be important to apply to different Brazilian cities as to avoid deterioration
What are the main challenges/limitations identified?	Brazil is still underdeveloped in tourism. International arrivals represent only 6.3% of the total and the political and economic situation are not helping improve the image as a safe and interesting leisure destination. The main limitation for a deeper understanding is the absence of reliable data on travel and tourism. However, different evidences abound – the volume of families with cars, the oversharing of holiday photos on social network, the exponential growth of home sharing listings and travel blogs "teaching" how to travel on a budget are just some examples.
Are there any interesting approaches or best practices you know of?	The best approach taken in Brazil was made by Espirito Santo tourism state department 4 years ago, when they hired a telephone company to monitor cell phones registration and routes during high season. Adopting strict privacy compliance regulations, this project brought to life a reality that differed completely from the previous assumptions. Length of stay, preferred destinations for day and night, demographics and origin were informed on a detailed report that led to a complete change on state policy, orientations and promotion strategy. The use of this intelligence is available at a cost no one is willing to pay, at the moment, in Sao Paulo state.
What are your recommendations for the industry or authorities with regard to the monitoring of overtourism?	Overtourism is a consequence of different approaches from public and private sector and poor information management. While the public sector slowly understand how tourism works and relates to all other areas of government, private sector (especially airlines and lodging companies) explores the marketing trends and bring attention and people to destinations. It is now a challenge to reconsider how much business is good for a city or a district – not limiting the access for tourists, but anticipating the consequences of more flights, more media exposition, more people talking about it.
Further remarks, comments and learnings	The more knowledge is produced and shared, the better. Even those destinations that are not yet trending or are aiming to become recognized nationally or internationally could benefit from experiences well documented, at the same time issues that were not anticipated in some regions could be spotted and carefully managed before the negative impacts become real and hard to deal.

4.7 Sylt (Germany)

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Description of the case	
Short description of the case	Sylt is a German island in the Nordic sea (North Frisian Island), which is situated close to the border between Germany and Denmark. It is a highly popular destination mainly for domestic tourists. The island has a surface of 99km² and is the biggest of the North Friesian Islands. Due to its exposed position, Sylt is confronted with continuously eroding beaches which means sand has to be brough ashore each season in order to safeguard the coastline. After the Second World War tourism began to develop fairly quickly, particularly between 1960 and 1980 mass tourism developed with high tourist arrivals due mainly to the islands image as a destination for the rich and famous in Germany. Current tourism arrivals are approx. 792.000 tourists (2017) with approx 7.1 Mio. overnight stays and an estimated 423.000 day visitors per year. Currently Sylt has around 18.000 inhabitants which results in a tourism intensity of 395.337. Sylt is a sea-side-resort with several spa facilities, the beaches and clean air attract many different tourism segments, including families, wellness and spa tourists, active holiday seekers, as well as many secondary home residents (weekend tourism).
Main challenges	The Island is a highly seasonal destination with major overcrowded during summer months. Particularly in August the island reaches peak capacities due to the summer holiday season. The winter months are less popular except for the Christmas and New Year season. Tourism is the biggest source of income for the island and should be supported sustainably, while protecting the natural resources of the destination. One of the main challenges is that island properties have been mostly converted to short-term rental properties (holiday homes / apartments) and high demand and real estate speculation has driven the prices so high, that most local residents have been displaced from the island. Furthermore, seasonal workers also pay exorbitant rents for poor housing conditions, some even live on campsites due to lack of affordable housing. There is limited capacity to build new houses and many native residents (estimated at 4.5 thousand people) who still work on the island now have to commute to Sylt everyday via train as they can no longer afford to live on the island.

	Consequentially the train as the main form of transportation to the island is used by tourists, commuters and inhabitants resulting in long waiting times during peak season. Additionally there have been many problems with the reliability of the train service, including train cancellations, which are currently being addressed by rail modernisation. However, this is a long term process and will not alleviate the problems until at least 2025.
Tourism data available	- personal interviews - local media - Insel Sylt Tourismus-Service GmbH (n. d.): Tourismus-Statistik 2017, https://images.insel-sylt.de/2018/05/Tourismusstatistik-2017.pdf - IQAir (2018): Westerland - Sylt air quality index (AQI) and air pollution information, https://www.airvisual.com/germany/schleswig-holstein/sylt/westerland - Statistisches Amt für Hamburg und Schleswig-Holstein (2018): Beherbergung im Reiseverkehr in Schleswig-Holstein 2017 - Statistische Amt für Hamburg und Schleswig-Holstein (2018): Bevölkerungsentwicklung in den Gemeinden Schleswig-Holsteins 2017, https://www.statistik-nord.de/fileadmin/Dokumente/Statistische_Berichte/bevoelkerung/A_I_1_j_S/A_I_1_j_17_SH.pdf - Statistisches Bundesamt (2016): Bruttoinlandsprodukt 2018 für Deutschland, https://www.destatis.de/DE/PresseService/Presse/Pressekonferenzen/2018/BIP2017/Pressebroschuere_BIP2017.pdf?__blob=publicationFile - Sylt Marketing GmbH (2018) - Tripadvisor (2018): Sylt Sehenswürdigkeiten, https://www.tripadvisor.de/Attractions-g198651-Activities-Sylt_North_Friesian_Islands_Schleswig_Holstein.html - Umweltbundesamt (2018): Jährliche Auswertung Feinstaub (PM10)- 2017, pm10_2017.xlsx - World Travel & Tourism Council (2017): Travel & Tourism Impact 2017, https://www.wttc.org/-/media/files/reports/economic-impact-research/regions-2017/world2017.pdf

Conclusions: Reflection on the process	
What are your main conclusions from the experience made with regard to measuring overtourism?	Many of the indicators are certainly a good basis to analyse overtourism. However, some of the more unconvential indicators (such as readers letters from newspapers) are a good idea but data is difficult to obtain. Surprisinlgly data regarding hotel beds and air travel were also difficult to access in our case. The main challenges in this case are quite destination specific, based on the island infrastructure und hence other cases mayalso require very case specific indicators. The indirect results of the high rent and realestate prices result in high commuter rates which are difficult to measure. A possible solution could be a tiered indicator base with must have, nice to have and destination specific open inidicators.
What are the main challenges/limitations identified?	Identifying specific destination indicators is one challenge, obtaining those then another. For example, the commuter statistics would be highly relevant for our island destination case study, however obtaining reliable data

	is very difficult and is currently merely an estimation as no actual data is available. Currently European data privacy policies can also inhibit the collection of some data.
Are there any interesting approaches or best practices you know of?	We are not aware of any specific tools to measure or monitor overtourism in order to strategically combat the problem. However, the local government shows efforts to offer subsidized housing for workers and there are efforts to stop the increase of real estate prices and the creation of more holiday homes.
What are your recommendations for the industry or authorities with regard to the monitoring of overtourism?	Measuring overtourism should include both qualitative and quantitative research until a stable set of indicators has been identified. All stakeholders should be included in the research process in order to capture destination specific issues and indicators which may not be apparent at first sight to external researchers.

4.8 Venice (Italy)

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Description of the case	
Short description of the case	Venice has been a well-known tourism destination in Italy for decades. With almost 10 million overnight tourist arrivals in 2017, a growth of 15.76% since 2012, the city offers 49'815 rooms in 1'188 hotels. The historical city centre alone (7.97 km^2) has 406 hotels with 16'164 rooms. The share of daily visitors is also extremely high, 66% of all arrivals. Cruise ships are an important segment of Venice tourism, in 2017, 1'424'812 cruise passengers arrived in the Port of Venice (https://www.vtp.it/en/company/statistics/). The main tourist attractions are the Doge's Palace, Musica a Palazzo, Scuola Grande di San Rocco, Basilica Santa Maria Gloriosa dei Frari, and the Teatro la Fenice. The tourist sights are concentrated in the historical city centre, which is only 7.97 km^2. This concentration leads to tourist flows issues. The city relies a lot on the international tourism, 76.4% of overnights arrivals are international arrivals.
Main challenges	The city is facing a major challenge to handle the huge tourist numbers, particularly in the city centre. The local population in the city centre, 261'321, seems to be more and more revolting against the influx of mass tourists, particularly against large cruise ships that flood the streets of Venice with a massive number of tourists. It is not rare to see messages such as "No big boats" in the streets. The Venetian tourism authorities have not found an effective solution to handle mass tourism in the city, yet. Not only are the streets and main attractions becoming overcrowded, and but the existing transportation system (vaporetto) is also short of ferrying tourists around the city, exacerbating overtourism in some iconic attraction cites. It is worth noting that tourism demand in Venice is subject to high year-round seasonality, striking demand changes oscillating between peak seasons and off seasons. A certain amount of supply in various tourism and hospitality sectors that can balance the demand on the year average by no means guarantees the same relationship hold in peak seasons or off seasons, ending up with not only overtourism but also, perhaps, undertourism (i.e., a shortage of demand).
Tourism data available	- The Italian official database: http://dati.istat.it - TripAdvisor: https://www.tripadvisor.com/ - Official website of the municipality of Venice: https://www.comune.venezia.it/it/content/superfici-amministrative

	- WTTC report on City travel & tourism impact: https://www.wttc.org/-/media/files/reports/economic-impact-research/cities-2018/city-travel--tourism-impact-2018final.pdf - Inside Airbnb: http://insideairbnb.com/
Further remarks	Not only is tourism a rather complex economic, social and geographical activity, but it also engages various stakeholders in its development, ranging from tourists from afar, local residents and governments, tourism and hospitality businesses and enterprises, as well as third-party non-profits and international organizations. In particular, tourism supply, which includes the supply of infrastructure, cannot be altered in the short run, while demand can surge. Thus, how overtourism is defined and for the sake of what stakeholders in what time period should precede the measurement of overtourism. We do not subscribe to a view that a consensus of what is overtourism exists, but rather that defining overtourism depends on who are the stakeholders.

Conclusions: Reflection on the process	
What are your main conclusions from the experience made with regard to measuring overtourism?	With an average of 26'030 overnight visitors per day and 97'868 hotel beds available (not including Airbnb beds), we can see that the hotel beds supply exceeds the demand. Even in the peak month, there is only 49'131 visitor arrivals per day, which is almost the half of the hotel beds available. Moreover, there is no regulation for hotels or Airbnb. These cold beds can lead to the increasing of the rents and the displacement of the local population. Venice city centre is very small, only 7.97 km^2, which leads to extreme concentration of tourists. This concentration leads to tourist flows issues. In order to counter these issues, the government has already implemented some measures such as flow management gates during peak periods. The fact that the top 5 attractions on TripAdvisor gather 59.12% of the comments shows that these attractions are highly visited. This can also lead to flow issues and the monuments degradation. The tourism is concentrated during the 4 peak months, with 5'534'421 tourist arrivals on 9'500'934 for the whole year. This concentration can lead to the saturation of the tourist places, the irritation of the local population, the increase of the prices and the dissatisfaction of the tourists. But surprisingly, the level of negative comments on overtourism on TripAdvisor is relatively low and the tourist arrivals continue to grow. This suggests that Venice has not reach the stagnation point yet. There is a higher criminal rate in Venice than in Italy.
What are the main challenges/limitations identified?	Venice is a small city, and thus measuring overtourism by referring to the city-level aggregate tourism demand versus supply is not sufficient. We need to track the geographical flows of tourists between major attraction sites as well as between transportation hubs across the city in a timely manner. However, obtaining these real-time data is not easy.

	Moreover, there is no exact data about the number of visitor arrivals, so the calculations have been based on the overnight tourist arrivals. This means that many measures are underestimated.
Are there any interesting approaches or best practices you know of?	Carrying capacity calculations: physical and psychographic, using mobile phones to track tourist flows between major attractions and transportation hubs across the city and tourists' duration at these sites; using image analytical tools to analyze the photos taken in Venice on the Internet or social networks to estimate overtourism
What are your recommendations for the industry or authorities with regard to the monitoring of overtourism?	For the industry, tracking and analyzing tourism demand based on historical data as well as real-time data are equality important, which helps the industry (particularly hotels, restaurants, and transportation) plan its supply in advance. For the authorities, understanding that overtourism cannot be reduced to a static metric that assesses demand exceeds supply is critical. Overtourism is an intertemporal deviation of tourism demand from the capacity of supply, and thus smoothing out demand over time, specifically between peak seasons and off seasons, is vital. Also, overtourism might be interpreted and perceived differently by different stakeholders in tourism development, therefore striking a balance between the benefits and costs of tourism development in the long term is recommended. Demand management: revenue management approach, commonly used by airlines and hotels, can help keep optimal level of tourists while maintaining the economic benefits of tourism industry. That is, destination capacity should be limited (e.g., travel pass, admission ticket) and dynamic pricing with various rate fences can be applied. Reservation system helps to forecast real-time demand and allocate proper level of inventories for differential prices.
Further remarks, comments and learnings	Negative TripAdvisor reviews might not be the best indicator to measure overtourism, because of the relatively low frequency in the case of Venice. It is the local population and local infrastructure that cope with uncontrolled mass tourism, hence more indicators should be incorporated about their perception or measurement. The city of Venice has already taken some measures to regulate tourism and improve the cohabitation between the tourists and the inhabitants. During the International Year of Sustainable Tourism for development, the campaign #EnjoyRespectVenezia has been launched. The #EnjoyRespectVenezia page (https://www.comune.venezia.it/en/content/enjoyrespectvenezia) provides some information for the tourist to enjoy a more sustainable trip in Venice (behavior guidelines, alternative itineraries, daily estimation of visitors for the year 2018, etc.). In addition to that initiative, an entry tax for daily visitors has been approved recently. The daily visitors entering in Venice will be charged between 2.5 to 10 euros depending on the time of the year. Moreover, there is no statistics on the number of visitors arrivals in Venice, this tax will help to provide these statistics (https://www.theguardian.com/world/2018/dec/31/venice-charge-day-trippers-up-to-10-enter-city).

4.9 Vienna (Austria)

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Modul University Vienna, Austria

Description of the case	
Short description of the case	Vienna's tourism industry is constantly growing, in 2017 the number of bednights broke through the 15 million barrier, and the tourism board is putting plans into place to break the 20 million barrier by 2020. The Vienna Tourist Board is marketing to tourist segments focusing on its cultural and imperial heritage, its musical past, its recreational facilities and its modernism (ranked 2nnd on the smart city index by Roland Berger). Vienna is also among the world's most popular congress cities And thus attracts a lot of business travel as well. Vienna's location within Europe is one of the reasons for its popularity as it connects as a gateway western to eastern Europe (18 new direct connections from an to Vienna international airport in 2017).
Main challenges	Growing tourist numbers create an issue in cities around the world. Although Vienna has many attractions scattered throughout the city, there are certain point in the city centre where the number of visitors might pose an issue. Compared to other cities, however, the sight and point of interests are not all concentrated in one point in the city center, which allows to spread out the tourism flows.
Tourism data available	Tourism review – Vienna Tourist Board, Marketing plan, Statistics & Market Research of the City of Vienna, Traffic statistics, Chamber of commerce, TourMIS.

Conclusions	
What are your main conclusions from the experience made with regard to measuring overtourism?	Finding indicators that solely measure over tourism is difficult. Indicators have to be put into relation to the destinations capacity – which in turn is also hard to define. General and economic indicators give an impression about the volume of tourism – but not its repercussions. For many indicators the reason of choosing them was clear, but not applicable to the case. E.G real estate price developments – which in this case are due to other, non-tourism related action.

Are there any interesting approaches or best practices you know of?	The area of interest. For the case of Vienna as a total overtourism may not be the issue yet, however, looking at specific sites individually, over tourism may become visible. Additionally, more surveys asking for the resident's opinion should be taken into account and making use of monitoring tools to understand when and where crowdedness exists.
What are your recommendations for the industry or authorities with regard to the monitoring of overtourism?	Indicators such as reinvestments in infrastructure should be included to measure sustainability. If indicators show healthy growth (capacity no reached / no growth in negative sentiment) there is no indication of overtourism

5. Comparison of indicators

By comparing the indicators of the different case studies and analyzing the comments and conclusions drawn by the authors of the case studies, findings on the informative value and the limitations of the indicators applied could be derived. This section presents the main results of the comparison of indicators. It is structured according to the framework for the analysis starting with the General indicators and corresponding relative indicators (5.1), presenting some experimental indicators (5.2) afterwards, before looking at the indicators from the WTTC-study (5.3) and the additional indicators proposed (5.4). References to the case study reports are given in brackets with the name of the case.

5.1 General indicators

The general indicators are captured to receive an overview of the destinations' key features and to calculate relative indicators (ratios). These twenty indicators allow a comparison of the cases and give a first impression of the character of the destinations.

Destination and tourist centre area

The destination area in the cases analyzed ranges from 26.8 km² in Venice (Italy) to 8,705 km² in Queenstown (New Zealand). The actual tourist centre is usually much smaller and ranges from 0.1 km² (Queenstown) or 0.4 km² (Lucerne) up to 19 km² (Byron Bay), 51 km² (Sylt) and 73 km² (Santorini).

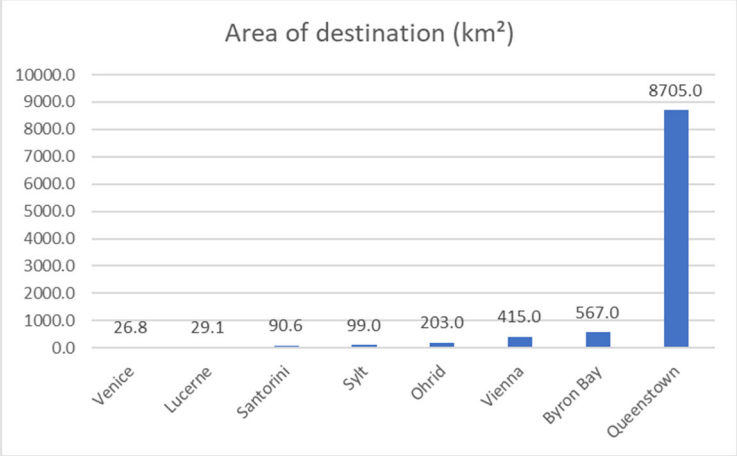

Figure 2: Area of the destinations (km²)

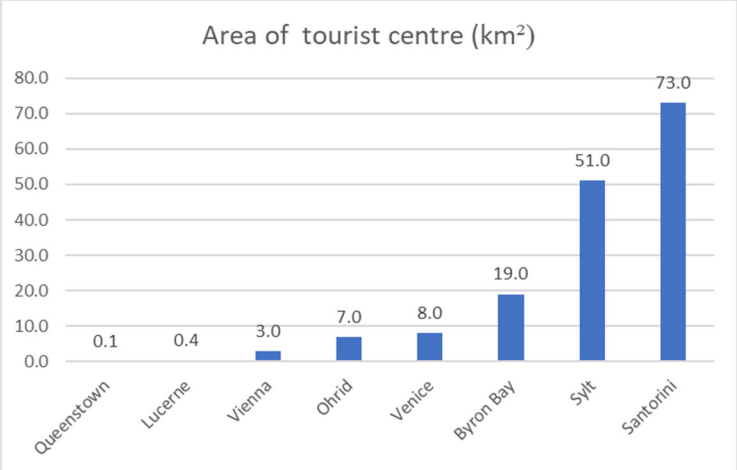

Figure 3: Area of tourist centres (km²)

The share of the tourist centres in the destination areas is illustrated in Figure 4. The largest shares of tourist centre area within the destination were defined for Santorini (80.6%), Sylt (51.5%) and Byron Bay (29.7%), while Vienna (0.7%) and Queenstown (0.001%) exhibit the smallest shares of the tourist centre area within the destination.

Since Venice is a small city, measuring overtourism by referring to the city-level aggregate tourism demand versus supply is not sufficient. The authors suggest tracking the geographical flows of tourists between major attraction sites as well as between transportation hubs across the city in a timely manner (Venice).

