eco-union

Guide to climate adaptation strategies in tourist destinations

COASTAL, ISLAND AND MOUNTAIN DESTINATIONS

Credits

The authorship of this guide belongs to the **eco-union** association. This guide has been developed within the framework of the **ADAPTUR** project, with the support of the Spanish Ministry for the Ecological Transition through Fundación Biodiversidad.

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Researchers: Alejandro González Domingo & Debora Tonazzini.
Adaptation: Alejandro González, Salvador Klarwein, Jérémie Fosse
Translation: Sara Campanales
Supervision: Jeremie Fosse

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Collaborators
Researchers of the Territorial Analysis and Tourist studies (GRATET) from Rovira i Virgili University: Raquel Santos-Lacueva, Òscar Saladié Borraz, Antonio Paolo Russo and Salvador Antón Clavé.

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Calvià Town Hall, Dirección General de Energía y Cambio Climático del Gobierno de las Islas Baleares, Comarca de la Jacetania (Huesca), Dirección General de Sostenibilidad del Gobierno de Aragón, and the Observatorio Pirenaico de Cambio Climático (OPCC).

Use and utility of this guide

This guide is a basic resource for the development of **strategies and adaptation plans** to climate change in tourist destinations. It includes information on the impacts, risks and vulnerabilities of mountain and coastal destinations to climate change.

The development of the guide has been inspired by the **Climat-Adapt** resource of the European Environment Agency as well as other guides, resources and scientific works for climate change adaptation.

This guide is the practical outcome of a comprehensive assessment of a coastal destination (Calvia, Mallorca) and a mountain destination (Jaca, Huesca) available here (in Spanish):
http://www.ecounion.eu/portfolio/adaptur/

The report conclusions have been discussed and validated with local stakeholders and researchers in different workshops in Barcelona (coastal destination), Calviá (island destination) and Jaca (mountain destination).

It is important to highlight that the strategic adaptation processes must always be **adapted to the local and national context.**

The guide is structured in three sections:
- Stage 1: Climate change & tourist destinations
- Stage 2: Vulnerability and adaptation to climate change
- Stage 3: Strategic process of adaptation to climate change

Guide to climate adaptation strategies in tourist destinations

COASTAL, ISLAND AND MOUNTAIN DESTINATIONS

STAGE 1: CLIMATE CHANGE & TOURIST DESTINATIONS

STAGE 2: VULNERABILITY AND ADAPTATION OF DESTINATIONS TO CLIMATE CHANGE

STAGE 3: STRATEGIC PROCESS FOR CLIMATE CHANGE ADAPTATION OF DESTINATIONS

STAGE 1

CLIMATE CHANGE & TOURIST DESTINATIONS

1.1. Tourism & climate

Coastal and mountain tourism are the main sectors of the **blue and green economy** in the Mediterranean[1], and the main economy in many settlements. This type of tourism is the one that contributes most to the tourism sector in Europe. Coastal and high mountainous areas are among the most **vulnerable systems** to climate change, which experience several of its impacts; such as sea level rise and snow cover reduction.

Climate plays an essential role in the popularity and success of tourist destinations and, therefore, in tourism revenues. Climate change is expected to "reconfigure" tourism activity and impact the geographical and seasonal distribution of tourists. In particular, due to heat waves and other impacts of climate change, it will affect the attractiveness of different tourist destinations.

Excessive development in tourist destinations, such as the construction of hotel complexes, ski resorts and transport infrastructure, has generated significant environmental impact. The intensity of infrastructure development increases the degree of **exposure and sensitivity** to the impacts of climate change, such as water scarcity, flooding and other climate events.

1.2. Climate change and tourism

Tourism is one of the most vulnerable economic sectors to climate change and climate variability, at any scale and destination typology[2]. Due to this close reciprocal relationship, elements of climate are key determinants of the spatial and temporal distribution of tourism[3].

The practice of many leisure activities is directly linked to specific **climatic conditions and climate comfort**. Knowing the optimal parameters for the practice of tourism activities is crucial for the management of demand led by destination managers and tourism companies. Both winter sports and summer tourist practices depend on temperature. Consequently, knowing the optimal parameters for the practice of tourism activities is crucial for the planning of adaptation options carried out by destination managers and tourism companies. The development of climate services is an essential resource to improve the adaptation capacities of the destinations.

On the other hand, tourism contributes directly to climate change. It is estimated that tourism is responsible for **8% of global GHG emissions**[4]. This relationship between tourism and climate change, of need / dependence, of cause / effect, puts the need for intervention (adaptation and mitigation) to climate change first.

1 Fosse, J., *et al.* (2017) *Tourism in the Mediterranean: State of Play and Strategic Directions*. Plan Bleu.

2 Simpson, M.C., et al. (2008) *Climate Change Adaptation and Mitigation in the Tourism Sector*: frameworks, Tools and Practices. UNEP, University of Oxford, UNWTO, WMO: Paris, France.

3 Gómez-Martín, B. (2005) Reflexión geográfica del binomio clima-turismo. *Boletín de la Asociación de Geógrafos Españoles*, Nº. 40.

4 "Lenzen, M., Sun, Y., Faturay, F. et al. The carbon footprint of global tourism. Nature Clim Change 8, 522–528 (2018)"

1.3. Benefits of adaptation and mitigation

In the face of climate change, two types of strategies[5] must be implemented: firstly, it is important to **reduce greenhouse gas** (GHG) emissions, for which mitigation measures must be adopted; secondly, we must act to cope with its inevitable impacts by adopting **adaptive measures**.

Despite efforts to mitigate the reduction of greenhouse gases (GHG), the impact of climate change will manifest itself in the coming decades, due to the effects of global warming caused by the economy. **Adaptation** measures are necessary to manage the inevitable impacts and costs on the economy, the environment and society. **Preventive action** offers clear economic, environmental and social advantages because it anticipates the potential impact and minimises threats to ecosystems, human health, the economy and infrastructure[6].

The impacts of climate change affect all geographic, administrative and socio-economic levels. Therefore, **local planning** must interact with the supra-municipal bodies at the **regional and state** level. Similarly, **tourism depends on different systems** (energy, transport, environment, health) to supply resources and generate tourist sites. The tourism system is complex, so adaptation strategies must consider the **cross-functionality of policies,** integrating the different administrative and policy areas of relevant authorities and agencies.

The **adaptation strategies and action plans** of tourist destinations to climate change can offer opportunities to generate **new jobs** in the sectors of renewable energy, construction, sustainable mobility, organic farming, diversification of tourism products or climate information and information and communications technology (ICT). In line with the **European 2020 Strategy,** adaptation strategies aim to move towards a climate-resilient and low-emission economy, promoting sustainable growth, stimulating investment and creating new jobs.

Therefore, the integration of **adaptation and mitigation strategies** enhances the resilience of territories, and thus, of tourist destinations, supposing that these are developed in a coherent and complementary way. This integration makes it possible to boost the **low carbon and climate resilient economy** by opening opportunities for territories that respond better to the impacts of climate change.

1.4. Statregies to adapt tourist destionations to climate change

Mountain[7,8], coast and island[9] destinations have been identified among the most vulnerable to climate change. In this context of **high vulnerability**, these destinations must establish climate change adaptation strategies. The strategic approach must address the physical and socio-economic aspects, to prevent and cope with the negative effects of current and future climate changes, and take advantage of new opportunities for sustainable tourism. In order to minimise the risks and impacts caused by the new current climate reality and the future prospective, it is essential to **involve all levels of political and socio-economic systems.**

5 Commission of the European Communities. COM(2009) 147/4. Adapting to climate change: Towards a European framework for action

6 Ídem

7 Pons, M., et al. (2015) The vulnerability of Pyrenean ski resorts to climate-induced changes in the snowpack, *Climate Change*, 131 (4), 591-605

8 EEA (2017) *Climate change impacts and vulnerabilities in Europe 2016. An indicator-based report.* No 1/2017

9 Simpson, M.C., et al. (2008) *Climate Change Adaptation and Mitigation in the Tourism Sector: frameworks, Tools and Practices.* UNEP, University of Oxford, UNWTO, WMO: Paris, France.