In addition, the case of Queenstown shows that the definition of spatial boundaries is crucial when referring tourism data to specific areas. The physical 'Queenstown region' is not uniformly defined and the Queenstown Lakes District (QLD) includes areas, which are not subject to the same issues or pressures as the central town of Queenstown. Additional data are needed in order to clearly demarcate what comprises the area of 'Queenstown' versus the larger district as the issues encountered in these areas can vary greatly in relation to specific tourism pressures/impacts (Queenstown).

In the case of Santorini the main island was defined as the tourist centre area, while the municipality area of Santorini, which includes the two inhabited islands of Santorini and Therasia as well as the uninhabited islands of Nea Kameni, Palaia Kameni, Aspronisi, and Christiana, was used for the definition of the destination area (Santorini).

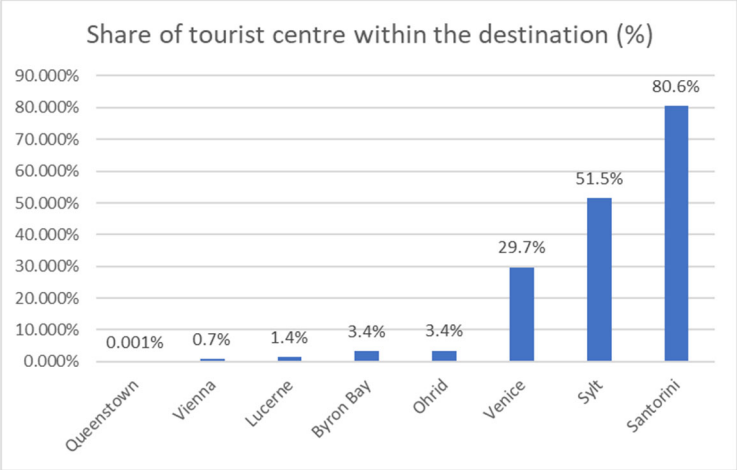

Figure 4: Share of the tourist centre within the destinations (%)

Since the destination area is normally not in line with political boarders, the size depends on the definition of the destination. The same is true for the tourist centre, which is often not clearly defined. As a result, the definition of the destination area and the area of the tourist centre were handled differently and made a comparison difficult. The definition of the area also affects the share of the tourist centre area within the destination area of course as well as all relative indicators related to the area. Consequently, much depends on the spatial boundaries defined.

Inhabitants in the destination and in the tourist centre

The evaluation of the number of inhabitants indicates that there are big differences when comparing numbers in the destination areas as well as in the tourist centre areas. Vienna exposes by far the highest number of inhabitants (1,800,000), followed by Venice (853,552) with less than half of the inhabitants of Vienna. The population in the other cases ranges from 81,401 inhabitants (Lucerne) to 15,550 inhabitants (Santorini).

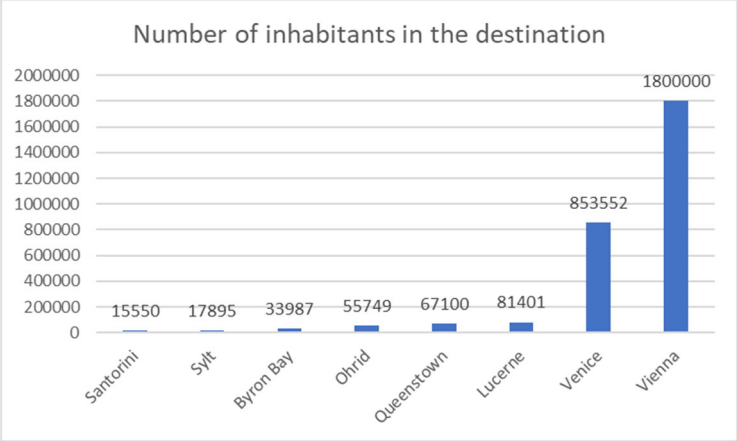

Figure 5: Number of inhabitants in the destinations

Similarly dispersed numbers of inhabitants can also be observed when looking at the number of inhabitants in the tourist centres. In this respect, especially Venice stands out of the crowd with 261,321 inhabitants residing in the tourist centre. The number of inhabitants in the other cases ranges from 1,857 residents in Santorini to 16,465 inhabitants in Vienna's tourist centre. Not in all the cases was it easy to obtain up-to-date data on the current population.

Relative indicator: Inhabitants per km²

Venice has by far the highest population density with 31,849 inhabitants per km², while Queenstown has the lowest population density with 8 inhabitants per km². The most populated destinations are Venice, Vienna and Lucerne.

The most densely populated tourist centres are in Queenstown, Venice and Lucerne. Queenstown has by far the highest population density with 132,500 inhabitants per km², while Santorini has the lowest population density with 25 inhabitants per km² (in 2017).

	Inhabitants per km² in the destination	Inhabitants per km² in the tourist centre
Queenstown	8	132,500
Byron Bay	60	322
Santorini	172	25
Sylt	181	267
Ohrid	275	343
Lucerne	2,797	5,773
Vienna	4,337	5,488
Venice	31,849	32,788

Table 9: Population density in the destination and tourist centre areas

The values of population density might be distorted by the different interpretations of the destination and tourist centre areas. Nonetheless, this indicator is capable of demonstrating the differences in the population density ranging from lightly populated to densely populated areas. A clear definition of the boundaries is crucial since otherwise all relative indicators related to the area might give a distorted picture.

Population development

All cases analyzed exhibit a slight increase in the population from 2012 to 2017 (Figure 6). The highest population growth in this period can be seen in Vienna (+12.4) and Santorini

(+11.7%). Only Sylt (0.5%) and Venice (0.9%) exhibit a population development, which is under 1%.

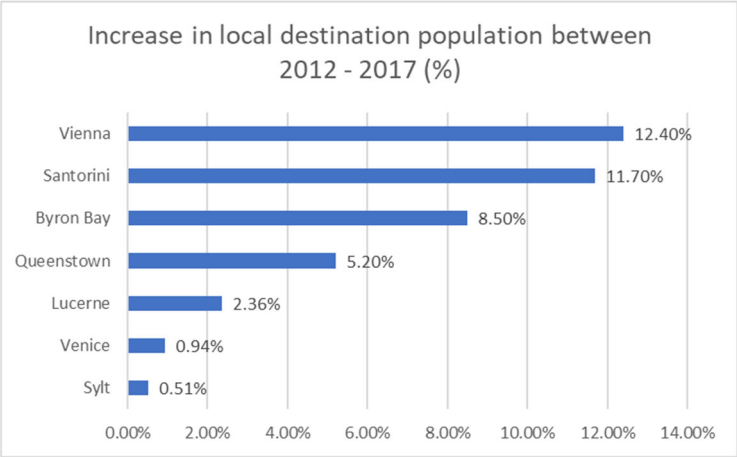

Figure 6: Increase in local destination populations between 2012 and 2017 (%)

Population development can be an indicator of the prosperity of a region. A strong growth of population can add to perceived problems of overtourism and enhance the competition when it comes to the use of existing infrastructure. Concrete statements are only possible when there is sufficient and current data available. For example in the case of Ohrid, the last correct census was done in 2002 and in the case of Santorini, the authors claim that part of the working population is not registered in official records.

Hotels, hotel rooms and hotel beds

The highest numbers of hotels can be found in Venice (1,188), Vienna (434) and Santorini (364), while the highest numbers of hotel rooms are in Venice (49,815), Vienna (33,610) and Ohrid (11,333). Also in the numbers of hotel beds Venice (97,868), Vienna (66,352) and Ohrid (29,113) are leading. Byron Bay indicates the smallest number of hotels (18) as well as the smallest number of hotel rooms (556), while Lucerne has the smallest number of hotel beds (6,019) from the cases with data available.

	Number of hotels	Number of hotel rooms	Number of hotel beds
Byron Bay	18	556	-
Ohrid	-	11,333	29,113
Queenstown	38	3,340	-
Lucerne	55	3,128	6,019
Sylt	77	-	23,361
Santorini	364	8762	17,295
Vienna	434	33,610	66,352
Venice	1,188	49,815	97,868

Table 10: Number of hotels, hotel rooms and hotel beds

As not all numbers are indicated, the findings regarding the hotels, hotel rooms and hotel beds are not completely reliable. Nonetheless, they give an idea in which cases the accommodation infrastructure is aligned with a high tourism occurrence. With the increase of alternative accommodation suppliers, the number of hotels and hotel beds loses significance. Referring to this, the New Zealand accommodation survey does not look at total hotel beds only, but instead counts the number of occupants per stay-unit.

Relative indicator: Hotels per km2

Figure 7 shows the density of hotels within the destination areas. The highest number of hotels per km² are to be found in Venice with more than 44 hotels per km² on average. Santorini has slightly more than four hotels per km² and in Vienna (1.046) and Lucerne (1.890) between one and two hotels are located within a km² of the destination area on average. Sylt, Byron Bay and Queenstown exhibit a density of less than one hotel per km².

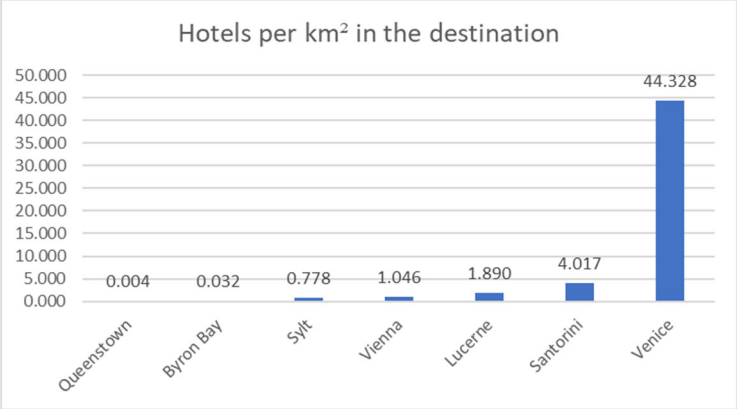

Figure 7: Hotels per km² in the destinations

While the hotel density calculated for the destination areas is rather low, the density of hotels in the tourist centres show a different picture. In this regard, Queenstown exhibits the highest hotel density with 316.7 hotels per km². Venice (149.1), Vienna (144.7) and Lucerne (138.5) present a quite similar hotel density within their tourist centres. Compared with this, the hotel density within the tourist centres of Santorini (5.0), Sylt (1.5) and Byron Bay (0.9) is considerably lower.

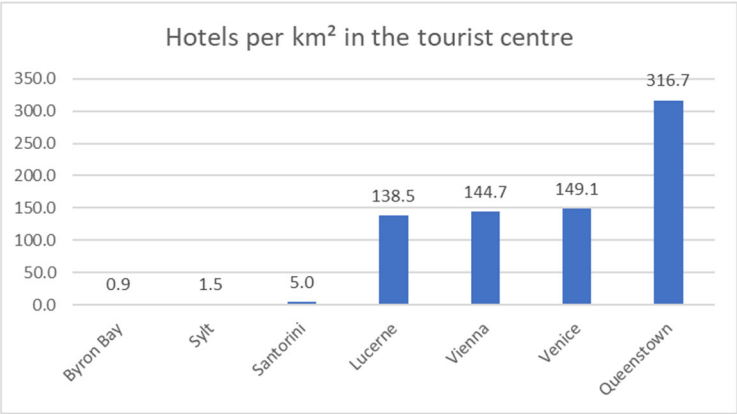

Figure 8: Hotels per km² in the tourist centres

It has to be taken into account that for both density calculations the total number of hotels per case is taken and compared to either the destination area or the tourist centre area. Furthermore, the indicator does not show the concentration within these areas and other forms of accommodation are not considered. Nevertheless, this indicator can offer an insight into the accommodation density within the destination areas and tourist centres.

Tourist arrivals

Figure 9 shows that Venice had the most tourist arrivals in 2017, followed by Vienna and Queenstown. Ohrid, Lucerne and Sylt showed the lowest absolute numbers.

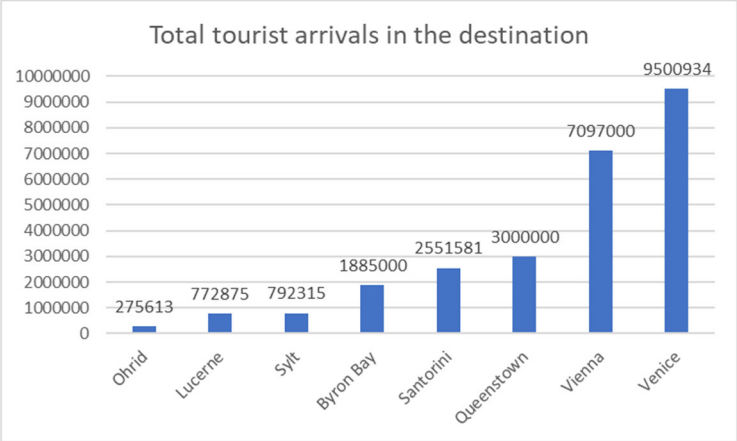

Figure 9: Total tourist arrivals in the destinations in 2017

Tourist arrivals is one of the most common tourism indicators. It has to be considered that not only the data is gathered differently, but also normally only arrivals in hotels are statistically recorded. In the case of Venice, the data recorded in accommodation establishments was claimed to be largely underestimated and in the case of Queenstown, the number published in a news article that differs from the arrivals at Queenstown airport was indicated, because the authors state that many tourists arrive by campervan or avoid measurement metrics in other ways. Without being set into relation with other indicators, the significance of the number of tourist arrivals is rather low.

Relative indicator: Tourist arrivals per km²

Figure 10 exhibits that Venice has by far the highest tourist volume with 354,512 tourist arrivals per km², while the other destinations count between 28,156 (Santorini) and 345 (Queenstown) tourist arrivals per km².

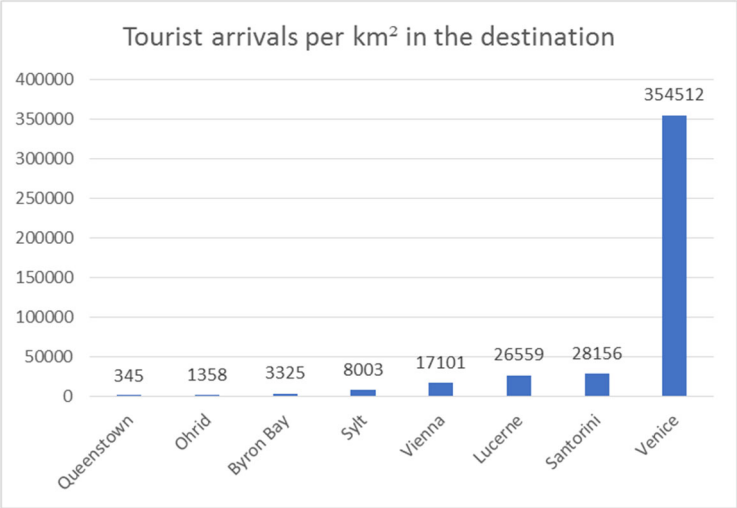

Figure 10: Tourist arrivals per km² in the destinations

If hypothesized that all arriving tourists visit the tourist centres, Figure 11 shows that the number of tourists per km² would be much higher. They would be enormously high in Queenstown with 25,000,000 tourists per km² (not in the figure), followed by Vienna, Lucerne and Venice. Sylt exhibits the lowest number of tourist arrivals per km² with 15,536 tourists per km².

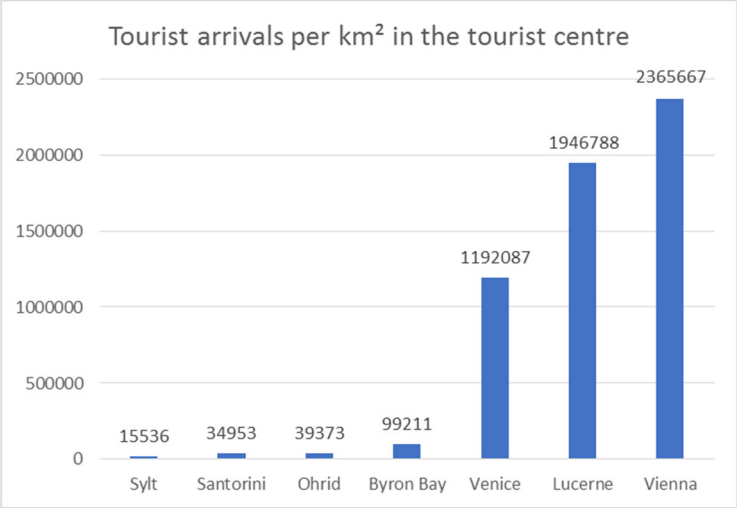

Figure 11: Tourist arrivals per km² in the tourist centres

Tourist arrivals are normally recorded on a district or community level only. Depending on the size of the units covered, the numbers cannot be downscaled to smaller areas. Consequently, numbers of tourist arrivals recorded on a destination level cannot directly be referred to the area of the tourist centre.

Relative indicator: Tourist arrivals per inhabitant

When looking at the number of tourist arrivals per inhabitant in the destination in 2017, Santorini has the highest number of arrivals per capita (164), followed by Byron Bay, Queenstown and Sylt. Vienna exhibits the lowest ratio (4).

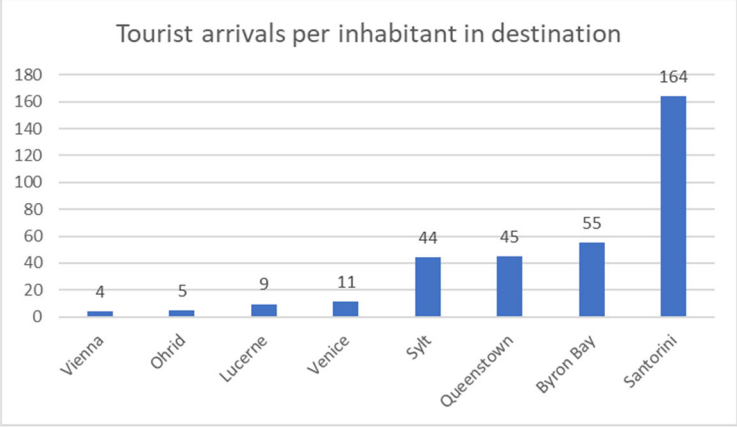

Figure 12: Tourist arrivals per inhabitant in the destinations

If hypothesized that all arriving tourists visit the tourist centres, the ratio between tourists and inhabitants is even more unbalanced. In that regard, Figure 13 shows that Santorini has by far the highest tourist arrivals per inhabitant in the tourist centre, followed by Vienna and Lucerne.

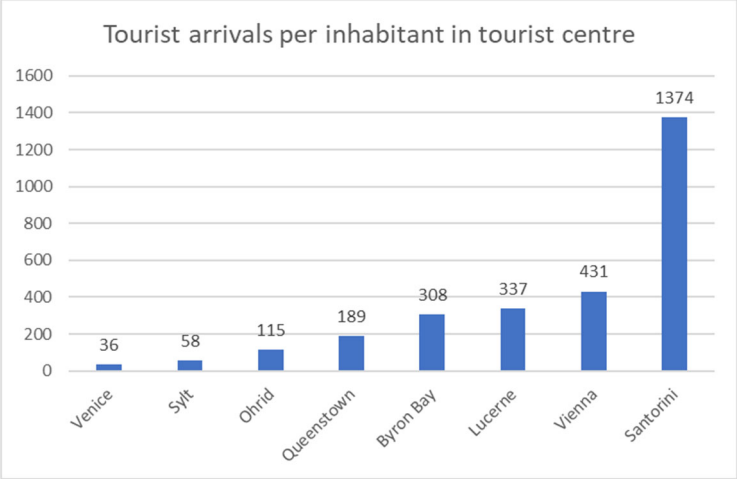

Figure 13: Tourist arrivals per inhabitant in the tourist centres

Similarly to the density indicator of tourist arrivals per km², the numbers of tourist arrivals recorded on a destination level cannot directly be referred to the inhabitants of the tourist centre. Still, the indicator can have some significance depending on visitor flows and on how dispersed tourists are in the area.

Arrivals growth

Regarding the tourism growth from 2012 to 2017, it is remarkable that all cases analyzed showed significant growth rates in tourist arrivals. Figure 14 illustrates that Ohrid (50.3%), Vienna (43.0%) and Byron Bay (41.6%) showed the highest growth in tourist arrivals in this period.

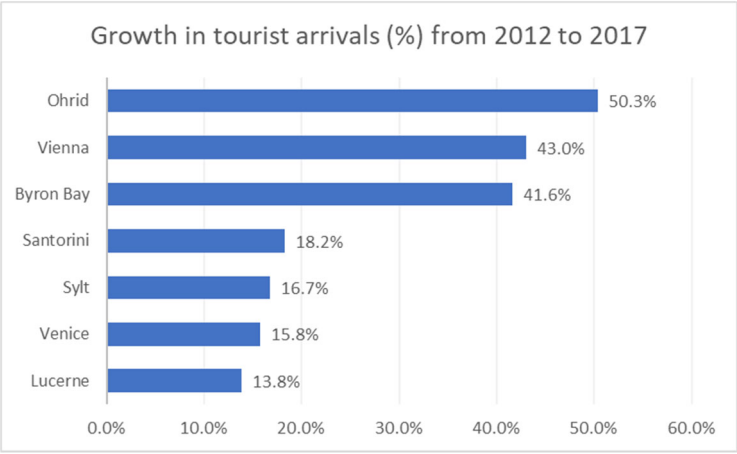

Figure 14: Growth in tourist arrivals (%) from 2012 to 2017

International and domestic arrivals

Figure 15 visualizes the shares of international tourist arrivals in the destinations. Vienna shows the highest share of international tourist arrivals with 81.8%, followed by Lucerne (77.0%) and Venice (76.4%). Sylt had the lowest share of international arrivals with 2.6%.

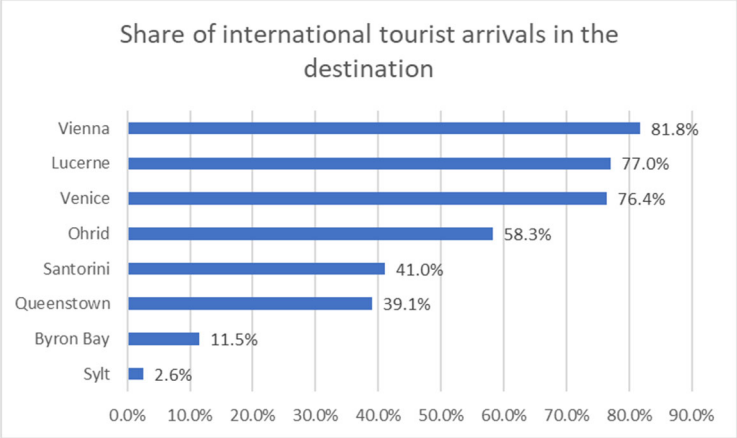

Figure 15: Shares of international tourist arrivals in the destinations

The international and domestic arrivals indicator reveals major differences in the visitor structure. While in some cases most arrivals are international, other destinations are preferably visited by domestic tourists. The origin of the tourists can be an interesting indicator since the potential for conflict might differ depending on source markets and visitor behaviour.

Overnights 2017

The examination of the total overnights in the destinations in 2017 shows that Venice (37,042,454) exposed by far the highest number in total overnights. It has to be considered that for Venice, the total number of arrivals in accommodation establishments are shown including hotels and similar establishments, tourist campsites and holiday villages, holiday dwellings, farmhouses, bed and breakfast and other collective accommodation.

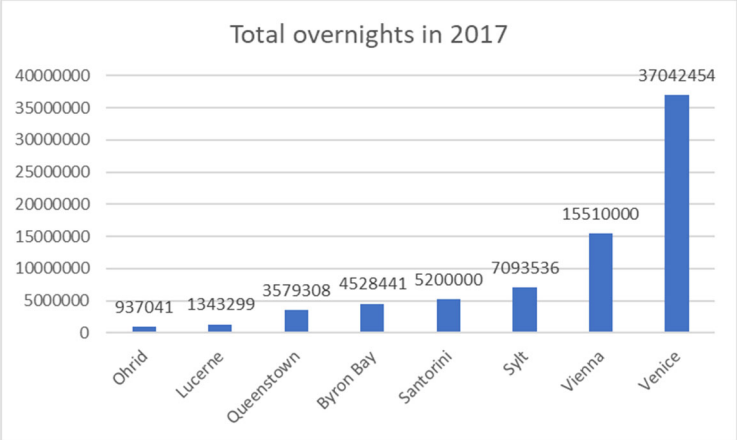

Figure 16: Total overnights in 2017

The numbers of overnights in 2017 show significant differences. The numbers of total overnights should be interpreted with caution, as normally only overnights in hotels are registered. Thus, alternative accommodations like Airbnb, rooms to let, campsites or holiday homes are not represented.

Relative indicator: Overnights per km²

Venice exposes by far the highest amount of overnights per km² (1,382,181), followed by Sylt (71,652), Santorini (57,381) and Lucerne (46,161). Queenstown (411) presents the lowest number of overnights per km² in its destination area.

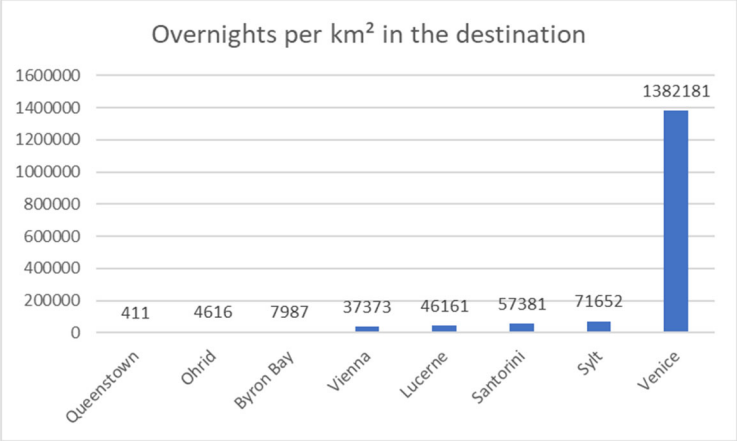

Figure 17: Overnights per km² in the destination

If the total number of overnights is divided per km² in the tourist centre area, a different picture appears. While Queenstown shows the highest amount of overnights per km² (29,827,567), followed by Vienna (5,170,000), Venice (4,647,736) and Lucerne (3,383,625), Santorini exposes the smallest number with 71,233 overnights per km².

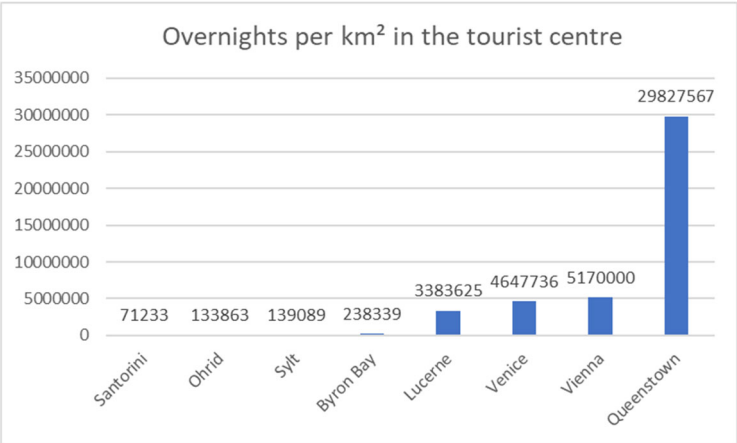

Figure 18: Overnights per km² in the tourist centre

Similarly to the tourist arrivals indicator, also the overnights indicator are mainly recorded on a district or community level. For this reason, the overnights recorded on a destination level can normally not directly be referred to the area of the tourist centre. This is especially true when there are several tourist centres within a destination or tourists do not necessarily visit the tourist centre.

Relative indicator: Overnights per inhabitant

Considering the inhabitants in the destination area, Sylt (396) shows the highest amount of overnights per inhabitant, followed by Santorini (334) and Byron Bay (133). Lucerne (17) and Vienna (9) show the lowest number of overnights per inhabitant in the destination area.

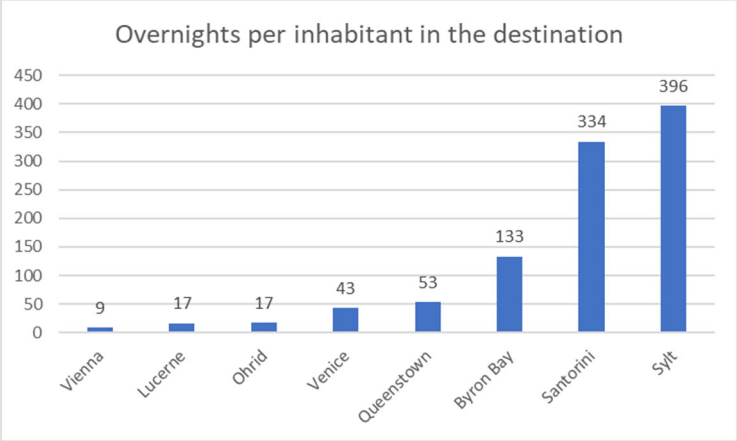

Figure 19: Overnights per inhabitant in the destinations

A completely different picture is shown if the total overnights are divided per inhabitant in the tourist centre area. In this case, Santorini (2,800) exhibits by far the highest number of overnights per inhabitant, followed by Vienna (942), Byron Bay (740) and Lucerne (586). Queenstown (225) and Venice (142) expose the lowest amounts of overnights per inhabitant in the tourist centre area.

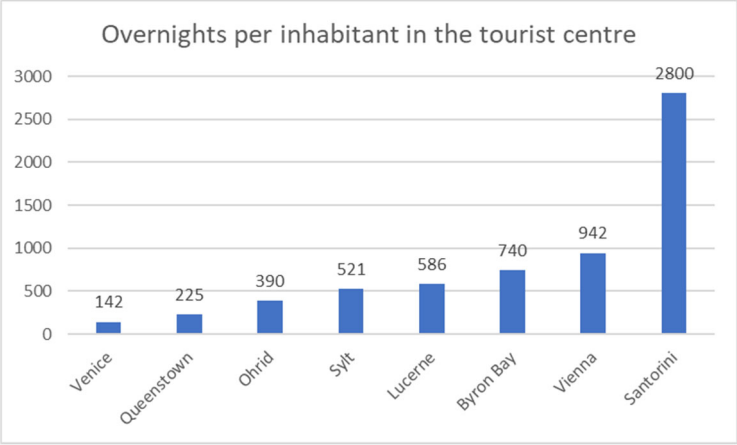

Figure 20: Overnights per inhabitant in the tourist centres

Similarly to the relative indicator of overnights per km², the numbers of overnights recorded on a destination level cannot directly be referred to the inhabitants of the tourist centre area. Sometimes, regional locations serve as a 'hub and spoke' type destination that facilitates the dispersal of tourists to surrounding locations over the period of their stay – hence while arrival or overnight numbers are high, this may not necessarily be a reliable indicator of overtourism (Byron Bay).

Development in overnight stays

Figure 21 shows the percentage change in overnight stays between 2012 and 2017. All cases exhibit an increase in overnights, whereby the extent of the increase considerably differs between the cases. Santorini (63.00%) and Vienna (55.00%) show the highest growth in overnight stays, while Venice (8.83%) and Sylt (8.30%) expose the lowest.

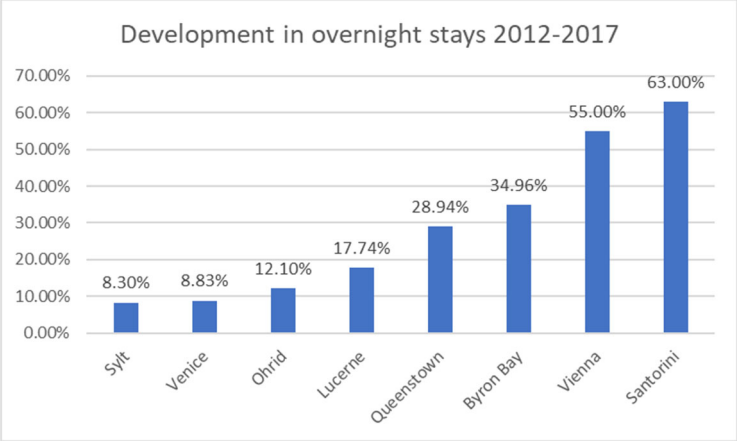

Figure 21: Development in overnight stays 2012-2017

The development in the number of overnight stays might demonstrate the growth of the accommodation industry in a destination. Especially in destinations with an increase of 25% or more, the infrastructure must probably have been considerably expanded to host the additional numbers of tourists.

Overnights in low season, peak month and lowest month

Since there was no reliable data for overnights in low season and lengths of the season indicated ranging from two to six months, data was not comparable. The situation is different and easier to interpret when looking at peak month and lowest month.

Figure 23 shows the number of overnights in the peak month. Venice shows by far the highest number with 8,722,049 overnights, followed by Vienna (1,641,337) and Sylt (1,104,688). Lucerne exposes the lowest value with 160,614 overnights.

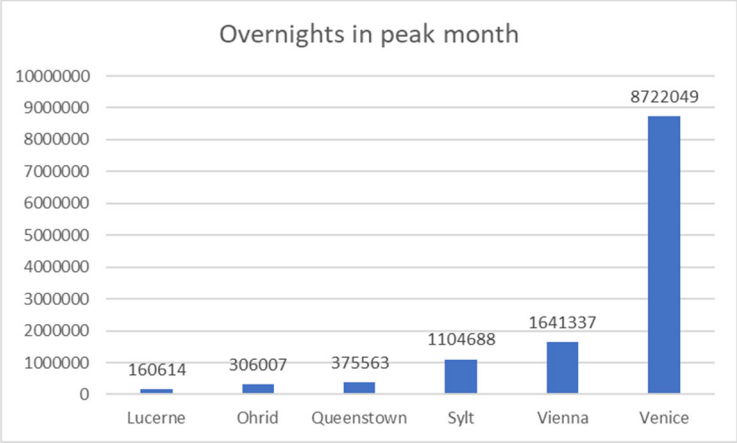

Figure 22: Overnights in peak month

	Peak month
Byron Bay	nA
Lucerne	July
Ohrid	August
Queenstown	January
Santorini	nA
Sylt	nA
Venice	August
Vienna	nA

Table 11: Peak month per case

The overnights in the lowest month are illustrated in Figure 24. Vienna exposes the highest number of overnights in the lowest month (788,117), while Ohrid presents the lowest (7,047).

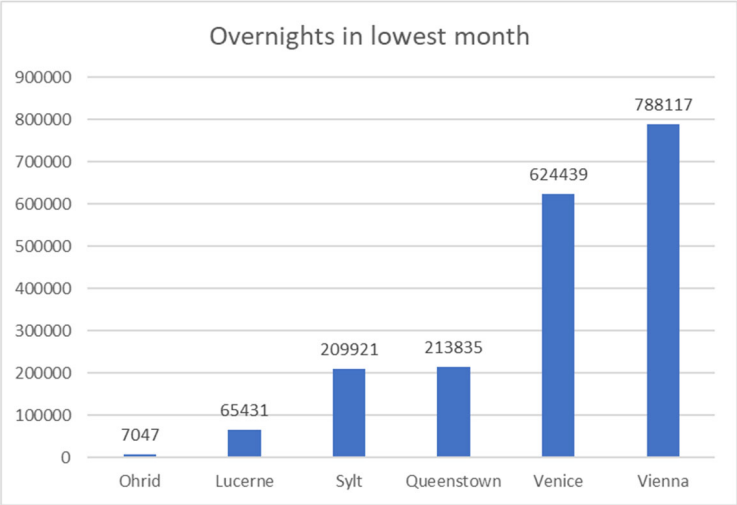

Figure 23: Overnights in lowest month

	Lowest month
Byron Bay	nA
Lucerne	February
Ohrid	February
Queenstown	May
Santorini	nA
Sylt	nA
Venice	January
Vienna	nA

Table 12: Lowest month per case

When the ratio between the peak month and the lowest month is looked at, this gives us an idea of the seasonality of the destination. Ohrid shows the strongest seasonality by far with a ratio of 1:43. In Venice, the ratio between peak month and lowest month is 1:14 while in all other destinations the ratios are significantly lower.

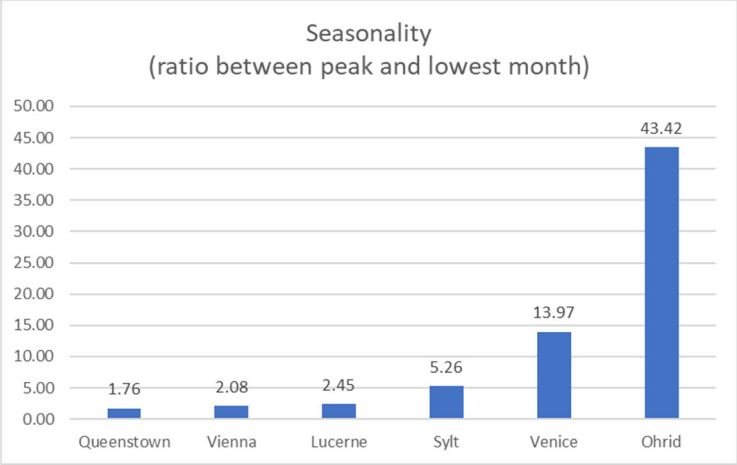

Figure 24: Seasonality (ratio between peak and lowest month)

While the absolute numbers of overnights for peak and lowest month are not really helpful when comparing destinations, the ratios not only make the cases comparable, but also seem to be a good indicator for the seasonality of the destination.

Overnight visitor high season

When the duration of the high season is defined as the number of months with overnight visitor numbers above average, the picture is as shown in Figure 25. It is shown that most destinations have 6 months of high season. Vienna (8) and Queenstown (7) have more, in Venice (4) and Ohrid (3) high season is shorter.

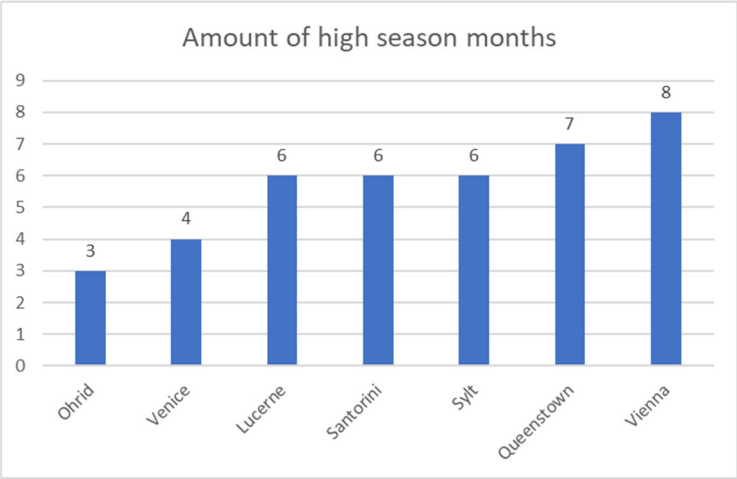

Figure 25: Amount of high season months per destination

The amount of high season months can give an indication of the distribution of tourists during the year. If there is only a short high season, the density of tourists in these months might be considerably higher than in destinations with a longer high season. Again, Ohrid and Venice show the highest seasonality with the shortest period of high season.

International and domestic overnights

Four out of the examined destinations present a share of international overnights that is around 75% or higher, whereas Ohrid, Byron Bay and Sylt have a higher share of domestic overnights. While most of Santorini's overnight stays (91%) are generated by international tourist, most of Sylt's overnights (97%) are caused by domestic visitors.