The design of **adaptation strategies** requires defining the **temporal and spatial scales**, that is, assessing current and future impacts in a given territory, since it is the local context that determines which approaches and initiatives will be most effective. Not all regions and tourist destinations are affected by climate change in the same way and with the same intensity. This implies adapting the strategies to the geographical characteristics (socio-economic, climatic, level of exposure), and strengthening and intensifying the adaptive capacity of all local stakeholders (policy makers, companies, consumers, civil society). **Information management and knowledge generation** play a fundamental role in assessing vulnerability to climate change and making the most effective, efficient and sustainable decisions.

The **adaptation strategies** of tourist destinations to climate change help to make **political and economic decisions**, which in turn reduce uncertainty, economic costs and allow taking advantage of opportunities Different strategies can be considered based on redesigning tourism activities in areas affected by climate impacts, adapting infrastructure and promoting alternative products:

Table 1:
Strategic framework for climate change adaptation in tourist destinations

STRATEGIC APPROACHES ORIENTED TOWARDS	ACTIONS	TEMPORAL SCALE	BENEFITS
RESOURCES MANAGEMENT (natural, human, economic, infrastructures, etc.)	Protection of natural and cultural resources Reconversion of active resources Regulation of resources	Short-Medium Term	Reduce vulnerability to climate risks
TOURISM PRODUCTS & SERVICES	Management of seasons based on climate information Diversification of tourist products and experiences Contracts with "climate risk insurance"	Medium-Long term	Take advantage of opportunities and adapt to changing conditions
MARKETS & VISITORS	Sensitivity / response of markets to climatic conditions Climate information to tourists	Short-Medium-Long term	Improve knowledge-based systems of destinations Prevent risks and reporting for decision-making

1.5. Climate services

Climate services are products with specific applications that are derived from the transformation of basic climate data and information. That is, they involve the practical translation of large volumes of data that are difficult to interpret for the end user, so that they serve to improve decision-making. Climate services are very useful for different economic sectors closely linked to climatic conditions, as in the case of tourism.

The **complexity** of the tourism sector means that sensitivity to climate change is diverse, in accordance with the different sub-sectors (accommodation, transport, catering, leisure...); tourism products and experiences; and the peculiarities of demand, according to its place of origin and the climatic characteristics.

Climate information can be offered differently and at different times, depending on the needs of its users. Thus, the time scale will vary from very short term, such as a few hours before an activity, to medium term, such as a few days or weeks and long term, for example, for multiple-year and decades projections.

Climate services users

- **Tour operators (TO) and Destination Management Organisations (DMO)**
  They can use historical series of climate information and long-term projections for strategic planning. Climatic data can influence investments, the selection of locations, and architectural and landscape design. Insurance companies also provide flexible contracts associated to climatic conditions that operators and tourist destinations can adapt to their particular characteristics and climatic conditions.[10]

- **Public authorities**
  Public institutions can use climate services to guide their promotion, investments and tourism development. In addition, climate information can help governments to respond to disasters and climate-related risks with emergency plans and regulations, such as environmental impact assessments, hazard warning systems, evacuation systems, fire prevention, natural resources management systems.

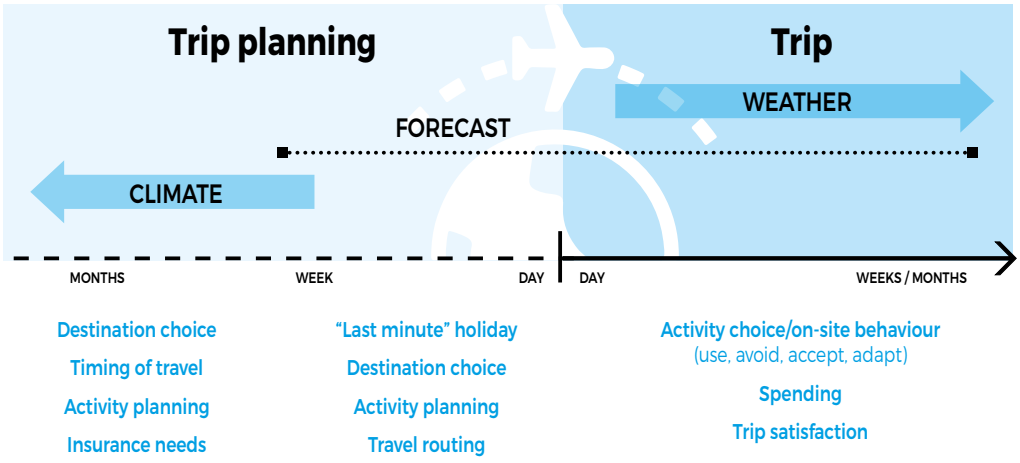
- **Tourists and visitors**
  Climate is a factor largely considered by tourists when choosing their destination, and therefore determines the attractiveness of tourist destinations[11]. The meteorological conditions also influence other aspects such as spending expenses during the holidays and the experience and satisfaction of tourists[12]. Tourists use climate information to make decisions at different times, before and during the trip (Illustration 1).

10 For example, some destinations offer to return part of the money to their visitors in the event of not exceeding certain temperature thresholds or experiencing more abundant rainfall than expected.

11 Hu, Y. and Brent Ritchie, J.R. (1993) Measuring Destination Attractiveness: A Contextual Approach. Journal of Travel Research, Vol. 33, 2

12 Smith, S.L.J. (1994) The Tourism Product. *Annals of Tourism Research*, Vol. 21, 3, pp. 582-595

Illustration 1:
Climate and Weather Information for Leisure Tourists' Decision-making[13]



Climate service providers

- **Public climate service providers**
  Governmental meteorological agencies usually offer basic meteorological services (short or medium term predictions); population and maritime and air transport alerts; climate change projections to facilitate adaptation; and some services intended for tourist use.

- **Private climate service providers**
  Private providers have led the creation of specific services for tourism, incorporating new technologies to facilitate their use, in particular for outdoor activities such as alpine skiing, fishing, boating or sporting events.

- **Tour operators**
  Tour operators usually provide basic climatic information, such as average temperatures. However, a greater use and precision of such information should be promoted so that it is more useful for trip planning or to promote the tourist destination.

- **Tourist destinations**
  Tourist destinations also tend to provide climate information as a tourist attraction and to improve visitor experience. In many cases it is limited to basic data (temperature, climate conditions) that could be supplemented with details on what clothes to wear or warnings about the use of insect repellents or sunscreen.