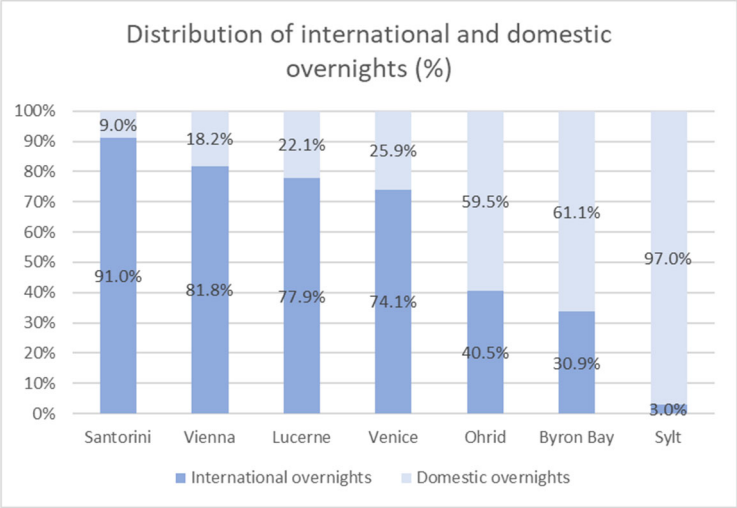

Figure 26: Distribution of international and domestic overnights (%)

The distribution of international and domestic overnights gives an overview of the visitors' origins and shows if a destination is more oriented towards international or domestic guests. Depending on the challenges occurring, information like this might help to better plan targeted measures to tackle overtourism problems.

Day visitors

Although day visitors contribute a lot to tourism in many destinations, data is often not available. Nevertheless, the estimated numbers indicated for the cases of Venice (9,500,000), Lucerne (8,000,000), Byron Bay (933,000) and Sylt (423,302) show that these numbers must not be neglected when analyzing the phenomenon of overtourism.

5.2 Experimental indicators

Apart from capturing the general destination characteristics and calculating the most acquainted relative indicators to allow a first assessment of the destinations' status regarding overtourism and to make a comparison between the cases, the research interest of this study also encompasses the experimentation with indicators of 'touristification' and overtourism. Therefore, a set of experimental indicators has been established to test their informative value and the challenges of implementation.

Visitors in main attractions

In order to get an idea on the number of tourists in the top attractions of the destination as well on the concentration of tourists to few single attractions, the following indicators were tested. TripAdvisor as a global platform seemed to be a logical choice for the selection of the attractions.

- Total numbers of visitors in top 5 (according to TripAdvisor) fee-based attractions
- Numbers of visitors in top 5 (according to TripAdvisor) fee-based attractions in highest month
- Numbers of visitors in top 5 (according to TripAdvisor) fee-based attractions in lowest month
- Number of attractions with visitor restrictions (time slots, guest limits, etc.) from 5 top attractions.

This indicator proofed not to be of any value for the comparison of destinations. Not only because the attractions are very different of course, but also mainly because there is hardly any data available. Many of the top ranked attractions seem not to collect or at least not to publish the numbers of visitors. Furthermore, some of the most visited attractions are visited by locals to a large extend so that no specific conclusions on tourism development can be drawn from these numbers.

Bike rentals

Figure 27 presents the number of bike rental businesses in the city centre. While in Venice bikes are forbidden in the city centre, Santorini has as many as 38 businesses.

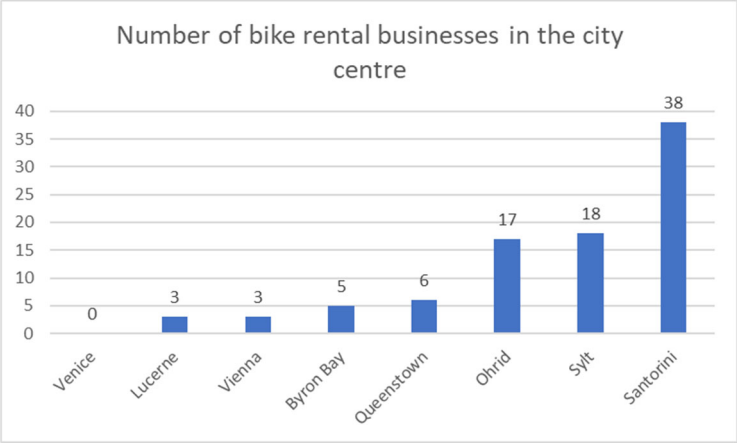

Figure 27: Number of bike rental businesses in the city centres

Even though the number of bike rentals might not allow conclusions on the overtourism situation, it can be an indicator for the touristification of a destination. While in cities like

Lucerne bike rentals are mostly used by residents, the situation is probably different in destinations like Sylt and Santorini. The share of foreigners who rent bikes, which was also captured under this indicator, provided not sufficient and adequate data.

Airbnb accommodations

The increase in alternative accommodation - especially Airbnb – is often mentioned as a relevant driver for overtourism in many destinations. Therefore, the number of Airbnb listings in the destination (at a specific date during the survey period) could be an indicator for the importance of this sector and maybe even the market share. Furthermore, as Airbnb is globally represented, the platform should allow comparable results.

Byron Bay (Byron Shire)	Lucerne	Ohrid	Queenstown	Santorini	Sylt	Vienna	Venice
233	306	306	300+	306	306	306	306

Table 13: Number of Airbnb listings in the destination indicated on the platform

The table shows well that obviously the number of accommodation shown on the platform is limited to 306. It is not possible to extract the exact data of accommodation provided.

Even when clicking on "show all (more than 1000)" only a selection is shown. The platform Insideairbnb (http://insideairbnb.com/) provides more detailed data for some destinations like Vienna (10714) or Venice (6755) demonstrating that the actual numbers are significantly higher. This shows that one must be careful when international platforms are to serve as data sources. Especially because such errors would not be noticed without comparison with other destinations.

TripAdvisor reviews relating to overcrowding

When accepting the satisfaction of the visitors as an indicator of overtourism, the share of reviews that address issues related to overcrowding among TripAdvisor's top 10 attractions (%) could help to better assess the situation. Keywords counted were: overcrowded, too many people, crowds, long wait, no room or others. Figure 28 shows that Santorini exposes the highest share of according reviews (18.7%), followed by Sylt (6.2%) and Venice (4.5%).

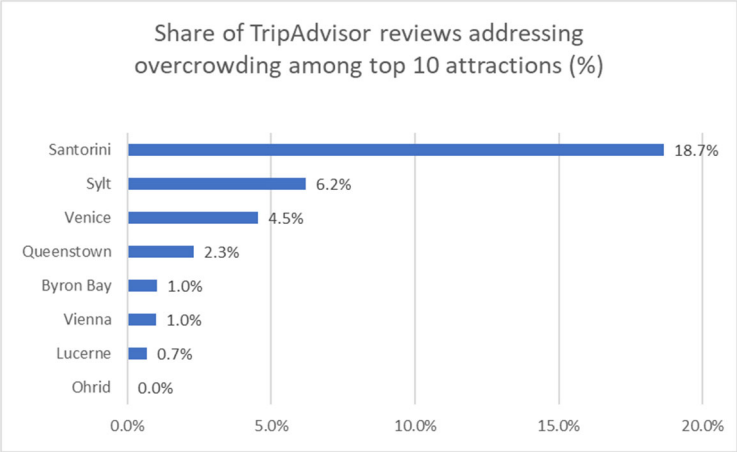

Figure 28: Share of reviews addressing overcrowding among top 10 attractions

It has to be considered that the numbers depend a lot on the keywords defined and also the language(s) taken into account. Nevertheless, these indicators can give an impression on visitors' perception of the situation and reveal trouble spots of course.

Coffee price ratio

One of the consequences of touristification often stated is the increase in prices for common goods. Therefore, the difference in the average coffee price in the tourism center was compared to the coffee price in the outskirts at a selected date during the survey period. To make the cases comparable, the average price in top five restaurants according to TripAdvisor (category: Coffee & Tea) in tourism center and in five randomly selected restaurants outside the center was analyzed. Figure 29 shows a surprising result: in Queenstown, Sylt and Venice the average coffee price is higher in the outskirts than in the tourist centre

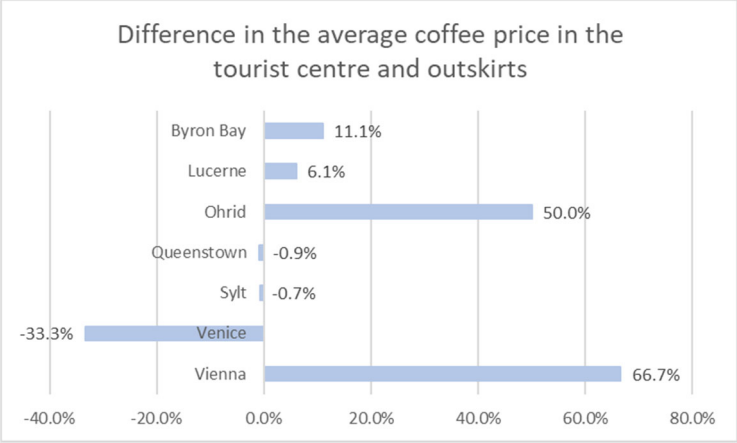

Figure 29: Difference in the average coffee price in the tourist centres and outskirts

The results show that a random sample probably does not provide useful results. The authors of these cases stated that using the TripAdvisor 'Coffee and Tea' category provided a very limited range of cafes. Furthermore, the cost of a 'normal' coffee was comparable between all of the surveyed restaurants, both city centre and outside.

The top 5 restaurants in the 'Coffee & Tea' category in Venice are especially cheap coffees considered as «authentic» because they are cheap (following the comments). The average price for Venice would have been probably higher if the top 5 restaurants or just 5 randomly selected restaurants in the 'Coffee & Tea' category would have been chosen. Another possible explanation might be that the high TripAdvisor rankings of the city centre cafés reflect customers' appreciation for a moderately priced coffee. For Sylt the authors stated that a reason could be the limited space of the destination and number of cafés on the island.

Beer price ratio

To compare the beer price in the tourist centre and in the outskirts, the average price of the top 5 businesses under the rubric TripAdvisor 'Bars & Pubs' in the tourism centre and 5 randomly selected businesses outside the centre were examined. In this context, Figure 30 shows a surprising result as well: in Lucerne, the average beer price is slightly higher in the outskirts than in the tourist centre.

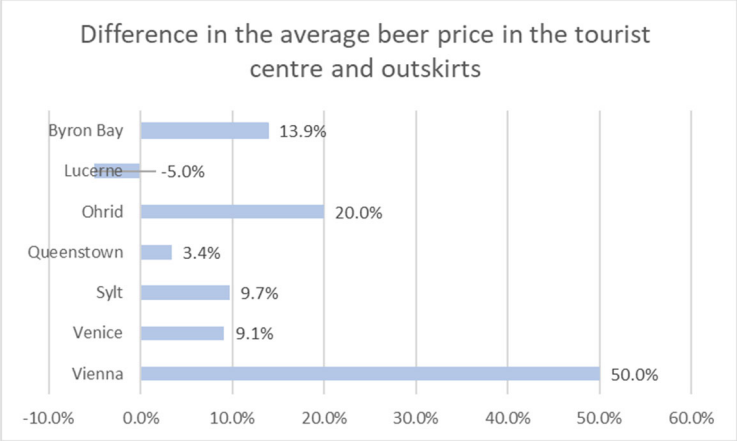

Figure 30: Difference in the average beer price in the tourist centres and outskirts

For the case of Lucerne, the authors explain that there were only 4 bars listed in Trip advisor (Bars & Pubs) in the centre and that these are not the most common or touristic bars what could explain the unexpected result. As for the coffee price ratio, the selection of the bars analyzed might play an important role. Furthermore, looking at alcohol prices based on TripAdvisor top venues, has limitations in countries like Australia, where not all venues are fully licensed. Nevertheless, the differences generally seem to be higher when comparing the beer prices.

Media coverage about local overtourism issues

When overtourism problems arise, normally local media reports on the issues of discussion. For this comparative case study, the amount of articles about local overtourism issues in two most important regional newspapers from 2012 -2017 were looked at.

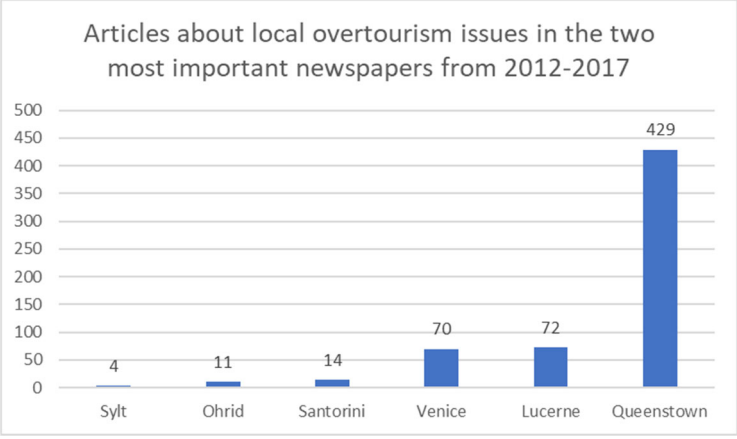

Figure 31: Articles about local overtourism

Regarding the media coverage in the destination's two most important newspapers from 2012 to 2017, Queenstown exhibits a much higher amount of newspaper articles thematising overtourism than all the other destinations analyzed.

It has to be taken into account that the definition of overtourism issues plays a role when implementing this indicator. In Sylt for instance, only a few articles were directly concerned with overtourism issues, but many articles were about the transportation problems onto

the island and the real estate prices. Sometimes, it was difficult to filter articles that deal with local issues. In Lucerne for instance, some articles deal with regional issues or even report international overtourism examples.

Reader's letters

Another indicator for the resentment of residents could be the number of reader's letters about overtourism. The two most important regional newspapers were looked at for the period from 2012 to 2017. Letters were found only in Lucerne (6) and Venice (3).

At some places, access to reader's letters is restricted (Queenstown). Furthermore, it is not everywhere common practice for readers to send or post letters to newspapers or electronic news portals (Santorini). Last but not least, not all the letters to the editors about overtourism issues use the specific term. Therefore, the analysis of the content of respective letters is complex and time-consuming.

Restaurants

The numbers of restaurant providing menus in other languages than the local language among TripAdvisor's 5 top restaurants was another aspect looked at as an indicator for the degree of touristification. All of the top 5 restaurants in Lucerne and Ohrid and 3 out of 5 in Venice provide menus in other languages. Although there was no data for Vienna, the authors state that almost all restaurants in the centre offer menus in English.

The situation is probably different in English speaking countries where restaurants do not have to adapt in the same way. In Sylt, most visitors come from Germany, or are able to speak and understand German, which makes it unnecessary for the restaurants to provide the menu in another language.

Another indicator examined was the number of restaurants having pictures in their menu among TripAdvisor's 5 top restaurants, since this could be an indicator for the internationality of tourism. Figure 32 shows the share for the cases where data was available. For Vienna, the authors estimate that around 30% of the restaurants in the centre are having pictures in their menus.

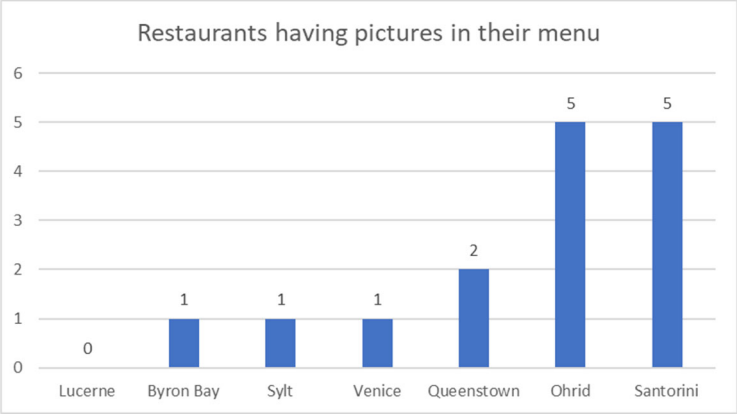

Figure 32: Number of restaurants having pictures in their menu

Whether pictures are necessary in order to explain the products offered might not only depend on the travel competences of the tourists, but also on the meals provided. If the

meals are only locally known or have complicated names, restaurants rather use pictures in their menu. If the TripAdvisors top 5 restaurants offer international food, the share might be lower.

Tourist transportation

When looking at the number of providers of transport aimed at tourists (e.g. tourist trains, segway tours or hop on/hop off busses), Queenstown has the highest number (93) followed by Venice (35). In the other cases, the number ranges from zero (Ohrid) to 7 providers in Santorini.

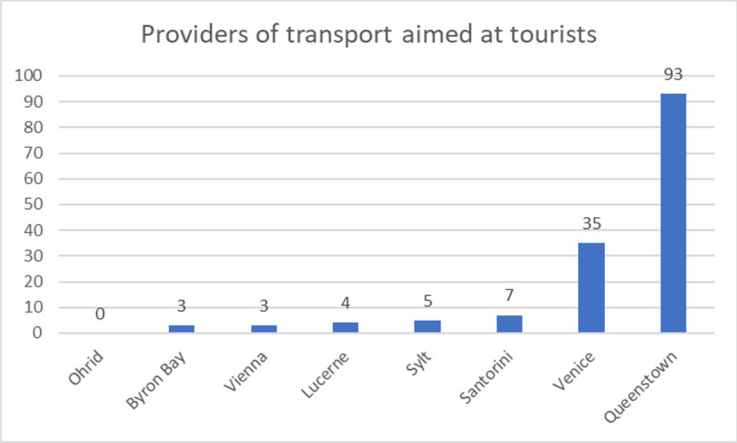

Figure 33: Number of providers of transport aimed at tourists

Of course, it might be difficult to clearly define whether the purpose of transport provided is mainly tourism, since some offers might aim at locals as well. Furthermore, the number of providers might also depend on the size of the area and the topography. Nevertheless, the existence of providers of transport aimed at tourists could be an indicator of the touristification of a destination.

Regulations for the hotel sector and/or sharing economy

The regulation of tourism industry and especially of new players of the sharing economy could show whether local governments or tourism boards already had to react and take measures. Therefore, the idea was to have the regulation for hotels, Airbnb, Uber and/or others (e.g. visitor limits, restriction in number of nights per flat, etc.) assessed from 1 (not regulated) to 5 (strongly regulated).

While most cases have some minor regulations that cannot directly be linked to the overtourism phenomenon, the situation in Venice is different. There are no regulations for hotels, Airbnb or Uber, but many new regulations regarding - amongst other - access limitation on specific locations, traffic limitation on the bridge to reach Venice from the mainland (for cars), gates to limit the number of tourists in specific locations, regulations on large boats as well as on tourist behavior.

It is shown that regulations are an issue in many places and that sometimes the fast growth of tourism played a role, but this cannot be measured in a quantitative way. More important is the kind of regulation implemented and to analyze the forces that led to these decisions.

5.3 WTTC indicators

The study by McKinsey & Company and World Travel & Tourism Council (2017) contains nine metrics that have been applied to several city destinations around the globe. By collecting data for these indicators, it should be tested whether these indicators are applicable to other (smaller) destinations. Furthermore, challenges and limitations of this approach were to be analyzed.

Importance of Tourism

Tourism Share of GDP and employment (%)

The share of tourism contribution to GDP is one of the most common indicator to illustrate the importance of the industry.

Figure 34 shows that the contribution of tourism to the GDP accounts for 70% in Santorini, while in the other destinations the contribution constitutes between 3.1% (Sylt) and 17.9% (Queenstown).

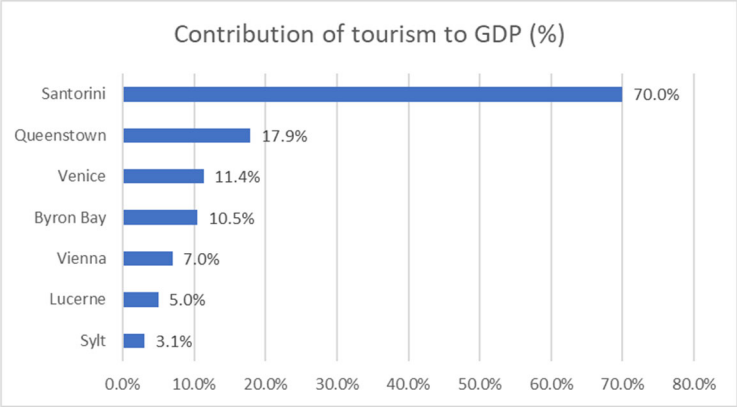

Figure 34: Contribution of tourism to GDP (%)

In the context of the importance of tourism, Figure 35 presents the share of tourism to the employment in the destination. The value for these indicators ranges between 3.6% (Sylt) and 48.9% (Queenstown).

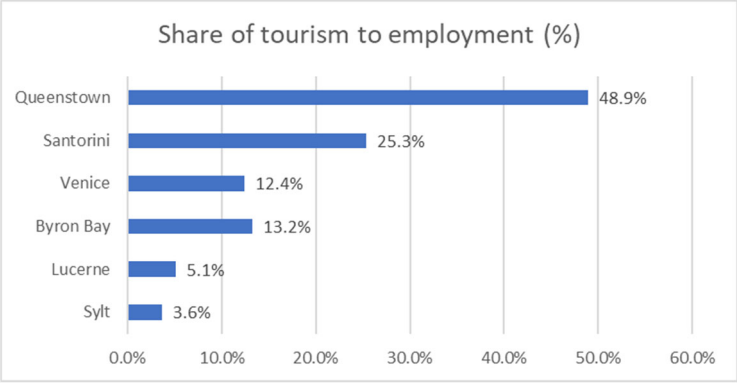

Figure 35: Share of tourism to employment (%)

Arrivals Growth

Growth in tourist arrivals (% CAGR)

The growth in tourist arrivals for the period of 2012-2017 shows impressive annual growth rates ranging from 2.8% in Lucerne to over 20% in Santorini. All destinations show positive growth, although not starting from the same initial level of course.

Figure 36: Growth in tourist arrivals (% CAGR)

Santorini, Ohrid and Vienna outline the highest growth rates, all above the global average of tourist arrival growth which according to data from UNWTO's Tourism Highlights 2013 to 2018 Editions (UNWTO, 2013; 2014, 2015, 2016, 2017, 2018) was at 5.08% (CAGR).

Tourism Density

Number of visitors per square kilometer (#)

Tourism density is probably one of the most straightforward indicators to emphasize on the impacts of tourists. To compare the numbers with cases analyzed in the study by McKinsey & Company and World Travel & Tourism Council *(2017)*, the indicators was calculated as 2017 arrivals divided by the number of square kilometers in the area encompassing TripAdvisor's top 20 attractions for the destination.

As illustrated before (cf. Figure 10 and Figure 11), there are significant differences between the cases analyzed. In Venice where the city centre is very small (7.97 km^2), there are over a million visitors per km^2 (1,192,087), which leads to extreme concentration of tourists. The values in other destinations are much lower with Byron Bay leading with 99,210 visitors per km^2.

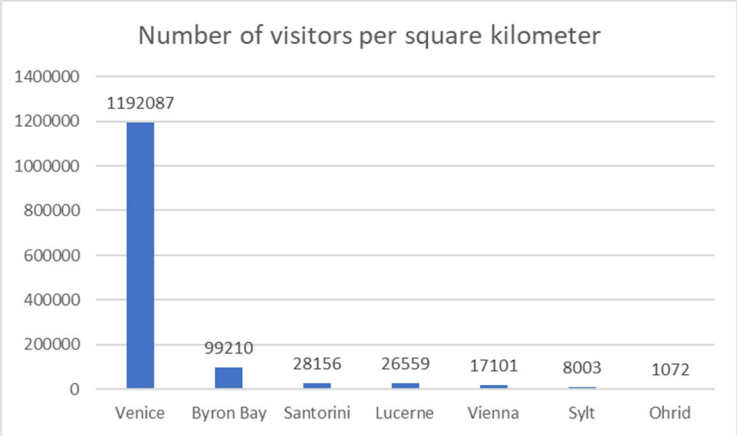

Figure 37: Numbers of visitors per square kilometer

Nevertheless, it has to be considered that the area encompassing TripAdvisor's top 20 attractions for the destination is not easy to define. Moreover, often data is not available for such a perimeter. Therefore, for some cases the destination area had been taken as a reference value (Lucerne, Queenstown, Sylt, Vienna) while others fell back on the area of the tourist centre only (Byron Bay, Venice). For Ohrid, the area had been defined as the area of the old town and the national park.

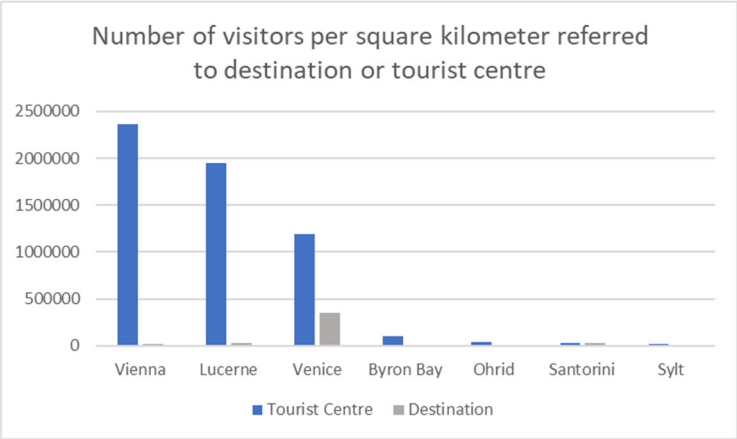

Figure 38: Numbers of visitors per square kilometer referred to destination or tourist centre

The area to be taken into account is crucial when calculating tourism density. Figure 38 shows the difference when taking the tourist centre or the destination as a reference. Density numbers are much higher of course when the perimeter to be analysed is narrowed down.

Tourism Intensity

Number of visitors per resident (#)

The Tourism Intensity is calculated as arrivals divided by the population in the destination (using the same definition of the area as for tourism density). When looking at the numbers of visitors per resident, Byron Bay shows the highest numbers (308) followed by Santorini (164), Queenstown (45) and Sylt (44) and Lucerne (36) while Vienna (4), Ohrid (5) and Venice (11) have lower tourism intensities.

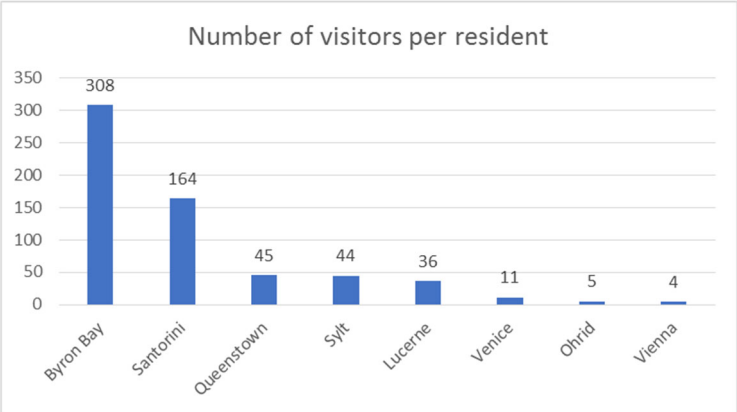

Figure 39: Number of visitors per resident

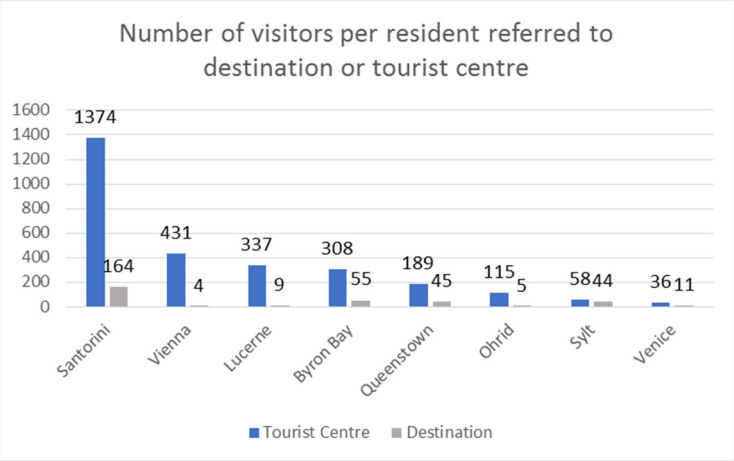

Figure 40: Number of visitors per resident referred to destination or tourist centre

Again, the chosen area of reference and its corresponding inhabitants can make a big difference. Furthermore, the values are higher in low populated areas of course than in big cities like Vienna. While in Figure 39 the perimeter is the same as used for the tourism densities, Figure 40 shows the difference when referring to the residents in the tourist centre or in the destination. Obviously, the perimeter taken into account has a major impact on the tourism intensity figures.

Negative TripAdvisor reviews

Share of "poor" or "terrible" reviews among top attractions (%)

Regarding the share of "poor" or "terrible reviews among the top 10 attractions, Figure 41 shows that Byron Bay has the highest share with 3% while the values in most other destinations are around 2%. Sylt (1.6%) and Venice (1.1%) show lower values and Lucerne does not have any poor or terrible reviews at all among the ten top attractions.

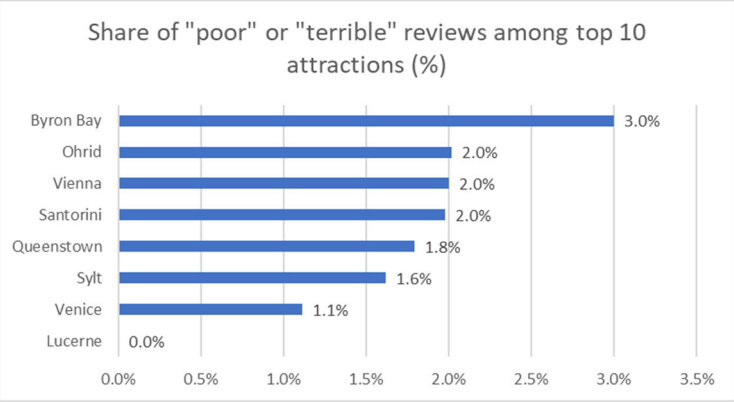

Figure 41: Share of "poor" or "terrible" reviews among TripAdvisors top 10 attractions (%)

Negative TripAdvisor reviews might not be the best indicator to measure overtourism, because it indicates the visitors' perception only. It many places, it is the local population and local infrastructure that cope with uncontrolled mass tourism; hence, more indicators would have be incorporated about their perception.

Arrival seasonality

Difference in arriving-flight seats between high and low month (ratio)

The difference in arriving flight seats between high and low month can be used as an indicator for overtourism. Unfortunately, these data are not always easy to obtain. Furthermore, in many destinations there is not a single airport that could be directly linked to the visitor numbers of the destination. In this study, these numbers could not be collected. Instead as shown above (cf. Figure 24), the ratio between overnights in high and low month could serve as an indicator for seasonality.

Attraction concentration

Share of reviews limited to top 5 attractions (%)

Figure 24 shows the share of TripAdvisor reviews that are limited to the top 5 attractions. The findings show that in Sylt and Venice more than half of the reviews are limited to the top 5 attractions, which means that these attractions are highly visited. In Lucerne, Santorini Byron Bay and Ohrid they roughly constitute between 30% and 40% of all reviews. Only Vienna exhibits a rather small ratio of reviews dedicated to its top 5.

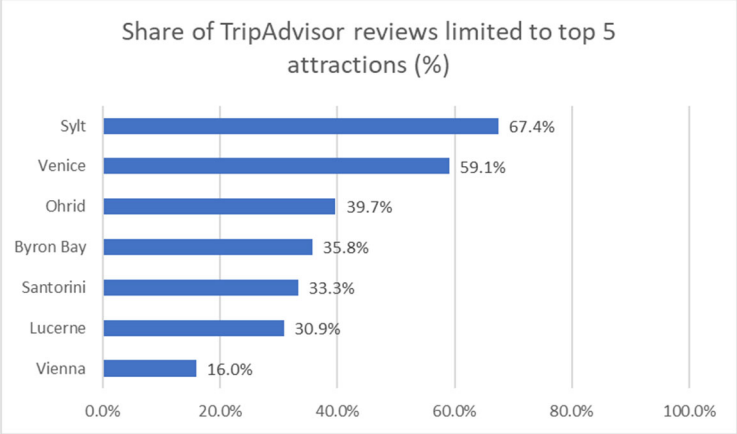

Figure 42: Share of reviews limited to top 5 attractions (%)

Air pollution

Annual mean PM10 particulate concentration (micrograms per cubic meter)

The annual mean of PM10 concentration is used in the study by McKinsey & Company and World Travel & Tourism Council (2017) as an indicator in the environmental dimension. Although air quality is one of the most relevant and most visible environmental issues in cities, values depend significantly on where and when it is measured. Moreover, tourism is normally just a minor contributor to the PM concentration. Other aspects like waste are likely to be more strongly influenced by tourism, but are also hard to measure – especially when we want to look at it in a comparative way.

Historic site prevalence

Share of top 20 TripAdvisor attractions that are historic sites (%)

Figure 43 presents the share of the top 20 TripAdvisor attractions that are historic sites. In Vienna, Ohrid and Sylt, more than 60% of the top 20 TripAdvisor attractions are historic sites. In the other destinations, the rate ranges from 10-14% except for Queenstown, where there are no historic sites among the top 20 TripAdvisor attractions.

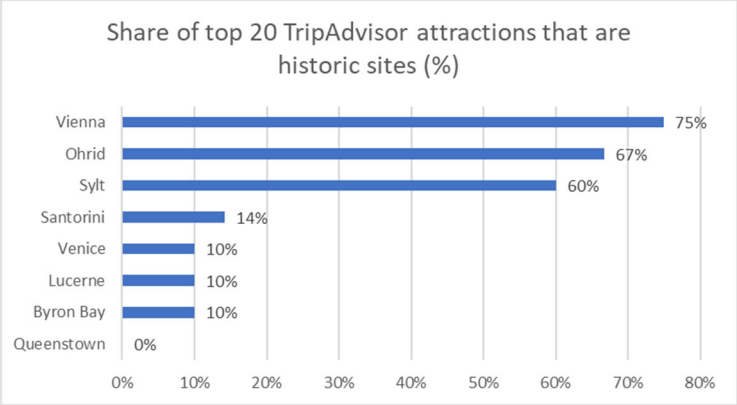

Figure 43: Share of top 20 TripAdvisor attractions that are historic sites (%)

The indicator shows the share of attractions that are classified as historic sites by TripAdvisor. It illustrates the differences between the cases. However, it is questionable whether it is useful to indicate potential risk to spiritual and physical integrity as intended in the WTTC study.

Application of indicators on case studies

After analyzing the data, the study by McKinsey & Company and World Travel & Tourism Council (2017) established benchmarks. The authors broke the 68 cities down into quintiles, or clusters of 20 percent, that indicate a city's relative risk of experiencing a given overcrowding problem. When applying the same thresholds on a five-step scale, the situation in the cases analyzed in this study looks as shown in Figure 44. As seen above, data could not be collected for all the indicators proposed in the study. Nevertheless, the application of these indicators allows a simplified comparison within the cases as well as with further destinations analyzed in the original study.

Figure 44: Application of indicators from the study by McKinsey & Company and World Travel & Tourism Council

The following figure allows a comparison with a selection of cities that had been analyzed by the WTTC study.

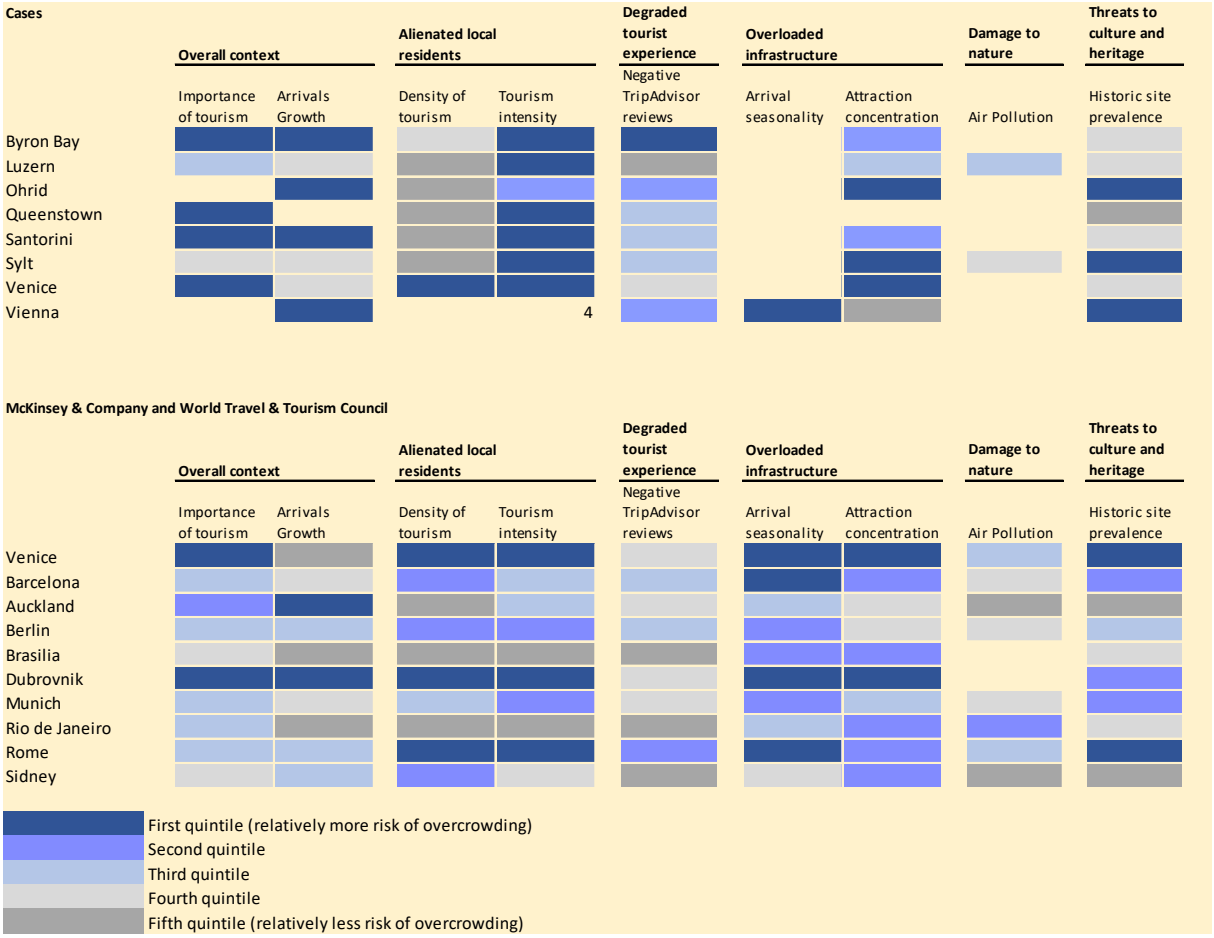

Figure 45: Comparison to cases from the study by McKinsey & Company and World Travel & Tourism Council

The application of the indicators used allowed some conclusions on the usefulness and the limitations of the set of indicators proposed by McKinsey & Company and World Travel & Tourism Council (2017).

It is clear that the indicators are useful when comparing destinations on a much-aggregated level. Furthermore, results can be visualized easily and in an attractive way. Nevertheless, the approach and the selection of the indicators seems to be primarily driven by the availability of data and the envisaged possibility to compare independent cases.

When analyzing the challenges at a specific destination, the set of indicator cannot serve as a valuable basis for monitoring. Not only that for many destinations, some data is not available, but also the informative value of the indicators with regard to potential impact is questionable.