13 Scott, D, Lemieux, C (2010) Weather and climate information for tourism. Procedia Environmental Sciences, Vol. 1

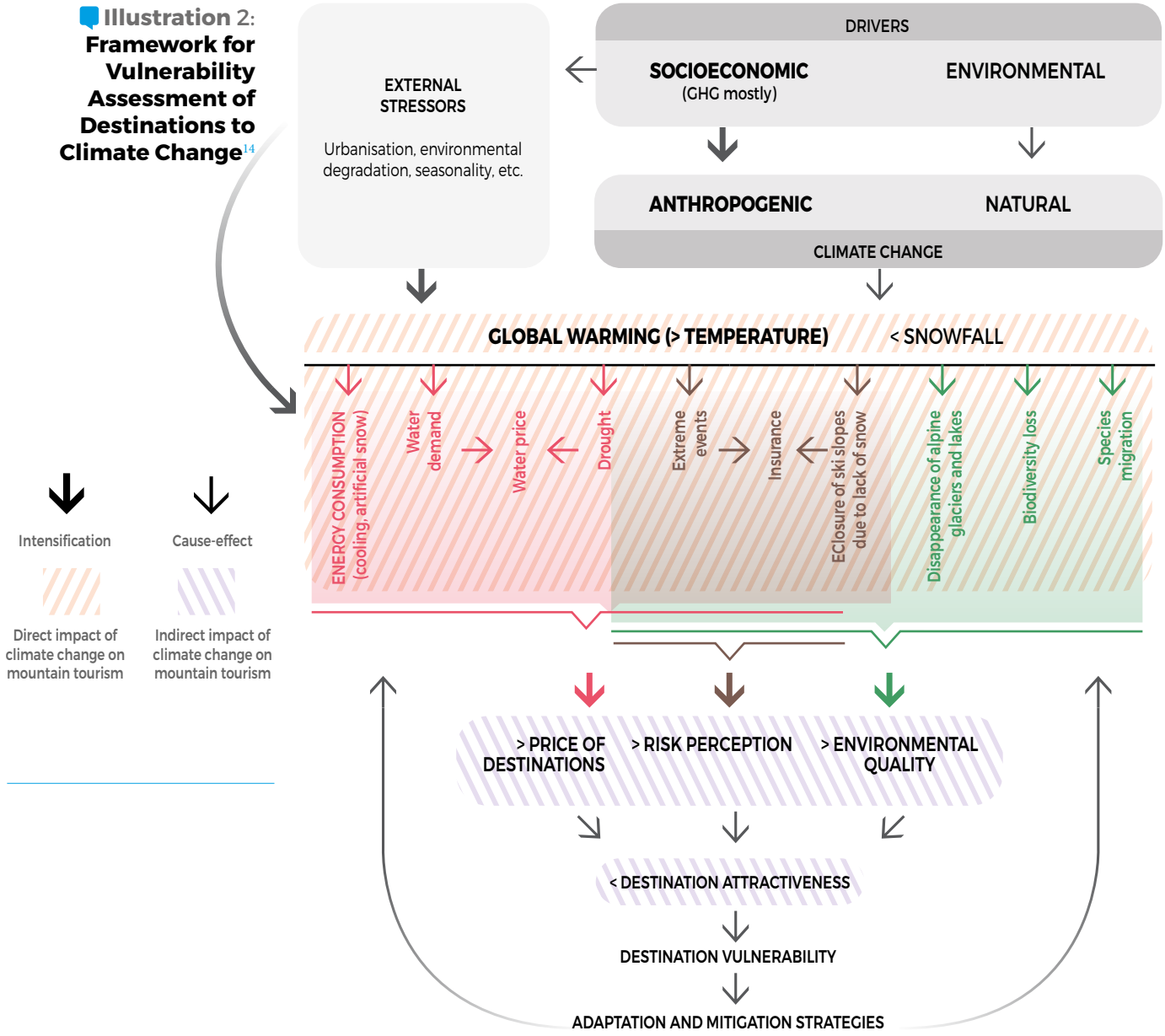
STAGE 2

VULNERABILITY AND ADAPTATION OF DESTINATIONS TO CLIMATE CHANGE

2.1. Vulnerability to climate change

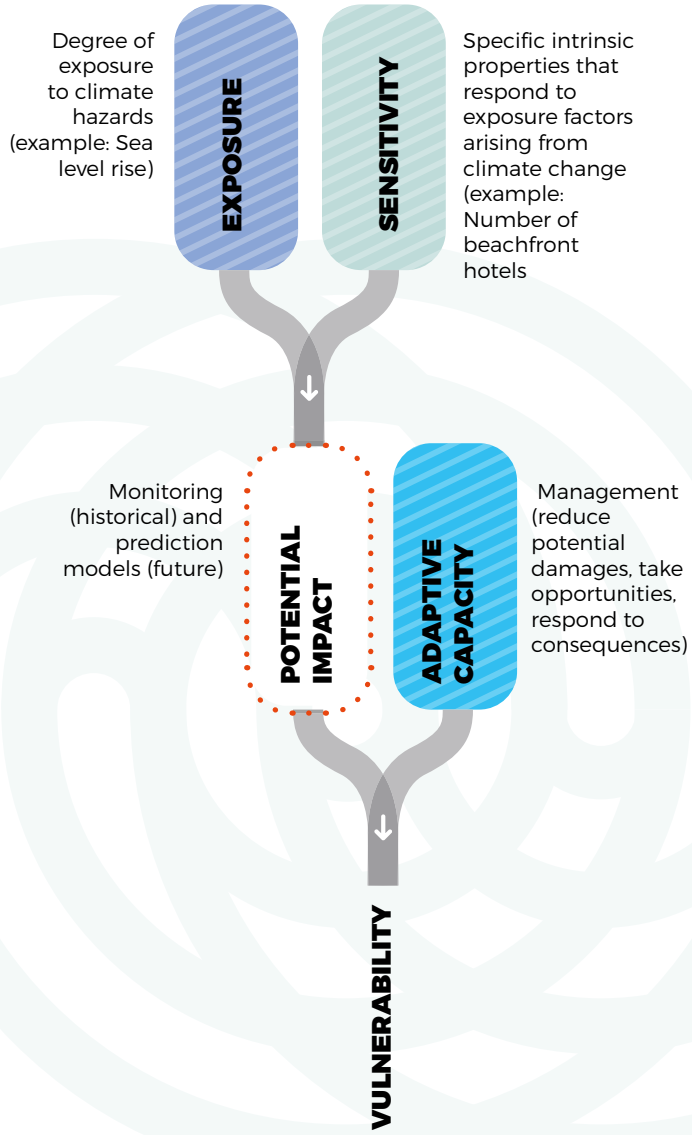
The **degree of vulnerability** of tourist destinations depends on the **degree of exposure** of tourism infrastructure, natural resources and tourists to climate risks, the **sensitivity of the tourism system** to specific levels of exposure, and the **ability of local technological and socio-economic systems** to adapt the tourism sector to climate change, including to extreme events and climate variability.

Illustration 2: Framework for Vulnerability Assessment of Destinations to Climate Change[14]



14 Santos-Lacueva, R. et al. (2017) The Vulnerability of Coastal Tourism Destinations to Climate Change: The Usefulness of Policy Analysis. *Sustainability*, 9, 2062

Illustration 3: Elements of Vulnerability to Climate Change[15]



Vulnerability of mountain and snow tourism

The geographical and tourism-related factors that increase the vulnerability of mountain tourism to the effects of climate change are, among others:

- The geographical and tourism-related factors that increase the vulnerability of mountain tourism to the effects of climate change are, among others:
- Ski resorts at lower altitudes, where the impacts of climate change are more pronounced.
- Reduced snow cover, essential for ecological balance and for tourism.
- High sensitivity of natural resources (snow, landscape, water resources) to climate change.
- Irregularity of rainfalls (seasonal and interannual; altitude and latitude).
- Strong socio-economic dependency on (snow) tourism.
- Extreme dependence on climatic conditions and natural resources.
- Biodiversity alterations that reduce ability to adapt.
- Reduced skills and resources.
- Development of second homes increasing pressure on natural resources.

15 MERF. 2013. *Vulnerability Assessment Tools for Coastal Ecosystems: A Guidebook*. Marine Environment and Resources Foundation, Inc.: Quezon City, Philippines, pg. 162.

Vulnerability of coastal and island tourism

The geographical and tourism-related factors that increase the vulnerability of coastal and island tourism to the effects of climate change are, among others:

- Location in mid-latitudes (Mediterranean Sea), with highest warming impact.
- Insularity amplifies exposure to the impacts and risks of climate change.
- Loss of the recreational attractiveness of certain sites and periods in coastal areas
- High anthropisation (infrastructure) of the coast increasing exposure to risks
- Strong socio-economic dependency on (coastal) tourism
- Seasonalisation of tourism during the summer months,
- Extreme dependence on the climatic conditions and natural resources quality
- Emergence of new destinations more resilient to climate change (including northern latitude)

Risks and impacts of climate change on destinations

The degree of exposure and sensitivity of mountain and coastal destinations will affect the viability of beaches, ski slopes, basic resources and tourist infrastructure, to a greater or lesser degree in accordance with the adaptation strategies promoted by different governments and the dynamics of global change.

The PESETA II[16] report estimates, in the optimistic scenario of 2º C of temperature rise throughout this century, losses of around 1.5% per year of the national GDP in the Mediterranean countries from 2070. This percentage rises above 2.5% of annual GDP for temperature rises above 3º C. Economic losses would affect the adaptive capacity of territories with strong socio-economic dependence on the tourism sector, especially those destinations linked to the ski industry.