A central finding is that tourism density and tourism intensity do not have much significance at this aggregated level and hardly allow conclusions to be drawn on the residents' perception on tourism and its perceived impacts. When referring tourist arrivals to the destination area, the density numbers are quite low in all cases analysed.

Therefore, density and intensity indicators must be looked at in a more disaggregated way (cf. 5.5). Furthermore, it would be important to know more about the type of tourists visiting as well as on the perception of the residents.

5.4 Additional indicators

As stated earlier, overtourism is a phenomenon that appears in many different forms and variations. The drivers as well as the impacts in different destinations differ a lot. That was also shown in the previous chapters. Therefore, a further aim was to collect interesting site-specific indicators that would better cover the situation in the specific case (even if no data were available). Nevertheless, some of the issues raised and indicators suggested are likely to be of relevance for many destinations. They are assigned to the following categories.

Policy indicators

With regard to a sustainable development of tourism, much depends on how tourism is managed and what policies are being implemented. Therefore, the following additional indicators were suggested:

- Existence and implementation of a sustainable destination strategy
- Political commitment to implement destination management plan
- Existence and quality of management plans
- Visitor regulations and monitoring
- Regular inventory and classification of tourism assets and attractions including natural and cultural sites (Byron Bay)

In addition, private sectors commitment to sustainability plays an important role and could for instance be measured by:

- Businesses with sustainability/ environmental certification

Financial indicators

The development of tourism is heavily steered by the allocation of financial means. Therefore, financial indicators as presented below could be interesting to look at:

- Tourism infrastructure funding
- Allocation of national funds to address the issues of sites struggling with overtourism
- Tourism Promotion Rate (Queenstown)

Infrastructural indicators

Beside the numbers of tourists, also the infrastructural capacities have an influence on overtourism. Therefore, the following indicators have been suggested:

- Sanitary facilities (Ohrid)
- Intensity of port usage (arrivals, vessels, passengers, etc.) (Santorini)

Local situation

The resilience towards overtourism is heavily influenced by the local (economic) situation and the dependency on tourism. Therefore, indicators on the property situation, employment or the share of international tourism spend could be of importance:

- Home ownership characteristics/ trends: % of local vs non domestic home owner (Santorini)
- Business ownership characteristics/ trends: % of local vs non domestic business owner (Santorini)
- Number of commuters (Sylt, where approximately 4500 persons commute every day, which is about 25% of the islands inhabitants)
- Employment conditions during summer months: Annual survey on employment conditions of local workforce based on perceptions (Santorini)

- Reliance on international tourism spend: % of tourism revenue coming from international tourism (Venice)

Attraction indicators

Since the majority of the tourists normally visit the main attractions, it can be helpful to monitor the numbers at certain local attractions and use site-specific indicators:

- Number of boats and seasonal occupancy at Lake Ohrid (Ohrid)
- Ticket numbers, entries in monastery (Ohrid)
- Number of city passes sold per year (Venice)

Prices

The increase of real estate prices are rising in many tourism destinations due to tourism and real estate speculation. This affects the housing costs as well as availability of accommodation for residents and workforce. Interesting indicators could be:

- Housing costs (per m²) and development of real estate prices in the destination. (Sylt)
- Fluctuation of Real Estate Values in % (Venice)
- Accommodation Pricing: Fluctuation in accommodation prices for locals during high, low season in % (Santorini)
- Accommodation Availability: Total accommodation available to locals and workforce in % (Santorini)

Noise and congestion

Where inhabitants, commuters and tourists come together at peak times, overcrowding, noise and/or congestion and long waiting periods can be negative impacts.

- Noise pollution: % of total noise regulations breach cases per year, as those recorded and processed by local police (Santorini)
- Number of tour coaches, congestion (Ohrid)
- Waiting periods (Sylt, at times of high utilization of 2-3 hours are usual)

Quality of life

A major issue that is often not taken into consideration sufficiently is the quality of life of the residents. It is true that most of the approaches are looking into how the tourists rate the destination and local perceptions on the growth of tourism are often neglected. In Queenstown, a "Quality of Life Report" as well as a "Resident and Ratepayer Satisfaction Survey" help to gain insights on the living conditions and satisfaction rates. This offers an opportunity to begin measuring and creating baselines for some of the social indicators covering the Queenstown overtourism situation. Only through establishment of these baselines and their change over time will an accurate picture of the region's issues emerge. Therefore, the following indicators can be suggested:

- Quality of Life Report (Queenstown)
- Resident satisfaction: % of negative social media reviews from residents. (Santorini)
- Community Perceptions and Understanding on the State of Overtourism (Santorini)

Others

- Criminality increase: Increase/decrease in crime rate between 2012 and 2017, or: Number of crimes per 100'000 inhabitants
- Credit Cards: Number of credit card transactions in the tourism centre in 2017
- WIFI: Number of free WiFi in the tourism centre (Venice)
- Customer retain: % of repeat/return visitors (Byron Bay)

5.5 Informative value of indicators

The type of indicators chosen and analyzed is crucial when measuring and interpreting the overtourism situation in a destination. Not only is it obvious that it makes no sense to compare absolute numbers of visitors, but also it makes a big difference which reference values are being used.
The most common variables used as reference values are the size of the area (density) and the numbers of inhabitants (intensity). However, when average values are compared, this might still lead to significant distortions. The relative disaggregated values of visitor numbers in relation to area and inhabitants are presented in Table 15 for the case of Lucerne (Switzerland).

	Year	Value	Source and remarks
Residents of the City of Lucerne	2017	81'401	LUSTAT (2018)
Residents in the Tourism Centre (Altstadt/Wey)	2016	2'292	LUSTAT (2018)
Destination Area (City of Lucerne)		29.1km2	
Tourism Centre Area (Altstadt/Wey)		0.397km2	
Hotel Arrivals in the City of Lucerne	2017	772'875	LUSTAT (2018)
Day Visitors in the City of Lucerne	2014	8'000'000	estimation from BHP Hanser und Partner AG (2015)
Hotel Arrivals per month (average)	2017	64406	LUSTAT (2018)
Day visitors per month (average)	2014	666'666	estimation from BHP Hanser und Partner AG (2015)
Hotel Arrivals per high and low season month	2017	64406	LUSTAT (2018)
Day visitors per high and low season month	2014		based on BHP Hanser und Partner AG (2015) when assuming a similar distribution as hotel arrivals
All numbers >10 are rounded off to whole numbers.			

Table 14: Facts & Assumptions for the calculation of ratio values

		Tourism Intensity			**Tourism Density**	
		Residents *81'401*	Residents in Tourism Centre *2'292*		Destination Area *29.1 km2*	Tourism Centre Area *0.397 km2*
per year	Hotel Arrivals (year) 772'875	9.5	337		26'559	1'946'788
	Total Arrivals including Day visitors (year) *8'772'875*	108	3'828		301'473	22'097'922
per month	Hotel Arrivals (average month) *64'406*	0.8	28		2'213	162'232
	Hotel Arrivals in high season month *83'599*	1	36		2'873	210'577
	Hotel Arrivals in low season month *27'188*	0.3	12		934	68'484
	Total Arrivals including Day visitors (average month) *731'073*	8.9	319		25'123	1'841'493
	Total Arrivals including Day visitors in high season month *1'050'394*	13	458		36'096	2'645'829
	Total Arrivals including Day visitors in low season month *341'608*	4.2	149		11'739	860'474

Table 15: Ratio values for the case of Lucerne

As seen above, the ratio values depend a lot on the definition of the boundaries of the destination and the tourism zone as well as on the specific numbers of arrivals taken into account.

Since the share of residents living in the tourism centre is only 2.82% of the total inhabitants and the area of the tourism centre only consists of 1.36% of the total area of the city, the ratios referred to the tourism centre are much higher.

For destinations like Vienna or Lucerne as a total, overtourism may not be the issue yet, however, looking at specific sites individually, overtourism may become visible. Thus, distribution within destination is crucial and not represented by general relative indicators. In order to consider the spatial distribution of tourists and their concentration in certain places, it makes sense to define a tourism zone or even several tourism areas. Unfortunately, the tourism zone often does not correspond with statistical boundaries, which makes a distinction more difficult.

Since overtourism can be looked at as an intertemporal deviation of tourism demand from the capacity of supply, also the temporal distribution of visitors with high concentrations during certain periods (time, day, weeks, season) has to be taken into account. Instead of

just comparing a yearly or monthly average, it can be useful to look at low and peak periods with much higher ratios resulting for the peak times of course.

Last but not least, the only statistical data available for tourist arrivals normally are hotel arrivals neglecting other forms of accommodation as well as the many day visitors. The data for Lucerne show that - when assuming that all day visitors in the destination also visit the tourism centre – the ratios are much higher and better reflect the actual situation in terms of crowding. Nevertheless, it has to be considered that the numbers of day visitors presented are based on assumptions and estimations done by previous studies. So again, there are many uncertainties to be dealt with.

In summary, Table 15 shows that much information can get lost when analyzing aggregated data. In order to receive a better picture and to plan the right measures at the right places, disaggregated data is needed that includes the spatial and temporal distribution of visitors and takes into account all tourists including day visitors.

6. Conclusions and recommendations

The following chapter presents the conclusions drawn. While chapter 6.1 closes the loop by answering the central research questions, chapter 6.2 presents corresponding recommendations and chapter 6.3 proposes a framework for monitoring overtourism. Some general guidelines on how to tackle overtourism can be found in chapter 6.4.

6.1 Challenges of measuring overtourism

In the study, a framework with different indicators had been developed. The application of the framework in different case studies around the world and the experimenting with different types of indicators allowed gaining experiences and deriving challenges.

What are the challenges to consider when measuring overtourism?

With regard to the main research question, the most relevant challenges can be summarized as follows:

- Heterogeneity
  Depending on the destination, overtourism manifests differently. The actual problems within the destination might differ and indicators have to be adapted accordingly.

- Aggregation
  Mot sets of indicators work with general indicators on a much-aggregated level in order to be able to compare data between different destinations. This "top-down" approach often does not reflect the temporal or spatial distribution of visitor flows.

- Validity of single indicators
  It is difficult to find indicators that solely measure overtourism. Indicators have to be put into relation to the destinations capacity. Only a mix of different indicators can provide a comprehensive picture.

- Data availability
  Data availability was often mentioned as a central challenge when applying the framework for the analysis. Some of the data is not monitored, not available for the perimeter requested or just not up-to-date. Furthermore, since data is often not available, new forms of data sources are to be discovered.

- Data reliability
  The study showed that default settings and algorithm based search functions might distort data gained from platforms such as TripAdvisor, Airbnb, etc.

- Dynamic
  Monitoring systems often lag behind, because they do not consider new trends and players entering the market. Furthermore, looking at the development of tourism demand over time and considering seasonality is vital. Certain aspects only become visible when monitored over time.

- Spectrum
  Growth in domestic tourism and day visitors are often overlooked and/or underestimated. Usually, there is no reliable way to count day visitors and estimations have to be based on vague assumptions.

- Non-consideration of residents
  Often, too little attention is paid to the residents' perception and social issues of overtourism. Since in many places it is the local population and local infrastructure that cope with uncontrolled mass tourism, hence indicators about their perception should be incorporated.

The following sub-questions had been determined and can be answered as follows:

What indicators exist to measure overtourism?

The literature section as well as the framework used for this study (cf. chapter 2.2) show a selection of potential indicators to be used when measuring overtourism. While most previous international studies focus on comparability of different destinations and therefore fall back on very general indicators, this study shows that in order to use monitoring as a basis for tourism management site-specific and problem-based indicators have to be developed in addition. Not all of the indicators tested in the study seem to work, since often data availability is not given or small sample sizes deter the results. Nevertheless, many of the indicators presented help to get a better understanding of the situation and can serve as a basis for discussion and for implementing measures where needed.

How can indicators help to determine the phenomenon of overtourism?

The study showed that indicators carry out several important functions with regard to the overtourism discussion. Indicators can:

- …help to get a better understanding of the situation.
- …be used (and misused) to steer the direction of the overtourism discussion
- …highlight certain problems and reveal need for action
- …allow comparisons between different destinations
- …help to monitor the development as a basis for tourism management

In addition, it is showed that no single indicators or indices can determine general thresholds for overtourism. It always has to be a set of indicators including problem-based indicators that are specific for the destination.

Whether indicators can help to determine the phenomenon of overtourism always depends on data available, the effort authorities are willing to take as well as on the context of the destination. The monitoring is easier when the area of the destination corresponds to political (statistical) borders, when there is homogeneity of visitors, and when the destination can only be reached via few delimited entrances.

What could be interesting indicators that are easy to manage?

The analysis of wrong data leads to wrong conclusions. Consequently, the definition of useful indicators is crucial in order to gain a comprehensive picture of the situation in a destination. Since the choice of indicators strongly depends on the purpose they have to fulfill, no general set of indicators can be recommended. The easiest to manage are those indicators where data is already available or can be easily accessed as for instance data derived from platforms such as TripAdvisor. Nevertheless, the findings of the study illustrate the use of some experimental indicators that could serve as indicators for

touristification (e.g. restaurants providing menus in foreign languages or with pictures, tourist transportation), for the importance of the discussion by local residents (e.g. media coverage, readers' letters) for indirect impact of overtourism (e.g. coffee price, beer price) or for tourism demand (e.g. visitors in main attractions, TripAdvisor re-views relating to overcrowding).

6.2 Recommendations

Considering the conclusions drawn by the authors of the case studies as well as the findings from the comparison of the cases and the challenges identified, the following recommendations can be deduced.

Challenge	Recommendation
Heterogeneity	Identify key problems
Aggregation	Choose the right set of indicators
Validity of single indicators	
Data availability	Work with what you have
	Make use of new tools and data sources
Data reliability	Choose data sources carefully
Dynamic	Take a dynamic approach
Spectrum	Extend the spectrum
Non-consideration of residents	Focus on the residents perspective

Table 16: Challenges and recommendations

6.2.1 Identify key problems

In order to tackle the issues relevant for the specific destination, key stakeholders have to be defined and the most important and meaningful indicators for that specific destination must be identified. As each destination is unique, indicators should be determined "at a local/regional level using a 'bottom-up', rather than 'top-down' approach" (Queenstown). This could be supported by the "development of general frameworks and examples that destinations could draw upon to inform their decision-making, which would include key categories of indicators and sample criteria." (Queenstown) To recognize the problem is a "crucial pre-requisite to solve the actual problem and plan for it." (Santorini) Especially, when destinations are still "focused mostly on the benefits from tourism growth" (Ohrid), and are hardly aware of the impacts from overtourism, even though the problems become more evident, the first step has to be to identify the key problems.

6.2.2 Choose the right set of indicators

There are no indicators that solely measure overtourism and there are many types of indicators with different advantages and disadvantages.

Only a set of indicators including qualitative, disaggregated, indirect and site-specific problem-based indicators leads to the desired results. Furthermore, indicators always have to be put into relation to the destinations capacity – which in turn sometimes is also hard to define. A combination of different types of indicators is needed in order to cover the phenomenon of overtourism and to create a comprehensive picture. (cf. chapter 6.3)

6.2.3 Work with what you have

Data availability seems to be the main hurdle for a comprehensive overtourism monitoring. In a first step the integration and analysis of existing data that can be used and transferred to the purpose of monitoring overtourism is crucial. Specific empirical surveys can complement existing data sets. When this is too complex or expensive, it is recommended to work with estimations rather than leaving important fields blank. Estimations can help to get an idea of the situation (e.g. day visitors). The motto should be: Rather roughly right than exactly wrong.

6.2.4 Make use of new tools and data sources

The insufficient data situation requires the examination of new data collection possibilities and data sources. Big data resources such as mobile phone tracking systems are interesting resources for tourist tracking and monitoring overtourism (Byron Bay), although still very expensive (Sao Paolo). Mobile phone tracking would allow tracking tourist flows between major attractions, transportation hubs, and tourists' duration at these sites. (Venice) An example from the Espirito Santo tourism state department in Brazil brought to life a reality that differed completely from the previous assumptions. Length of stay, preferred destinations for day and night, demographics and origin were informed on a detailed report that led to a complete change on state policy, orientations and promotion strategy. (Sao Paolo). Furthermore, the use of image analytical tools to analyze the photos taken in a destination on the internet or social networks could be interesting to estimate overtourism (Venice).

6.2.5 Choose data sources carefully

When it comes to finding indicators that enable to compare different destinations around the world, the use of global reports or platforms seems to be an obvious choice. Nevertheless, the study showed that data obtained from platforms such as Airbnb or TripAdvisor has to be analyzed carefully, since it might be distorted significantly by default settings and algorithm based search functions. In addition, different websites depending on language and country might lead to different results.

6.2.6 Take a dynamic approach

Monitoring systems have to adapt to changes in the destination. When new players are entering the market or new problems are arising, they often cannot be captured due to missing indicators. An example are home sharing listings where data is often missing. It would be beneficial to have access to "more uniform, transparent data using metrics from providers such as Airbnb in order to develop an accurate picture of the state of short-stay accommodation" (Queenstown). Monitoring systems must be open to new data that emerges as the destination changes and evolves.

Furthermore, overtourism cannot be reduced to a static metric. Some developments are only displayed when looking at a certain period of time. Data is needed that looks specifically into overtourism impacts over time. "Overtourism is an intertemporal deviation of tourism demand from the capacity of supply, and thus smoothing out demand over time, specifically between peak seasons and off seasons, is vital" (Venice). Only a dynamic approach enables to monitor impacts over time and to consider new trends and developments.

6.2.7 Extend the spectrum

Since the official tourism statistics normally only collects data from overnight visitors, there is normally no – or only insufficient – data on the number of day visitors. In places where day tourists represent a majority, this might lead to a wrong picture and possibly wrong

conclusions when analyzing data. Furthermore, the international tourism statistics from the UNWTO cover international tourist arrivals only which means that domestic tourism does not appear in these numbers. Therefore, it is crucial to include day visitors and to find indicators that allow getting an idea on the volume and the type of day tourists in the destination.

6.2.8 Focus on the residents perspective

The analysis of the cases showed that by analyzing indicators of tourism supply and demand, the perspective of the residents is often given insufficient attention. It is often the residents that suffer the most. Even when the numbers would not show any alarming signs, the perception of overtourism might be even more crucial for the discussion about the development of tourism. Data on tourist volume has to be linked to data on the satisfaction of residents.

Queenstown Lakes District Council's (QLDC) approach to the region's rapid growth has included a variety of community consultation initiatives and data gathering metrics, which the researchers consider to be best practice in that they are establishing baseline social and environmental indicators in the region. Through publications such as a report examining resident's quality of life, the QLDC can establish baselines for future comparison and measurement (Queenstown).

6.3 Indicator framework for monitoring overtourism

Monitoring tools can help authorities to understand when and where crowdedness exists and to early detect hot spots and challenges. The system has to be developed for the specific needs and challenges in the destination. There is unlikely to be a one size fits all approach when attempting to monitor or identify the indicators of overtourism. General and economic indicators give an impression about the volume of tourism – but not its repercussions. (Vienna) A combined set of indicators is needed that looks at potential drivers, the supply as well as the demand side, the impacts and also potential responses. The following framework should enable communities to identify and establish quality indicators and develop specific baselines for social and environmental standards in the destination and for continued monitoring over time.