Table 2:
Risks, Exposure, Sensitivity and Impact of Climate Change on Mountain Tourism

	Climatic factor	Exposure	Sensitivity	Impact
High Temperatures				
	Increase in average temperatures and frequency of hot events	High maximum and minimum average temperatures, decrease in snow cover, decrease in the number of skiable days	High sensitivity of snow to rising temperatures, alteration of the seasonal pattern of snow tourism	Shortening of the ski season and decline of snow tourism; Loss of natural attractions due to the disappearance of glaciers
Droughts				
	Decrease in rainfall and snowfall.	Reduction of rainfall and snowfall, loss of natural resources and attractiveness of the destination (snow, landscape, lakes, etc.), decrease in water resources. Decrease in the number of days with a sufficient accumulation of snow for skiing or other outdoor activities (rafting).	Reduction of the tourism attraction due to insufficient snow coverage and thicknesses for skiing. Recreational activities such as rafting depend on the hydrological regime of rivers, affected by reducing rainfall and water availability.	The reduction of rainfall will limit snowfall, with an increase in artificial snow production, increasing the economic and energy cost for its generation and influencing water reserves, which are already under pressure. The pressure on water demand could generate conflicts between economic sectors and reduce the economic profitability of ski resorts.

	Climatic factor	Exposure	Sensitivity	Impact
Flooding				
	A higher frequency of intense rainfall will increase the number of rapid responses to flooding	Public security and disruption of tourist infrastructures, buildings, roads, trails.	Tourist areas in mountainous places, vulnerable to flooding.	The increase in flooding creates direct damage to the local and tourist population and can gener-ate catastrophic events. The incidence of impacts increases with changes in land use.
Landslides and avalanches				
	Increase of natural disasters due to the incidence of heavy rains and the disappearance of vegetation, or the replacement of native vegetation with another with a weaker root system.	Public security and disruption of tourist infrastructures, buildings, and ski slopes.	High sensitivity of infrastructures and homes, skiing activities.	The increase in landslides and avalanches can generate catastrophic events to the local and tourist population. These risks can affect the attractiveness of the territory in winter and summer.
Forest fires				
	Warm weather conditions, reduced rainfall and extreme wind episodes increase the risk of forest fires.	Public security; land degradation and biodiversity loss.	High risk of fire propagation throughout the territory.	Forest fires cause deaths and hospitalisations; they generate high public healthcare costs. Land degradation and biodiversity loss lead to a loss of attractiveness, a limitation in recreational use and a high cost of environmental recovery.
Biodiversity disruption				
	Warming can cause the displacement of tree species to higher alti-tudes and latitudes.	Deforestation, loss of biodiversity and ecosystem services, land degradation, increase in invasive species and forest fire risk.	Mountain areas are particularly exposed to the imbalance and loss of biodiversity.	Climate and landscape have always been fundamental for mountain tourism. Landscape modification can reduce attractiveness and adaptive capacity, affecting the possibility of offer diversification.

16 Ciscar, J.C.; et al. (2014): *Climate Impacts in Europe. The JRC PESETA II Project*. JRC Scientific and Policy Reports, EUR 26586EN, pg.151

Table 3:

Risks, Exposure, Sensitivity and Impact of Climate Change on coastal tourism

	Climatic factor	Exposure	Sensitivity	Impact
High Temperatures				
	Increase and frequency of hot events	High temperatures	Sun and beach tourism require a certain climate comfort.	Increase in deaths and hospitali-sations; decline in summer tourism reduction; Increase in energy and water consumption
Droughts				
	Increase and prolongation of droughts during the summer	Water scarcity	Many coastal destinations have a high water foot-print due to their tourism model (residential, hotel sector, golf…).	The reduction of rainfall and increase in temperature limits the amount of available water in water reserves, increasing generation costs and water use conflicts.
Rising sea levels				
	The sea level rise is estimated between 18 and 70 centimetres on the Mediterranean coast	Reduction of beach width, water pollu-tion, public security; and tourism infra-structure disruption	High sun and beach tourism specialisation	Increase erosion and the disap-pearance of coastal ecosys-tems, leading to the loss and modification of tourist re-sources. Damage to tourism infrastructure.
Flooding				
	Increased frequency of heavy rains increases the number of floods.	Public security, and tourism infrastruc-ture disruption	Coastal destinations are vulnerable to flooding, due to land use change and soil artificialization	The increase in floods exposes the population and tourism to health impacts.
Forest fires				
	Warm weather con-di-tions, reduced rain-fall and extreme wind episodes increase the risk of forest fires	Public security; landscape degrada-tion and biodiversity loss.	High risk of fires in coastal destinations, especially in the Mediter-ranean, with a high densi-ty of tourist urbanisation scattered throughout the territory	Forest fires cause deaths and hospitalisations; generate high public healthcare costs. Land degradation and biodiversity loss lead to a loss of attractive-ness, a limitation in recreational use and a high cost of environ-mental recovery
Biodiversity disruption				
	The increase in tem-pe-ratures, sea level, changes in ocean cir-culation and de-crease in salinity are causes of ecological imbalance	Invasive species; Tropical diseases; degradation of natu-ral heritages.	Strong tourism seasonali-ty (more pronounced in summer) and high “sun-and-beach” tourism specialisation	Loss of biodiversity and invasive species alter ecosystems; new risk of contracting tropical diseases and decrease in the attractiveness of beaches (jelly-fish).

2.2. Climate change adaptation of destinations

One key issue of tourism is to make it **environmentally sustainable**. For this, it is important to reduce vulnerability to the risks and impacts of climate change, by implementing technological, knowledge and management adaptation measures, viable at an economic, social and environmental level. Adaptation options should consider financial limitations, equality and environmental implications, as well as avoid poor adaptation strategies.

Mountain destinations

- **Conversion of ski resorts highly vulnerable to climate change**
  Consider the closure of ski resorts vulnerable to climate change, avoid public subsidies that have no guaranteed financial return; avoid opening new ski resorts that involve putting greater pressure on destinations; optimise the performance of the ski slopes and avoid investments under a minimum amount. Generate incentives and regulations to promote the energy transition to renewable sources and reduce the water footprint of ski resorts.
- **Management of the demand and reorganisation of the snow sector**
  Diversify and promote alternative activities offered by the ski resorts to skiers; redirect tourist flows to those stations less vulnerable to climate change; connect collective transport systems to facilitate transit between valleys and stations, and between ski resorts.
- **Diversification of the portfolio offer throughout the year**
  The transition from ski resorts to "mountain resorts" is a highly recommended adaptation option to plan the future of mountain tourism, with strategies mainly aimed at the active leisure industry. It would be advantageous to categorise the various tourist guidance systems as "mountain guides", which would guarantee more employment options throughout the year.
- **Reduction of the vulnerability of tourism infrastructure to climate risks**
  Increase the number of protected areas in mountain areas to improve active management against climatic risks; climate change risk prevention plans, such as for avalanches and landslides; flood risk plans in the valleys.

Coastal destinations

- **Conversion of the "sun and beach" tourism model**
  This strategy may involve: the cessation of the tourism activity of beachfront infrastructures affected by sea level rise; the diversification of tourism products throughout the year; give rise to a new hotel and residential tourism offer as an alternative to that less resilient to climate change, promoting its relationship with GHG reduction strategies and promote the extended-stay market.
- **Recovery of the maritime-land public domain and its easement area**
  This strategy involves climate-resilience measures to eliminate obsolete and heavily affected infrastructure, and the recovery of natural barriers along the coast as a nature-based solution to adapt to climate change impacts such as sea level rise or extreme climate events.