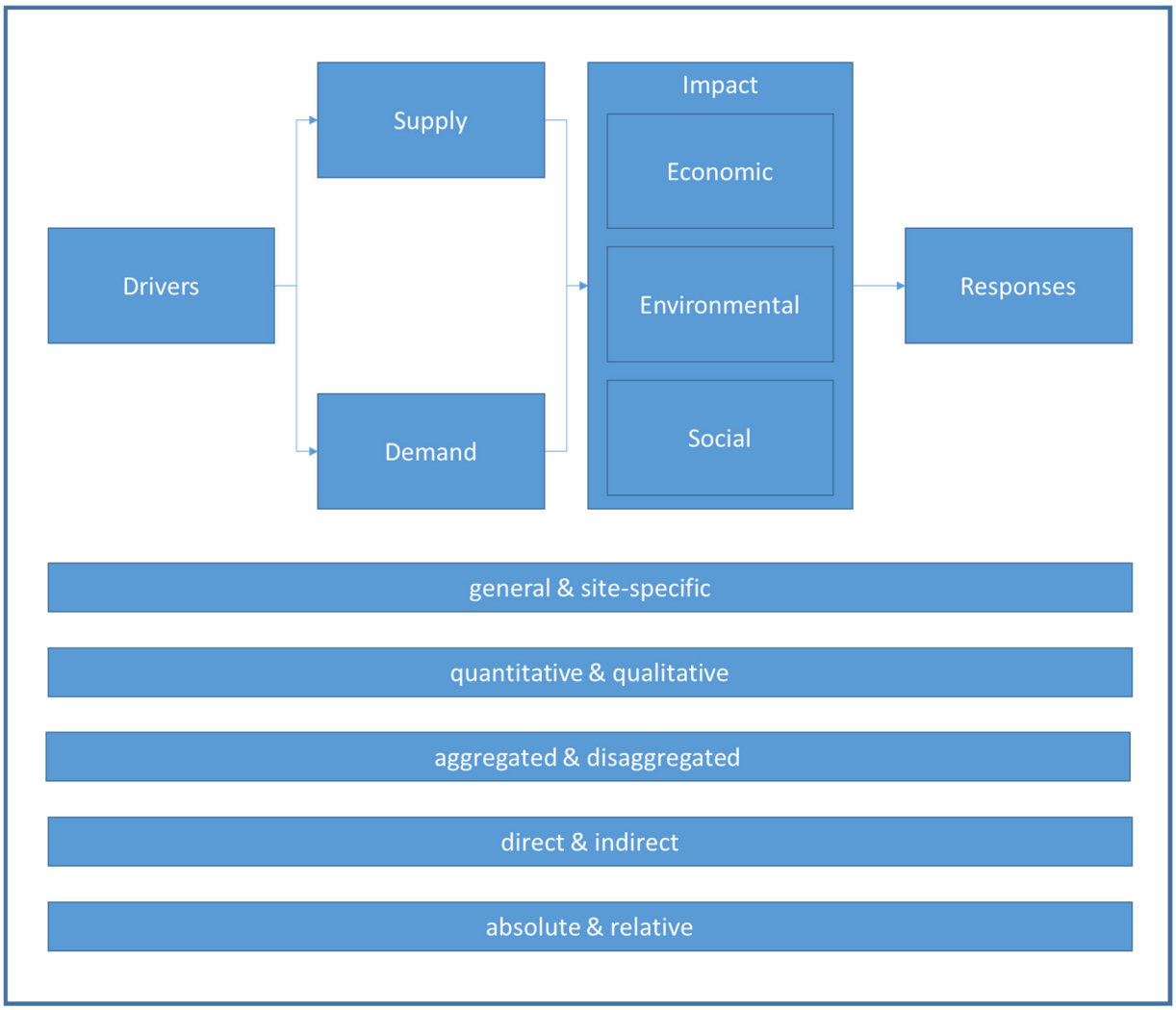

Figure 46: Indicator framework for monitoring overtourism

Driver indicators

Depending on the destination, there are different drivers for overtourism. The most relevant drivers must be identified and respective indicators found. Potential indicators could be: Economic situation in source markets, new flight connections or cruise ship contracts, changes in visa requirements, big events and new attractions and many others. The monitoring of drivers will help to prepare early for upcoming challenges.

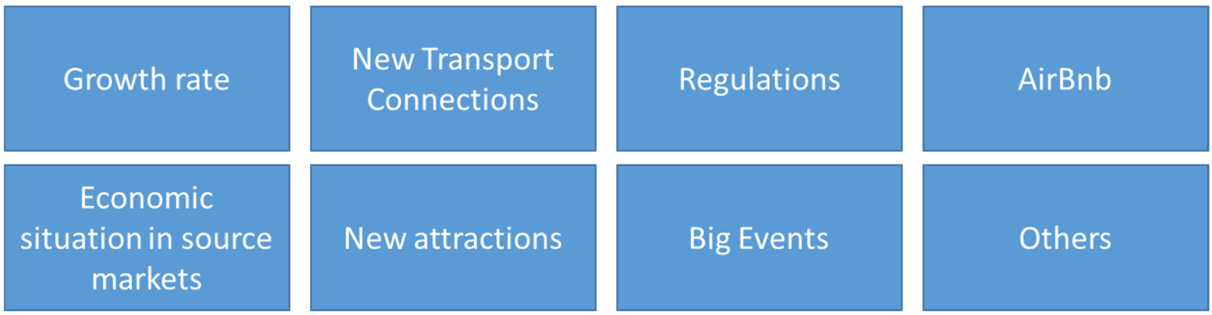

Figure 47: Examples for driver indicators

Supply indicators

Since overtourism is always also a question of the capacity of the tourism system, supply indicators with regard to carrying capacity, infrastructure etc. should be taken into account. In some places, problems are hardly referred to too many tourists but rather to the "lack of appropriate infrastructure and investments to manage the phenomenon" (Santorini). In many destinations, there are seemingly important infrastructure issues when tourism flows have grown fast in a short amount of time.

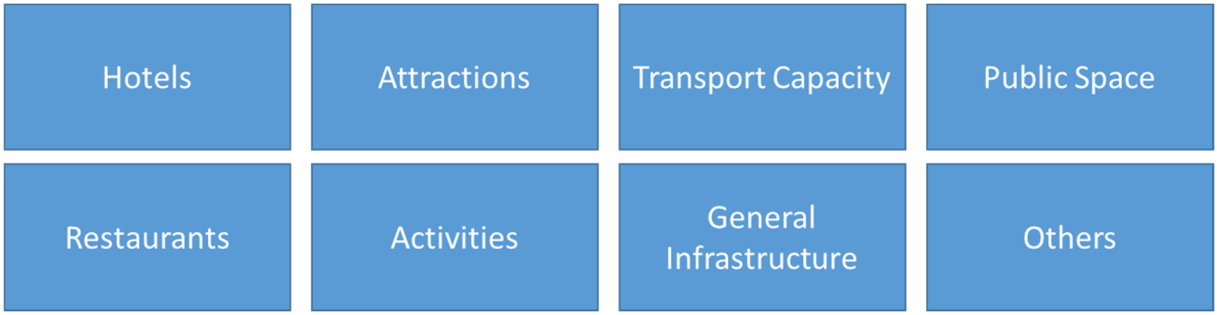

Figure 48: Examples for supply indicators

Demand indicators

The number of tourists is the most common indicator communicated through media and often stands at the heart of the overtourism discussion. Nevertheless, the study showed that these numbers have to be put into perspective and that there are many more aspects relevant in order to understand the phenomenon (cf. Figure 49).

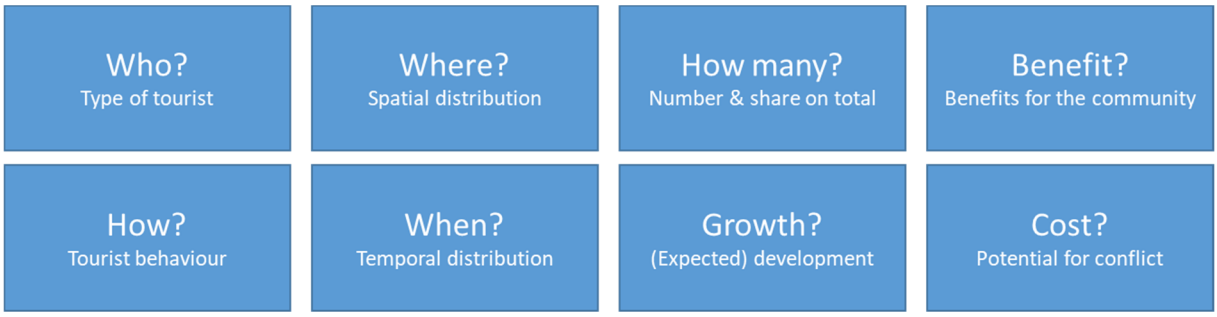

Figure 49: Examples for demand indicators

Besides knowing the numbers of tourists, it is also important to know what type of tourists visit the destination, what is their behavior, when and where do they visit the destination, is it a growing segment and what are the benefits and costs linked to specific tourist segments.

Especially, tourist behavior and the kinds of tourists that are attracted to a destination should also be considered when assessing the impact that tourism has on a destination. Some tourists leave larger 'footprints' than others which has to be taken into account in marketing and when seeking solutions to overcrowding and negative guest/host interactions (Byron Bay).

Impact indicators

Impact indicators signpost (potential) challenges and problems caused by high tourism densities. They have to be chosen in accordance with the most relevant issues in the destination and can be categorized in economic, environmental and social indicators.

Economic: Potential indicators to measure the economic impact of tourism are amongst others: the cost of regional infrastructure upkeep, price of real estate (relative to average income), rents and commodities, economic inequalities and value added generated by tourism.

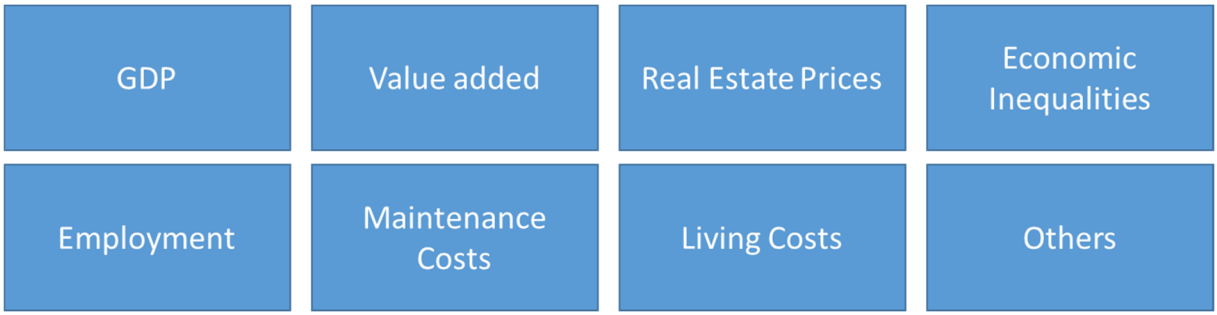

Figure 50: Examples for economic impact indicators

Environmental: Examples for indicators in the environmental dimension are water quality, pollution, waste, native flora and fauna, erosion, noise or traffic density and congestion.

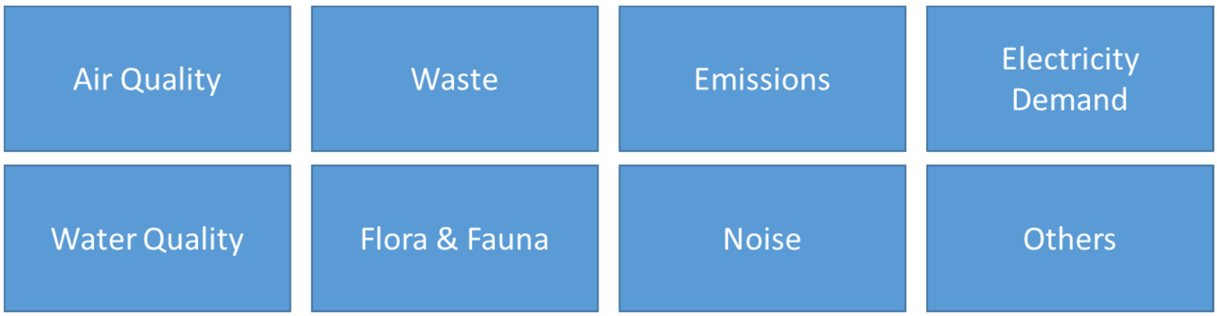

Figure 51: Examples for environmental impact indicators

Social: The quality of life of impacted stakeholders as well as their living conditions, the visitor experience, the destination image, social exclusion, changes in place identity, local tensions, perceptions of overcrowding, inappropriate social behaviors, psychological (ill-being) issues related to overtourism and safety statistics are potential fields of interest in the social dimension.

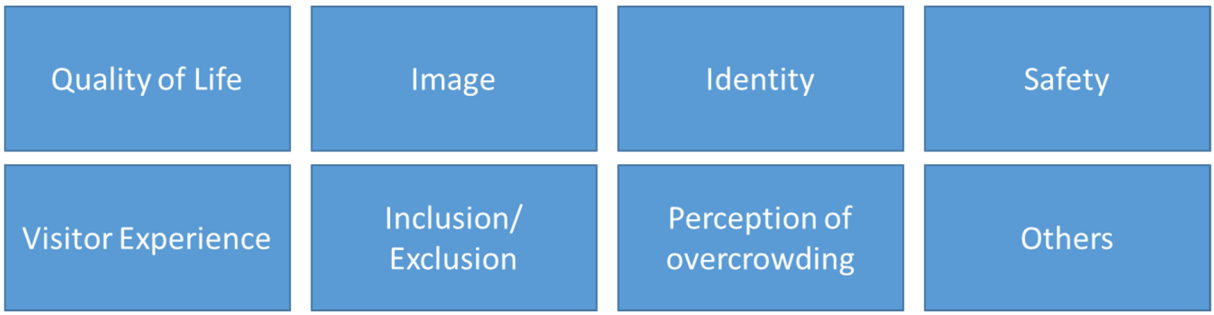

Figure 52: Examples for social impact indicators

Response indicators

The implementation of new measures and regulations should be used as a chance to also measure their impacts. Furthermore, in the ideal case new measures also provide new data. In the case of Venice, an entry tax for daily visitors has been approved recently. Since there is no statistics on the number of visitor arrivals in Venice, this tax will help to provide these statistics. (Venice) The effectiveness of new measures can usually be monitored by measuring impact indicators over time in order to derive potential changes that could be attributed to the regulations implemented.

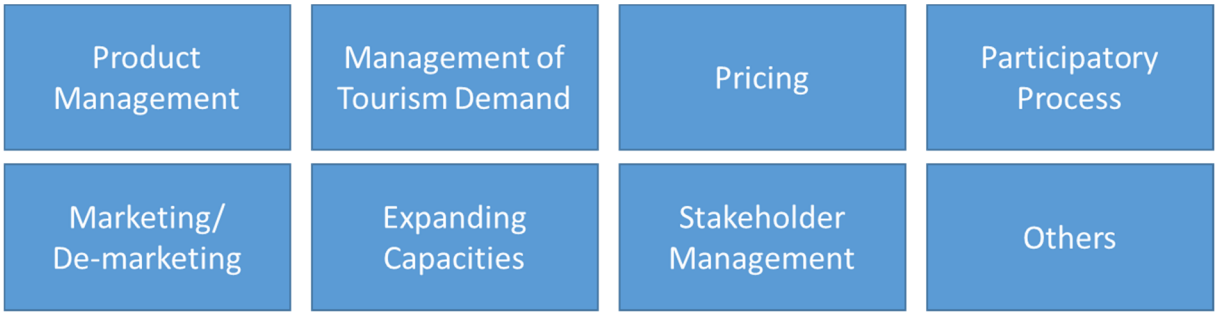

Figure 53: Examples for response indicators

Beside the content coverage, the following criteria must be observed when selecting indicators.

General and site-specific (problem-based) indicators

The overtourism situation manifests differently depending on the geographical location, its infrastructure and surroundings, governance and policies, the stakeholders as well as on the type of tourism. Accordingly, the measurement of overtourism is a "complex and individualized process, specific to each destination affected." (Queenstown)

The data and indicators, which provide the strongest indication of overtourism, are unlikely to be the same in different heterogeneous destinations. The indicators used in the study for example were mainly concentrating on city based tourist activities, and on visitors accommodated in hotels. In some cases (like Byron Bay), backpacker accommodations and other accommodation types are much more important. Tourism destinations that lie within regional areas may not present the same indicators or 'symptoms' of overtourism as major cities. (Byron Bay) Therefore, it can be concluded that the peculiarities of a destination have to be considered and each destination has to add its own indicators that represent the local challenges the best, even if that means that comparability and benchmarking is limited.

Quantitative and qualitative indicators

While quantitative indicators allow to get an idea of the tourism volume and to compare different cases, it is only through qualitative data that the phenomenon and its complex interrelationships can be understood.

Aggregated and disaggregated indicators

While aggregated indicators or indices can act as key indicators and allow a simplified comparison of destinations, in reality, they might lead to too general or false conclusions. The comparison of averages does not consider the unequal distribution of visitors within the destination as shown in chapter 5.5. Therefore, the disaggregation of data is an important step to better understand the situation in a destination and to identify the hot spots of overtourism.

Direct and indirect indicators

Since it is not always feasible to measure direct impacts of overtourism, indirect indicators (e.g. real estate prices) can help to complete the picture and are sometimes easier to measure and analyze. Furthermore, some destinations (like Sylt) are facing more indirect than direct overtourism issues. The challenge with indirect indicators is that they might be influenced by other factors, non-related to tourism (Vienna). Nevertheless, to make use of uncommon experimental indirect indicators for touristification and overtourism can help to get a better understanding of the situation in the destination.

Absolute and relative indicators

The comparison of absolute numbers is normally not very meaningful. This means that after the collection of general data, indicators have to be put in relation to certain reference values such as number of inhabitants, area size, number of hotels/ hotel beds, parkings, average income, etc. to provide adequate context for interpretation (Queenstown), as well as to allow comparisons with other destinations. Consequently, data has to be ‘normalised’ in relation to the destination. Nevertheless, to choose the correct reference values can be tricky as well as seen in chapter 5.5. When looking at ratios such as arrivals per area, much depends on the boundaries defined.

6.4 General guidelines to tackle overtourism

While measuring and monitoring overtourism is an important step to capture the phenomenon and initiate the right actions, other measures are also important to address overtourism comprehensively. Si in addition to the measures presented in chapter 6.2, some general guidelines and recommendations on how to deal with the overtourism phenomenon were mentioned by the authors of the case study or could be drawn by comparing the different cases. They can be summarized as follows.

Get prepared early

For the industry, tracking and analyzing tourism demand based on historical data as well as real-time data are equality important, which helps the industry (particularly hotels, restaurants, and transportation) plan its supply in advance (Venice). Furthermore, indicators such as reinvestments in infrastructure should be included to measure sustainability and whether there is indication of overtourism (Vienna). It is a challenge to reconsider how much business is good for a city or a district. Therefore, anticipating the consequences of more flights, more media exposition, more people talking about the place and so on is crucial (Sao Paolo).

Enhance tourism research & knowledge sharing

In order to better understand the complex phenomenon of overtourism, research on the relevant factors and meaningful indicators is needed. Destinations that are not yet affected from overtourism could benefit from practices well documented and profit from experiences made in other places in order to prevent negative impacts (Sao Paolo).

Learn from best practices

The more destinations react to overtourism issues and implement measures, the more experience will be around to profit from. Many destinations have already taken measures to regulate tourism and to improve the cohabitation between the tourists and the inhabitants. For example in Venice, the campaign #EnjoyRespectVenezia has been launched. The #EnjoyRespectVenezia page provides information for the tourist to enjoy a more sustainable trip in Venice (behavior guidelines, alternative itineraries, daily estimation of visitors for the year 2018, etc.). Another interesting approach is taken by Visit Copenhagen with its campaign "The end of tourism". More and more destinations will have experiences from which others will be able to benefit.

Manage tourism through product development

Product development that leads to enhanced visitor dispersal to fringe destinations and transport infrastructure that supports this dispersal is also recommended. This will not only reduce congestion at popular sites but also enable more equitable distribution of tourist expenditure. Tour companies and package tour operators could be encouraged to promote 'off the beaten track' localized experiences as part of their itineraries that complement visits to popular sites. However, it should be noted that new problems may arise if areas are visited that were not previously tourist. Accordingly, such measures must be defined with the involvement of the stakeholder groups concerned - in particular the population.