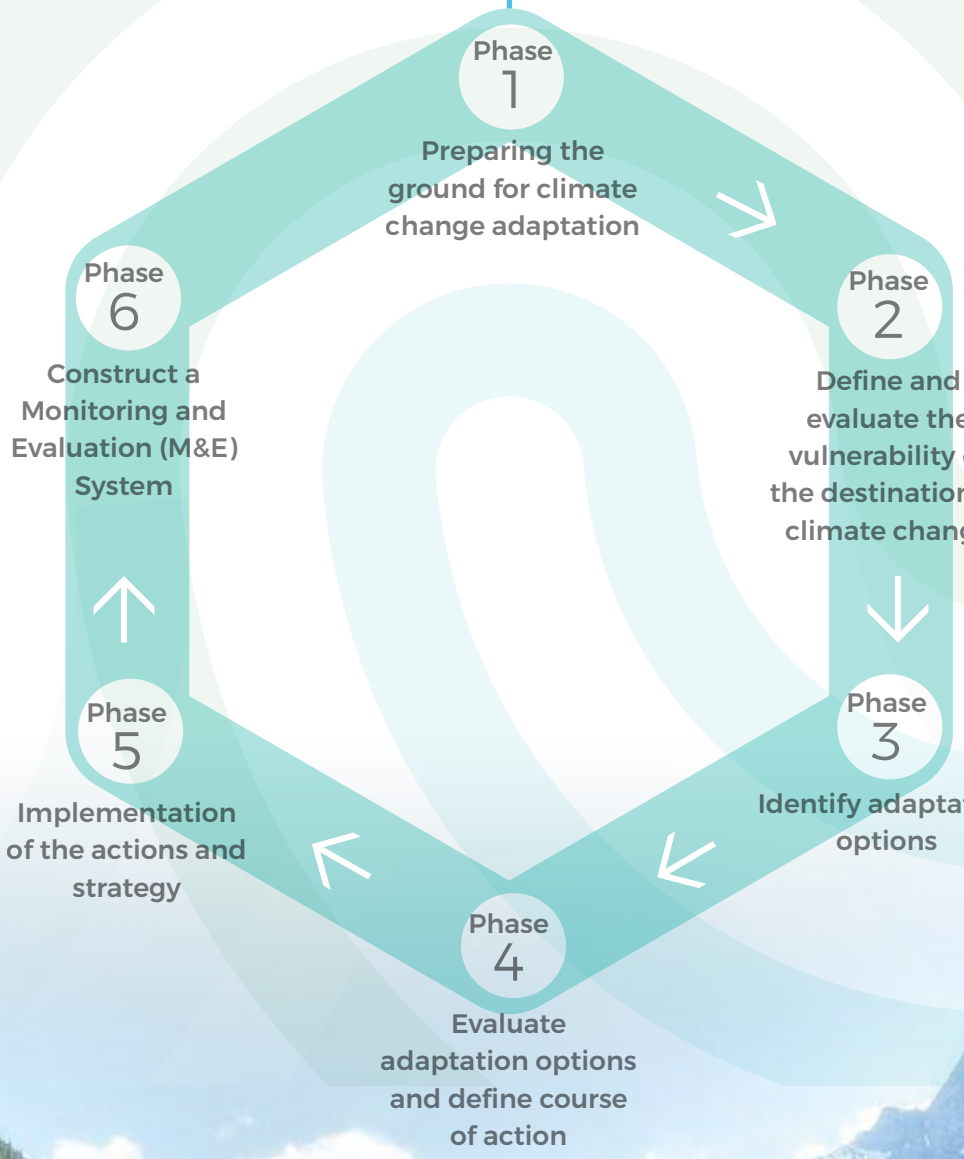
- **Improvement of public security and naturalization of destinations**
  Increase the number of green spaces and trees to provide shaded areas and lower the temperature in the villages and on the coast; public security plans against new diseases, food and water security; flood and temporary risk plans.

Tourist destinations

- **Development of climate Services**
  Develop a tourism-oriented climate information system that guides market strategies; the conversion of tourism infrastructure; the prevention and management of natural disasters derived from extreme events; encourage cooperation between research centres, tourism companies and governments for the development of applied research and the development of climate services.
- **Promotion of climate-related finance and taxation**
  Funds for climate change adaptation derived from the tourist tax and other fiscal resources related to tourism; promote investment plans and public-private cooperation for the conversion of the tourism offer; integrate climatic guidelines for infrastructure development; incentives for investment in renewable energy, energy efficiency, integral rehabilitation, etc.
- **Boost of Climate Change communication**
  Promote the training of the private sector; generate communication plans to reach tourists and residents, promoting responsible consumption habits and preparation for extreme events.
- **Integral Planning and Management**
  Strengthen the transversal management of policies related to tourism (climate change, agriculture, land management, transport, water, energy transition and biodiversity) and their connection with supra-municipal policies.
- **Greater cooperation between destinations**
  The authorities from different destinations should encourage cooperation to join forces and effectively implement climate change adaptation strategies on a supra-municipal, regional, national and international scales.
- **Transition towards sustainable tourism**
  Develop actions that guarantee the sustainable development of tourism in terms of landscape and biodiversity protection and climate-resilient infrastructure planning. It is necessary to adapt the different regulatory frameworks to generate adaptation capacities to climate change.

STAGE 3

STRATEGIC PROCESS FOR CLIMATE CHANGE ADAPTATION OF DESTINATIONS



PHASE 1
Preparing the ground for climate change adaptation

The first step is to organise the resources needed to develop the strategy.

- Achieve a high level of institutional support.
- Involve all government departments with different levels of competence
- Establish coordination mechanisms between departments
- Identify the necessary financing sources
- Collect and review all relevant studies, information and data on tourism and climate change
- Identify and involve all social agents linked to tourism and climate change

1. Ensure political commitment

At the municipal and regional level, a strategy for adapting a tourist destination to climate change depends on municipal and supra-municipal policies and regulatory frameworks to implement measures and obtain adequate financing. It is important that institutions, social and business sectors achieve a broad consensus to ensure that the strategy lasts beyond political mandates.

Table 5:
Main Policies for Climate Change Adaptation

European Union	27/05/2019: Conclusions adopted by the Council on the competitiveness of the tourism sector as a driver for sustainable growth, jobs and social cohesion in the EU for the next decade
	Directive (EU) 2018/2001/EC on Renewable Sources
	Directive 2018/2002/EC on Energy Efficiency
	EU Strategy on Adaptation to Climate Change 2013
	Water Framework Directive 2000/60/EC
	Directive 2007/60/EC on Flood Risks
	Communication on Water Scarcity and Droughts
	EU Civil Protection Mechanism

2. Coordinate local and regional policies

The adaptation of tourism to climate change depends on the coordination of various municipal, county and regional departments that define strategies in various fields (resources, markets, products). This requires the following steps:

- Define a coordination committee with the affected municipal and regional areas and delegate the coordination and leadership of the strategy to a regional department.
- Inform all relevant administrations with competencies on tourism, climate change and energy, civil protection, public health, natural areas, land management, transport, finance, etc.
- Identify all the private and social stakeholders affected at the municipal and county level.

3. Estimate the necessary resources and evaluate sources of financing

Resources needed for adaptation must be taken into consideration when allocating budgets to different departments. Similarly, sources of funding at local, regional, national and European levels must also consider these financial needs. In parallel, direct and indirect financing mechanisms must be evaluated through municipal (and regional) taxation and agreements with financial institutions. Public-private collaboration is essential to promote adaptation strategies for private tourism products and infrastructure.

Table 6:
Sources of Public Financing for Climate Change Adaptation

European Union	LIFE programme
	Cohesion Fund
	European Agricultural Fund for Rural Development (EAFRD)
	European Regional Development Fund (ERDF)
	European Social Fund (ESF)

4. Review relevant data, studies and information on climate change

The adaptation strategy should be based on robust evidence-based information. It is important to organise and structure existing knowledge on the risks and impacts of climate change and climate projections at the local-regional-state level. Gathering information on existing adaptation measures and good practices at the regional and European level is essential to carry out an analysis of these adaptation measures. Finally, evaluate which climate information the strategy needs, which will be used to define knowledge generation processes that improve the capacity to adapt to climate change.

Table 7:
Sources of Information and Good Climate Change Adaptation Practices

Climate ADAPT	Online public access database on Climate Adaptation research. http://infobase.circle-era.eu/
AdapteCCa.es	Platform for access and exchange of information, knowledge and experiences on impacts, vulnerability and adaptation to climate change in Spain https://www.adaptecca.es/
OPCC	The Pyrenean Climate Change Observatory is a basic resource for climate and strategic information for adaptation to climate change. https://www.opcc-ctp.org/

5. Involve tourism and social stakeholders

Climate change is a shared responsibility among all economic, social and institutional stakeholders. Creating participatory and collaboration environments facilitates the development and implementation of the adaptation strategy. The running of roundtables, of working groups and / or the creation of a monitoring commission, allows the conveying of views and the generation of consensus, as well as creating spaces for democratic representation.

6. Communicate and raise awareness

Communicating in an attractive and effective way the impact of climate change on the population, visitors and private and public stakeholders is a prerequisite for the joint success of any climate change adaptation strategy. It is necessary to involve all the stakeholders of the destination through different channels and formats, adapting the communication to the adaptation needs of each stakeholder. The education of all stakeholders is very relevant, so it is necessary to emphasise the understanding of the effects of climate change, the vulnerability of fate and adaptation actions. The implementation of Agenda 21 at the local level serves as a benchmark for participation and promotion of very relevant sustainable development policies that can be used as a model to promote a shared climate strategy.

Climate ADAPT SHARING ADAPTATION INFORMATION ACROSS EUROPE	Glossary of terms used by the European Environment Agency. https://climate-adapt.eea.europa.eu/help/glossary

PHASE 2
Define and evaluate the vulnerability of the destination to climate change

Assessing the vulnerability of a tourist destination to climate change helps obtain a better understanding of the risks, climate change and non-climatic impacts on the current and future tourism system. This analysis allows us to identify opportunities (e.g. new markets, new green jobs), and offer information on how to assess adaptive capacity and address uncertainty. The adaptation needs both information on climate projections and information on how climate change interacts with the regional tourism system. This information serves as a guide to scenario planning, which in turn allows us to understand the main challenges and create a vision of the future of the tourist destination.

Vulnerability
The degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity[17].

The vulnerability assessment should be based on:

- Political, socio-economic and natural systems of the tourist destination
- Climatic and non-climatic variables, and the multiple stressors that affect the destination
- Stakeholders participation throughout the planning and implementation process
- Different adaptive capacities and scenarios with prospective and historical analysis
- Consistency between local, regional and national political frameworks
- Vulnerability and adaptation indicators manageable, transparent and easy to communicate.

The objective of the vulnerability assessment should:

- Identify climate vulnerability hotspots (e.g. temperature increase, sea level rise, reduction of skiable snow days, etc.)
- Raise awareness of the vulnerability of the destination
- Improve understanding of destination dynamics
- Contribute to other plans and policies to reduce vulnerability
- Compare and prioritise vulnerable systems

Vulnerability Assessment Methodologies for Tourist Destinations

There are different methodologies that can be used to assess the vulnerability of a tourist destination. This guide explains a tool known as the **Vulnerability Scoping Diagram** (VSD)[18]. It is a data visualisation and comparison tool for different destination vulnerability assessments. It is divided into five phases aimed at defining subsystems of threat-activities, which can help guide decision-making in identifying the best adaptation options for the tourist destination.

17 IPCC (2016) *AR5 Climate Change 2014: Impacts, Adaptation, and Vulnerability.*

18 Moreno, A. and Becken, S. (2009) A climate change vulnerability assessment methodology for coastal tourism. *Journal of Sustainable Tourism*, 17, 4.

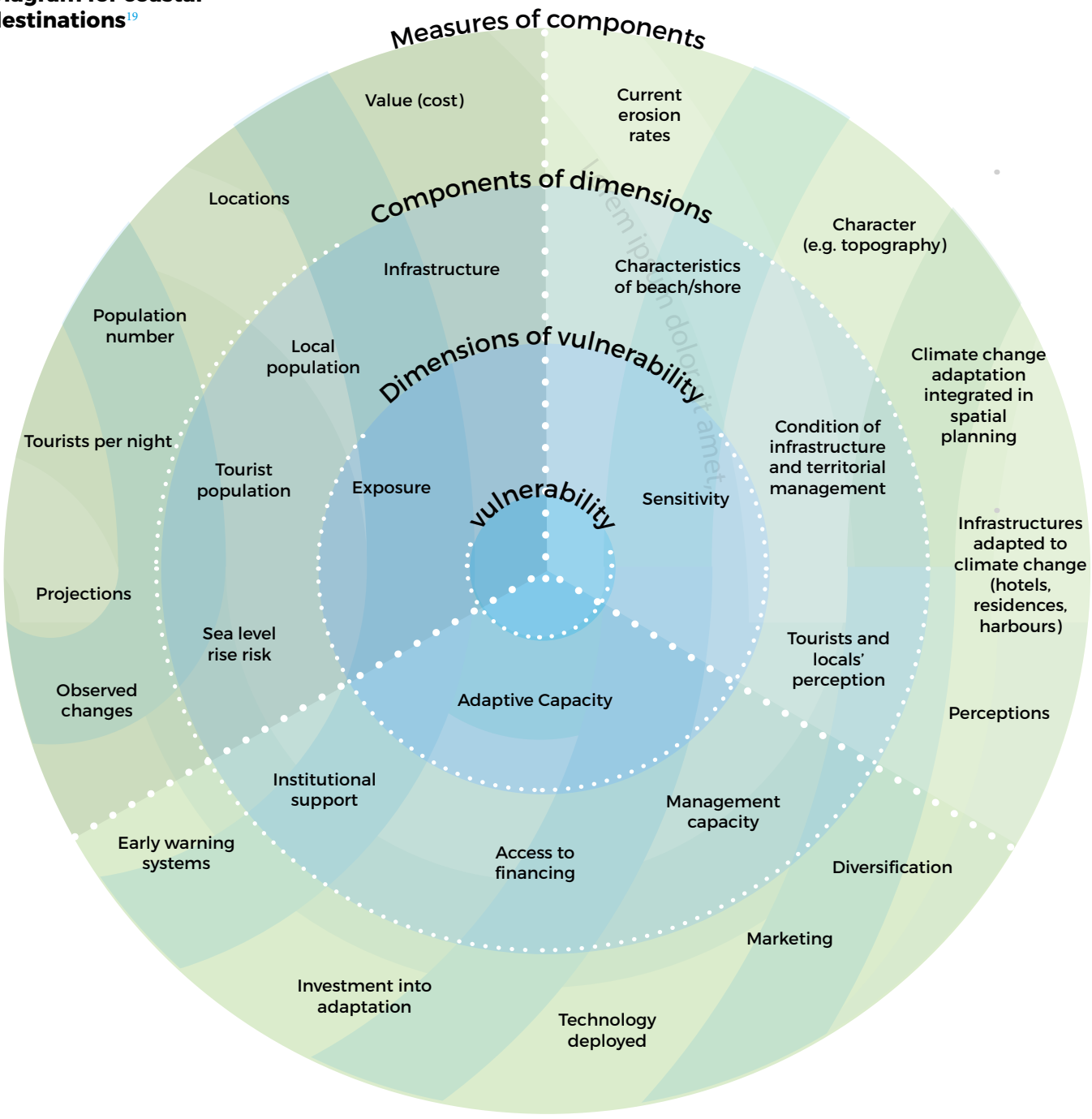
Table 8:

Tourism Destination Vulnerability Assessment based on Vulnerability Scoping Diagram (VSD)

Process for the climate change vulnerability assessment of a tour-ism destination	Instructions for the conduct of the assessment
Stage 1: **Analyse the system** • The social, economic and environmental context of the destination. • Identification of tourist activities and their characteristics. • Prioritisation according to its importance.	• Describe and analyse tourism-climate policies and binding regulatory frameworks, and the tourism and climate governance of the destination • Involve all stakeholders and organise workshops to collect information and generate consensus. • Identify and value the main tourist activities taking into account their socio-economic, environmental and socio-cultural dimensions.
Stage 2: **Analyse the Climate** • Characterisation of climatic conditions and identification of the main threats. • Creation of subsystems of activites-threats • Selection of subsystems for analysis	• Analyse the relationship between the climate, climate change and the tourist activities taking place at the destination. It is important to consider not only factors of climate comfort, but also the impact on the entire value and supply chains. • Adapt climate information to local reality and the needs of different agents. • Classify the destination into different subgroups of activities-potential threats, for example: alpine skiing and conservation of Posidonia oceanica. • Involve stakeholders in the tourist destination in the defining of these subsystems.
Stage 3: **Vulnerability** • Identification of vulnerability components and indicators • Adjustment of components and indicators (with the help of VSD) • Operationalising vulnerability • Validation of steps 1-3	• Based on the previous two steps, identify the components of vulnerability and define quantitative indicators to measure them. • The indicators will support decision-making to assess the components of adaptive capacity, exposure and sensitivity, as well as serve to monitor these components during the implementation of the strategy. • The indicators should include risk, danger and damage criteria to avoid subjective evaluations.