Develop capacities according to desired tourism development

Local government policy and planning decisions around destination development should also consider limiting the number of tourist accommodation facilities around popular sites and reward tourism investment that encourages better tourist dispersal. With the specific

development of capacities and corresponding visitor-flow-management negative impacts can be reduced.

Manage tourism demand and visitor flows

A revenue management approach, commonly used by airlines and hotels, can help keep optimal level of tourists while maintaining the economic benefits of tourism industry. That is, destination capacity could be limited (e.g., travel pass, admission ticket) and dynamic pricing with various rate fences can be applied. Reservation system helps to forecast real-time demand and allocate proper level of inventories for differential prices (Venice).

Involve and coach stakeholders

Stakeholder involvement: The involvement and coaching of local stakeholders should be facilitated by tourism organisations and/or cross-sectoral government entities. This will allow for open communication, faster resolution of problems and less bureaucratic drawbacks on decision-making (Santorini). Acceptable levels of change across key indicators must be negotiated. (Queenstown).

Finally, overtourism might be interpreted and perceived differently by different stakeholders in tourism development; therefore, the involvement of different stakeholders as well as striking a balance between the benefits and costs of tourism development in the long term is crucial.

7. Limitations

The study design chosen has proven to be a good approach for the investigation of the challenges when measuring overtourism and to derive generalizations. Nevertheless, when interpreting the results, certain limiting factors with regard to the methodological approach have to be taken into account.

Selection of cases: Even though rough criteria for the selection of case studies were given, in the end very different cases had been analyzed. The cases differ in terms of the type of tourism and the specific challenges. They are also affected to varying degrees by overtourism. However, since comparability was not a priority, the lack of representativeness of the case studies was not crucial.

Sample size: Even though the comparison of the cases was not the primary goal, it is clear that the validity of the comparison is limited due to the small number of cases and their diversity. Especially, where data for some cases was missing, the sample of the remaining cases was usually too small to draw any conclusions.

No empirical surveys: In order to get a more complete picture of the situation in the cases analyzed, it would have been useful to have more data from different data sources. Especially, the perspective of residents had not been considered enough and would have been analyzed with specific extra surveys.

Data collection: Even though a uniform framework was used for the analysis of the cases, the data was collected decentrally by the authors of the case studies. The amount of effort involved and the sources used were different from case to case.

Data availability and data quality: The different approaches and data availability led to dissimilar levels of detail and quality of information. In some cases, unvalidated estimates had to be used. Furthermore, the lack of data for many indicators of the framework led to many gaps, so that not all indicators could have been analyzed and considered for the conclusions.

Conclusions: The personal background of the researchers might also play a role in the interpretation of data and the generalization of research findings. Although the framework for the cases had been completed by the authors of the case study, the cross-case analysis and comparison of the cases had been done by a research team that was not directly involved in the evaluation of all the case studies.

Despite these limiting factors, the coordinated approach, the feedback loops, the multi-eye principle and the expertise of the authors of the case studies helped to compensate for these potential shortcomings.

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9. Appendix: Data of the case studies

Disclaimer:

Although every effort has been made to ensure that this study contains accurate quality content, the editors of this study cannot take responsibility for the quality or content of the data presented in the case studies. Not all of the data could be double-checked by the editors.

Since the data situation is often insufficient, the authors of the case studies sometimes had to work with secondary sources or even estimations. Some of the data had to be corrected or to be recalculated based on numbers provided. Nevertheless, since the main goal of the study was to learn about challenges and limitations, the set of data collected in the case studies served as a valuable basis for the comparison of the cases and the derivation of the challenges faced.

The authors of the case studies provided further explanations and comments for all values and calculations as well as data sources for the indicators. Nevertheless, to ensure readability, the following section provides the overview of the data for the case studies without any further comments.

9.1 General indicators

The general indicators were needed in order to calculate density indicators and to put other indicators into relation to specific indicators like the area or the number of inhabitants.

Metric	Definition (Description of indicator)	Byron Bay	Luzern	Ohrid	Queenstown	Santorini	Sylt	Venice	Vienna
Destination area	Area of destination (km2)	567	29.1	203	8705	90.62	99	26.8	415
Area of tourist centre	Area of tourist centre (city centre) (km2)	19	0.397	7	0.12	73	51	7.97	3
Inhabitants in destination	Number of inhabitants in destination	33987	81401	55749	67100	15550	17895	853552	1800000
Inhabitants in tourist centre	Number of inhabitants in tourist centre	6119	2292	2400	15900	1857	13613	261321	16465
Population development	Absolute increase or decrease in local destination population from 2012 - 2017	2888	1923	N/A	8300	1819	92	8023	223200
	Absolute increase or decrease in local tourist centre population from 2012 - 2017	600	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Relative increase or decrease in local destination population from 2012 - 2017	8.50%	2.36%	N/A	5.20%	11.70%	0.51%	0.94%	12.40%
	Relative increase or decrease in local tourist centre population from 2012 - 2017	9.81%	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hotels	Number of Hotels	18	55	N/A	38	364	77	1188	434
Hotel rooms	Number of Hotel rooms	556	3128	11333	3340	8762	N/A	49815	33610
Hotel beds	Number of Hotel beds	N/A	6019	29113	N/A	17295	23361	97868	66352
Tourist arrivals	Number of tourist arrivals in destination (2017)	1885000	772875	275613	3000000	2551581	792315	9500934	7097000

Metric	Definition	Byron Bay	Luzern	Ohrid	Queenstown	Santorini	Sylt	Venice	Vienna
Arrivals growth	Absolute growth in tourist arrivals 2012- 17	63261	93631	92278	N/A	N/A	N/A	N/A	N/A
Arrivals growth	Relative growth in tourist arrivals (%) from 2012 to 2017	41.63%	13.78%	50.33%	N/A	N/A	16.71%	15.76%	43.00%
International and domestic	Share of international tourist arrivals	11.47%	77.00%	58.27%	39.05%	41.00%	2.58%	76.40%	81.80%
Overnights 2017	Total overnights per year	4528441	1343299	937041	3579308	5200000	7093536	37042454	15510000
Development of overnight stays	Development of overnight stays from 2012 - 2017	1583104	202355	113375	1035809	N/A	N/A	N/A	N/A
	Relative development of overnight stays 2012-17	53.74%	17.74%	12.10%	28.94%	63.00%	8.30%	8.83%	55.00%
Overnights in low season	Overnights in low season	N/A	69595	96501	972255	N/A	1528784	4037929	800000
Overnights in peak month	Overnights in peak month	N/A	160614	306007	375563	N/A	1104688	8722049	1641337
Overnights in lowest month	Overnights in lowest month	N/A	65431	7047	213835	N/A	209921	624439	788117
Overnight visitor high season	Number of months in 2017 with overnights above average	N/A	6	3	7	6	6	4	8
International and domestic overnights	Absolute international overnights	1400000	1046333	379472	N/A	4732000	209969	27447075	12687180
	Share of international overnights	30.92%	77.89%	40.50%		91.00%	2.96%	74.10%	81.80%
	Absolute domestic overnights	2766000	296896	557569	N/A	468000	6883567	9595379	2822820
	Share of domestic overnights	61.08%	22.10%	59.50%		9.00%	97.04%	25.90%	18.20%
Day visitors 2017	Total day visitors per year (estimated)	933000	12000000	N/A	N/A	N/A	423302	26030	
Employment in Destination	Tourism share of employment (%) in destination (as percent of total)	13.20%	5.06%	N/A	48.90%	25.30%	N/A	12.40%	

9.2 Density indicators (composed indicators)

The composed indicators allow to combine different indicators and to put them into relation to other indicators. Not all of the indicators presented are equally meaningful.

Metric	Definition (Description of indicator)	Byron Bay	Luzern	Ohrid	Queenstown	Santorini	Sylt	Venice	Vienna
General indicators									
	Area of tourist centre/ Destination area	3.35%	1.36%	3.45%	0.0014%	80.55%	51.52%	29.74%	0.72%
	Inhabitants per km² in the destination area	59.9	2797.3	274.6	7.7	171.6	180.8	31849.0	4337.3
	Inhabitants per km² in the tourist centre	322	5773	343	132500	25	267	32788	5488
	Arrivals/ Destination area	3325	26559	1358	345	28156	8003	354512	17101
	Arrivals/ Area of tourist centre	99211	1946788	39373	25000000	34953	15536	1192087	2365667
	Arrivals/Inhabitants in destination area	55.46	9.49	4.94	44.71	164.09	44.28	11.13	3.94
	Arrivals/ Inhabitants in area of tourist centre	308	337	115	189	1374	58	36	431
	Total overnights/ Destination area	7987	46161	4616	411	57381	71652	1382181	37373
	Total overnights/ Area of tourist centre	238339	3383625	133863	29827567	71233	139089	4647736	5170000
	International overnights/ Destination area	2469	35956	1869	N/A	52216	2121	1024145	30572
	International overnights/ Area of tourist centre	73684	2635599	54210	N/A	64822	4117	3443799	4229060
	Domestic overnights/ Destination area	4878	10203	2747	N/A	5164	69531	358037	6802
	Domestic overnights/ Area of tourist centre	145579	747849	79653	N/A	6411	134972	1203937	940940
	Total overnights/ Inhabitants in destination area	133	17	17	53	334	396	43	9

Metric	Definition	Byron Bay	Luzern	Ohrid	Queenstown	Santorini	Sylt	Venice	Vienna
	Total overnights/ Inhabitants in area of tourist centre	740	586	390	225	2800	521	142	942
	International overnights/ Inhabitants in destination area	41	13	7	N/A	304	12	32	7
	International overnights/ Inhabitants in area of tourist centre	229	457	158	N/A	2548	15	105	771
	Domestic overnights/ Inhabitants in destination area	81	4	10	N/A	30	385	11	2
	Domestic overnights/ Inhabitants in area of tourist centre	452	130	232	N/A	252	506	37	171
	Hotels per km2 (destination)	0.03	1.89	N/A	0.00	4.02	0.78	44.33	1.05
	Hotel rooms/Hotel	30.89	56.87	N/A	87.89	24.07	N/A	41.93	77.44
	Hotel beds/Hotel	N/A	109.44	N/A	N/A	47.51	303.39	82.38	152.88
	Hotel beds/Hotel room	N/A	1.92	2.57	N/A	1.97	N/A	1.96	1.97
General indicators & experimental indicators									
	Number of visitors in top 5 fee-based attractions/Arrivals	N/A	89.90%	188.29%	31.59%	13.73%	N/A	N/A	N/A
	Number of visitors in top 5 fee-based attractions/ Total overnights	N/A	51.72%	55.38%	26.48%	6.74%	N/A	N/A	N/A
	Number of hotels/ destination area	0.03	1.89	N/A	0.00	4.02	0.78	44.33	1.05
	Number of hotels/ tourist centre area	0.95	138.54	N/A	316.67	4.99	1.51	149.06	144.67
	Number of hotel rooms/ destination area	0.98	107.49	55.83	0.38	96.69	N/A	1858.77	80.99
	Number of hotel rooms/ tourist centre area	29	7879	1619	27833	120	N/A	6250	11203

Metric	Definition	Byron Bay	Luzern	Ohrid	Queenstown	Santorini	Sylt	Venice	Vienna
	Number of hotel beds/ destination area	N/A	207	143	N/A	191	236	3652	160
	Number of hotel beds/ tourist area	N/A	15161	4159	N/A	237	458	12280	22117
	Number of hotel rooms/ Inhabitants in destination area	0.02	0.04	0.20	0.05	0.56	N/A	0.06	0.02
	Number of hotel rooms/ Inhabitants in tourist centre area	0.09	1.36	4.72	0.21	4.72	N/A	0.19	2.04
	Number of hotel beds/ Inhabitants in destination area	N/A	0.07	0.52	N/A	1.11	1.31	0.11	0.04
	Number of hotel beds/ Inhabitants in tourist centre area	N/A	2.63	12.13	N/A	9.31	1.72	0.37	4.03

9.3 Experimental indicators

These indicators were collected to experiment with different indicators for 'touristification' and overtourism and to derive challenges and limitations of these indicators.

Metric	Definition	Byron Bay	Luzern	Ohrid	Queenstown	Santorini	Sylt	Venice	Vienna
Visitors in main attractions	Total numbers of visitors in top 5 (TripAdvisor) fee-based attractions	N/A	694793	518950	947770	350265	N/A	N/A	8773839
	Nr. of visitors in top 5 (TripAdvisor) fee-based attractions in highest month	N/A	26345	206950	28810	N/A	N/A	N/A	N/A
	Nr. of visitors in top 5 (TripAdvisor) fee-based attractions in lowest month	N/A	9003	3658	8073	N/A	N/A	N/A	N/A
	Nr. of attractions with visitor restrictions (time slots, guest limits, etc.) from 5 top attractions	N/A	0	0	N/A	0	1	4	N/A

Metric	Definition	Byron Bay	Luzern	Ohrid	Queenstown	Santorini	Sylt	Venice	Vienna
Bike rentals	Absolute number of bike rental businesses in the city centre	5	3	17	6	38	18	0	3
	Share of foreigners who rent bikes (eg. use of foreign address or credit card)	N/A	30%	N/A	60%-90%	N/A	N/A	0	25%
Airbnb accommodations	Number of Airbnb listings in the destination (at a specific date during the survey period)	233	306	306	300+	306	306	6497	306
TripAdvisor reviews relating to overcrowding	Share of reviews that address issues related to overcrowding among TripAdvisor's top 10 attractions (%) *Keywords: overcrowded, too many people, crowds, long wait, no room, others*	1.01%	0.68%	0.00%	2.30%	18.66%	6.20%	4.54%	1.00%
	overcrowded	8	14						
	crowds	70	154						
	too many people	0	3						
	long wait	0	1						
	others	0	28						
Coffee price ratio	Difference in the average coffee price in the tourism centre and the coffee price in the outskirts at a selected date during the survey period. *Average price in top 5 restaurants (TripAdvisor Coffee & Tea) in tourism centre and 5 randomly selected restaurants outside the centre.*	0.50	0.28	30	-0.04	N/A	-0.03	-0.50	4.00

Metric	Definition	Byron Bay	Luzern	Ohrid	Queenstown	Santorini	Sylt	Venice	Vienna
	Difference in the average coffee price in the tourism centre and in the outskirts at a selected date during the survey period in %. *Average price in top 5 restaurants (TripAdvisor Coffee & Tea) in tourism centre and 5 randomly selected restaurants outside the centre.*	11.1%	6.1%	50.0%	-0.9%	N/A	-0.7%	-33.3%	66.7%
	outside	4	4.32	30	4.62	N/A	4.1	1.5	2
	centre	4.5	4.6	60	4.58	N/A	4.07	1	6
Beer price ratio	Difference in the beer price in the tourism centre in the outskirts at a selected date during the survey period. *Average price in top 5 restaurants (TripAdvisor Bars & Pubs) in tourism centre and 5 randomly selected restaurants outside the centre.*	1.25	-0.24	20	0.32	N/A	0.34	0.50	3.00
	Difference in the beer price in the tourism centre and in the outskirts at a selected date during the survey period in %. *Average price in top 5 restaurants (TripAdvisor Bars & Pubs) in tourism centre and 5 randomly selected restaurants outside the centre.*	13.9%	-5.04%	20.0%	3.4%	N/A	9.7%	9.1%	50.0%
	outside	7.75	5	80	9.08	N/A	3.16	5	3
	centre	9	4.76	100	9.4	N/A	3.5	5.5	6

Metric	Definition	Byron Bay	Luzern	Ohrid	Queenstown	Santorini	Sylt	Venice	Vienna
Media coverage about local overtourism issues	Amount of articles about local overtourism issues in two most important newspapers from 2012 - 2017	N/A	72	11	429	14	4	70	N/A
Reader's letters	Number of reader's letters about overtourism in the two most important newspapers from 2012-2017	N/A	6	0	N/A	N/A	N/A	3	N/A
Restaurants	Number of restaurants providing a menu in other languages than the local language among the TripAdvisor's 5 top restaurants	0	5	5	0	N/A	0	3	N/A
	Number of restaurants having pictures in their menu among the TripAdvisor's 5 top restaurants	1	0	5	2	5	1	1	N/A
Tourist transportation	Number of providers of transport aimed at tourists (e.g. tourist trains, segway tours or hop on/hop off busses)	3	4	0	93	7	5	35	3
Regulations for the hotel sector and/or the sharing economy	Existence of regulation for Hotels, Airbnb, Uber and/or others (e.g. visitor limits, restriction in number of nights per flat, etc.) *Assessment from 1 (not regulated) - 5 (strongly regulated)*	2	3.5	N/A	N/A	0	0	1	N/A

9.4 WTTC indicators

The colletion of these indicators from WTTC-study (WTC 2017) allowed testing their appclicability to other (smaller) destinations and deriving challenges and limitations of this approach.

Metric	Definition (Description of indicator)	Byron Bay	Luzern	Ohrid	Queenstown	Santorini	Sylt	Venice	Vienna
Importance of tourism	Tourism share of GDP and employment (%) *Average contribution of direct tourism to GDP (as percent of total) and employment (as percent of total) in 2017 (Average of GDP & employment)*	11.85%	5.03%	N/A	33.40%	47.65%	3.35%	11.90%	N/A
	GDP	10.50%	5.00%	N/A	17.90%	70.00%	3.10%	11.40%	7.00%
	Employment	13.20%	5.06%	N/A	48.90%	25.30%	3.60%	12.40%	N/A
Arrivals growth	Growth in tourist arrivals (% CAGR) from 2012 to 2017 *Average annual growth rate in international and domestic arrivals from 2012 to 2017; given data availability*	8.33%	2.76%	10.06%	N/A	20.75%	3.34%	3.15%	8.60%
Density of tourism	Numbers of visitors per square kilometre *Calculated as 2017 arrivals divided by the number of square kilometers in the area encompassing TripAdvisor's top 20 attractions for the destination*	99210	1946788	1072	344	28155	8003	1192087	17101

Metric	Definition	Byron Bay	Luzern	Ohrid	Queenstown	Santorini	Sylt	Venice	Vienna
	referred to destination	3325	26559	1358	345	28156	8003	354512	17101
	referred to tourist centre	99211	1946788	39373	25000000	34953	15536	1192087	2365667
Tourism intensity	Numbers of visitors per resident *Calculated as 2017 arrivals divided by the population in the destination (using the same definition of each destination as arrivals data)*	308	337	4.9	44.7	164	44.3	36.4	3.9
	referred to destination	55	9	5	45	164	44	11	4
	referred to tourist centre	308	337	115	189	1374	58	36	431
Negative TripAdvisor reviews	Share of “poor” or “terrible” reviews among top attractions (%) *Data captured from TripAdvisor’s top 10 attractions in the destination at a date during the survey period*	3%	0%	2%	1.79%	1.98%	1.62%	1.11%	2%
Arrival seasonality	Difference in arriving-flight seats between high and low month (ratio) *Value from month in 2017 with highest number of arriving-flight seats divided by value from month with lowest number*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.78

Metric	Definition	Byron Bay	Luzern	Ohrid	Queenstown	Santorini	Sylt	Venice	Vienna
Attraction concentration	Share of reviews limited to top 5 attractions (%) *Data captured from TripAdvisor at a date during the survey period and calculated as reviews of top 5 attractions divided by reviews of all attractions*	35.79%	30.89%	39.70%	N/A	33.34%	67.43%	59.12%	16.00%
Air pollution	Annual mean PM10 particulate concentration (micrograms per m^3)[1] *Data captured by the World Health Organization in cities for most recent year with official reporting (typically 2012–14 but varies by destination)*	N/A	43	N/A	N/A	N/A	18	N/A	N/A
Historic site prevalence	Share of top 20 TripAdvisor attractions that are historic sites (%) *Data captured from TripAdvisor at a date during the survey period on the top 20 attractions for the destination, analyzed to identify historical sites*	10%	10%	66.66%	0%	14.20%	60%	10%	75%