Stage 4: **Integration of individual vulnerability assessments** • Construction of scenarios • Non-linear analysis, interdependencies, and feedback loops • Validity of scenarios and evaluation of uncertainties	• Evaluate the impact of climate change on the tourist des-tination. • Develop scenarios to project future potential vulnerabili-ties, analyse relevant variables and development pat-terns, and explore different adaptation options and possi-ble unexpected events that may negatively affect the destination. • Stakeholders in the tourist destination should be involved to define development patterns and other elements and factors that can influence future vulnerability. • Multi-criteria decision-making tools that allow actors to value different measures based on their personal per-spectives and values can contribute to building consen-sus. • Consider non-linear system attributes (potential for unex-pected events), interdependencies, and adverse reac-tions. • Involve stakeholders in the tourist destination in the vali-dation of the methodology and the components of vulner-ability and the indicators.
Stage 5: **Communication of results** • Communicate the results of the vulnerability analysis to the entire community	• Communicate the results to destination stakeholders, beyond those who participated in the process. • Transparent communication adapted to different needs gives credibility to the process.

Illustration 5:
An example of a Vulnerability Scoping Diagram for coastal destinations[19]



19 Adapted from de Moreno, A. and Becken, S. (2009) A climate change vulnerability assessment methodology for coastal tourism. Journal of Sustainable Tourism, 17, 4.

PHASE 3
Identify adaptation options

Identifying and evaluating possible adaptation options serves, based on the vulnerabilities identified, to guide options that reduce the impacts and take advantage of the opportunities that may arise from climate change. From the point of view of a destination, this process involves identifying solutions to maintain the attractiveness of the tourist destination, which may lead to the conversion of the most vulnerable resorts to other markets, products and seasons. Local / county administrations must not only use scientific and technical knowledge to define adaptation options, but must also be consistent with regional, national and European strategies.

Table 9:
Matrix to formulate options for adapting the tourist destination to climate change

Adaptation objectives

- **Accept the impacts and manage their effects** (e.g. Reduction in the number of skiable days of snow, rise in sea level).
- **Compensate losses** by sharing or allocating the risks (e.g. climate insurance).
- **Prevent or reduce the exposure** of climate change (e.g. manage water resources to ensure a sustainable supply).
- **Take advantage of new opportunities** (e.g. strengthen strategies on active mountain tourism and extend the tourism season in coastal destinations).

Types of action

- **Temporary** (e.g. Alternative offers for days without skiable snow, climatic shelters against heat waves in tourist areas).
- **Management** (alternative offers during extreme episodes).
- **Technological** (warning systems against natural disasters caused by climate change).
- **Strategic** (e.g. Reconversion of resorts, climatic shelters against heat waves in tourist areas)
- **Resources** (e.g. limitations on the use of water in the hotel sector and second homes).
- **Products** (e.g. planning new alternative products for the sun and beach and snow tourism).
- **Markets** (e.g. knowing the sensitivity of markets to weather events).

Build adaptive capacities

- **Generate knowledge** (e.g. cooperation agreements with research centres to develop climate services for tourism)
- **Monitor and follow-up threats and impacts** (e.g. defining a repository of adaptation indicators).
- **Raise awareness** among companies, visitors and locals.

Institutional support systems

- Generate sustainable tourism standards.
- Improve taxation and regulation to promote adaptation.
- Offer incentives for adaptation and knowledge tools
- Develop specific plans and strategies for the impacts of climate change on tourism.

PHASE 4
Evaluate adaptation options and define course of action

The process of selecting adaptation options requires the evaluation of measures and allows their prioritisation and ruling out based on economic, social, and environmental criteria. The process of evaluating the options must be carried out in collaboration with the stakeholders in the tourist destination. The evaluation of the options allows starting a strategic planning. For this reason, it is important to define the main purpose and the adaptation objectives (see table 9).

Table 10:
Generic Criteria for the Evaluation of Adaptation Options

• **Efficacy**	Achievement of objectives
• **Efficiency**	Optimal results with the resources invested
• **Equality**	Engage vulnerable groups
• **Urgency**	Implementation time
• **Flexibility**	Increase, intensify or decrease according to the severity of climate change
• **Robustness**	Strong options to face climate projections
• **Practicality**	Time and scale implementation
• **Legitimacy**	Politically, socially and culturally acceptable
• **Synergy / Coherence**	Offers co-benefits (generating new jobs, mitigating CO_2 emissions)

Approaches to assessing the costs and benefits of adaptation options

Estimating the economic, social and environmental costs and benefits of adaptation options in relation to baseline scenarios is necessary as the projected costs and impacts of climate change should be examined. This guide exposes three approaches widely used in planning and development contexts: **cost-benefit analysis, cost-effectiveness analysis, and multi-criteria analysis.** Other approaches that can be used are: risk analysis, to assess long-term risks; the application of the **Delphi method** by experts can be useful when the information on costs and benefits is insufficient and the strategic **environmental assessment and the environmental impact assessment**, which are mandatory in certain cases in accordance with European regulations, evaluates the environmental criteria that this option will have for the destination.

These approaches should consider three issues when developing an evaluation approach: uncertainty, equality and valuation.

Manage uncertainty

The adaptation measures should be flexible and able to be adjustable or reversed. Measurement data must be robust, including a sufficiently large sample and a measurement approach.

Distribute benefits

Include an analysis of how the measures generate benefits to different social groups, including economic agents, tourists and residents.

Assess the economic and financial impacts

Develop a benchmark methodology that incorporates financial costs as well economic, market, social and environmental costs. Integrate different *discount rates* to estimate the benefits of adaptation over a set period of time, including investment and maintenance costs, benefits and expected impacts of climate change.

1. Cost-Benefit Analysis (CBA)

The priority of this approach is to know the efficiency of adaptation options. The method consists in calculating and comparing all costs and benefits, expressed in monetary terms.

Strengths

- Compare and / or add many different categories of benefits or costs in a single value.

Weaknesses

- Does not consider other criteria beyond efficiency.
- It is not easy to objectively monetise all categories over time.
- It does not evaluate the equality of access to the benefit for all the agents, or the financial viability of the final beneficiaries.
- The cost-benefit ratio assumes that the beneficiaries of this measure can compensate for the rest.

2. Cost-Effectiveness Analysis (CEA)

This approach is useful in finding out the least expensive option or the options that best fits your selected physical goals. This approach can be used when the benefits of adaptation are difficult to express in monetary terms, including public health, drinking water systems, extreme events, and biodiversity and ecosystem services, but the costs can be quantified. For example, evaluating the best options to guarantee a sustainable supply of drinking water to the tourist destination, without incurring a long-term impact on local consumption.

Strengths

- It can be complemented with other qualitative analyses and evaluations.

Weaknesses

- It is not recommended to rely entirely on this method, since it only shows one dimension (cost-effectiveness). Other variables such as viability, co-benefits or equality, are not valued.

3. Multi-Criteria Analysis (MCA)

It can be used to analyse different adaptation options based on different criteria. Each criterion is dimensioned with a scale of values in order to obtain a result on the most favourable option. This approach is useful when partial information is available, or when social and ecological variables are not easy to assess, or when criteria other than the effectiveness and / or efficiency is considered. This implies building a quantitative analysis framework where all the criteria for decision-making are integrated, without assigning monetary values to all the factors. The robustness of this approach depends on the degree of uncertainty of the information for the selected criteria, the priorities on weighting of the criteria, and the degree of participation of the stakeholders. A sensitivity analysis can be used to check the robustness of the results by changing the criteria weighting.

Strengths

- It helps to define adaptation challenges by displaying information on the objectives and the criteria for measuring those objectives in a transparent way.
- Can include quantitative and qualitative information
- Helps communicate strengths and weaknesses of adaptation options
- Facilitates the participation of tourist destination stakeholders by involving them in the evaluation process of adaptation options.

Weaknesses

- Inaccurate weighting when the number of criteria is extensive and diverse, making standardisation difficult, resulting in some loss of information.
- Weighting of criteria can improve public debate, but generates problems to reach consensus.
- A sensitivity analysis will be accurate in many cases.

PHASE 5
Implementation of the actions and strategy

Strategic planning for adaptation of destinations to climate change can be started when adaptation options have been correctly chosen and evaluated, with a process of participation of all the destination stakeholders. This strategic process is focused on the implementation of an action plan involving the systematic establishment of what needs to be done to convert adaptation options into actions, specifying the local, regional and state departments responsible, a temporary course of action and the necessary resources (human, technological and financial). The adaptation plans of the tourist destination must be consistent with local, regional and national strategies.

Policy coherence with multi-scale climate change and tourism frameworks

Policy coherence will facilitate the achievement of objectives, facilitate the flow of supra-municipal financing and avoid risks of maladaptation or counterproductive effects by not responding to agreed political objectives at the supra-municipal level and between tourism and climate policy. It is important to adapt the strategy to existing policies (e.g. PNACC for the Spanish acronym of Plan Nacional de Adaptación al Cambio Climático), to existing sources of financing (see stage 1), to territorial management and coordination structures, and to decision-making processes. Integrating the objectives of the adaptation plan into the existing policies and strategies of the destination (e.g. tourism, urban planning, environment, transport), will allow us to review instruments and adapt them to the strategic objectives.

Climate Governance by engaging stakeholders and building consensus

To ensure a good implementation of the adaptation strategy, agreements should be sought with institutions, economic stakeholders and other stakeholders, as well as identifying and assigning roles and responsibilities to implement adaptation actions. The participation of tourism stakeholders and funders is essential to be able to promote changes in the tourism model. The participation of public research centres facilitates the building of adaptation capacities of the destination. Other stakeholders such as insurers facilitate climate risk management. Civil society helps to generate broad consensus, to monitor and generate ideas.

Table 11:
Stakeholders involved in the implementation of the Destination Adaptation strategy to Climate Change

	Stakeholders in the destination	Adaptation options
Resources	**National government** · Ecological Transition · Ministry of Development · Ministry of Health **Provincial, insular and autonomous government** · Energy and Climate · Tourism · Public Security · Public Health · Biodiversity · Transport **Research institutes and centres** **Insurers** **Tourism sector** **Civil society organisations**	· Reduce exposure and sensitivity, and improve the ability to adapt to the increased risk for tourism infrastructure. · Regulate land use. · Ensure sustainable supplies of drinking water. · Energy transition to renewable energy. · Boost environmental conservation. · Early warning systems for the prevention of natural disasters caused by climate change. · Increase awareness and training of the tourism sector. · Communication during extreme events to visitors and residents. · Climate services to improve the destination's adaptability
Markets and Products	**National government** · Tourism · Transport **Provincial, insular and autonomous government** · Tourism · Transport · Spatial Planning · Climate Change **Research institutes and centres** **Insurers** **Tourism sector**	· Planning strategies towards alternative markets to the snow and sun and beach tourism. · Planning of new tourism products throughout the year taking advantage of natural attractions. · Climate services to plan and manage seasons and strategic transitions. · Contracts with "climate insurance". · Adaptation of hotel infrastructures (resource efficiency) and other tourist infrastructures to climate change. · New labour clauses in resorts concerning weather events. · Promotion of entrepreneurship in active tourism and the definition of common standards for guides to new tourism products in vulnerable destinations.

Adaptation to climate change is a complex process, since climate change affects all destinations, involving different levels of decision-making. Therefore, the different levels must be coordinated and integrated for adaptation at the local-regional level to work. Coordination involves at least three levels: cross-sectorial, regional, and vertical integration of decisions to convey a combined vision on the problem of adaptation.

PHASE 6
Construct a Monitoring and Evaluation (M&E) System

It was only recently that we started to gain knowledge about the adaptation of destinations to climate change. The degree of exposure and sensitivity to climate change is very high in mountain destinations and on the Mediterranean coast, giving rise to a tourism model vulnerable to the impacts and risks of climate change. Investing in adaptation is essential to ensure the efficiency, effectiveness and sustainability of adaptation interventions. In this context, developing a climate change adaptation strategy provides an opportunity to identify the best way to monitor, evaluate, and report on adaptation implementation and progress. National and regional governments must in turn support and monitor these processes to establish destination models that are more resilient to climate change and so that they can also be capitalised.as tourist destinations.

In order to build an M&E System for adaptation, it is necessary to consider that the purpose of monitoring and evaluation should define the best methods, the type of stakeholders that should be involved in the process, and the extent to which the results of the monitoring and evaluation activities will used in adaptation policies and practices.

Monitoring and evaluation (M&E) system allows tracking of the implementation of adaptation plans and measuring their effectiveness and results. The adaptation M&S System can focus on the adaptation process (is the implementation being carried out?) as well as on its results (are the adaptation action goals being achieved?).

Development of climate services

The development of climate services by destinations as a strategy to improve adaptive capacity is a key aspect for the future of resilience in destinations. The development of tourism-oriented climate indices (meteorological, avalanches, fires, etc.) can also help monitor the results of the strategy.

Collaboration with research centres, producers of climate information and other stakeholders is essential to generate a climate innovation system. Likewise, you can access current research projects or information resources such as the one offered by the Copernicus project: Climate Change Services (C3S), which offers information and knowledge about the past, present and future climate. Destinations can use European funds to cooperate with other destinations and climate knowledge stakeholders to develop climate services for tourism.

https://climate.copernicus.eu/

Mountain Tourism Snow and Weather Indicators (MTSWI) *– Past conditions; long-term future projections.*

The service will provide relevant information on mountain tourism activities, in particular the operating conditions of ski resorts in the mountains of Europe. This includes, for example, past and future temperatures and the length of the natural and managed snow season (including grooming and snowmaking effects), based on altitude.

Fire Weather Index (FWI) - Seasonal projection; Long-term projections.

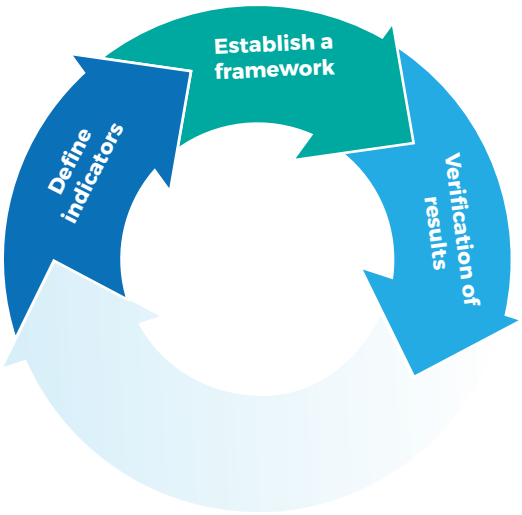
The FWI is a weather-based index used worldwide to estimate fire danger. It will be important for the tourism industry to take this high future risk into account when planning for the long term. In addition, the seasonal fire risk forecasts will be important for tour operators when planning for the next season.

Holiday Climate Index (HCI) - Seasonal Projection; Long-term projections.

The HCI is a meteorological index of climatic suitability for tourist activities. This will be provided on seasonal and long-term time scales to help users shape their marketing strategies and future investments in a changing climate.

Construction of adaptation indicators

Adapted from GIZ (2011) Adaptation Made to Measure. A guidebook to the design and results-based monitoring of climate change adaptation projects. Second Edition



Step 1: Definition of indicators

The vulnerability assessment and the precision of results of adaptation options help to define indicators. Adaptive capacity outcomes are related to developing the potential necessary to drive adaptation (knowledge generation, early warning system development, training / awareness). The results of the adaptation actions serve to know whether the action has been implemented and how the destination's vulnerability has been reduced. The results help improve the destination's sustainability, using indicators that measure improvements in economic, social and environmental sustainability. The design of the indicators must follow quality criteria to verify their suitability and relevance to measure the results.

Table 12:
Matrix for the construction of adaptation indicators

	Building adaptive capacity	Risk and vulnerability reduction	Tourism sustainability in the face of climate change
Examples	Availability of climate services; Level of involvement of the tourism sector and other administrations; Co-ordination and knowledge transfer processes; risk management capacity against extreme events	Reduction of water consumption per hotel and second residence; Scope of the protection system against climatic risks.	Benefits per hotel production unit; Increase of the kw ratio of renewable energy in hotels and second homes; Seasonal balance of demand (without increasing the number of tourists); Increased protection / conservation of natural spaces.
Quality	Specific Measurable	Consensual Relevant	Temporal
Visibility	Available information	Responsibility	Cost

Step 2: Establish a frame of reference

A key element of the adaptation strategy is the reference framework, which is developed based on the expected results, the indicators and the adaptation context. The vulnerability assessment can be used to compile the reference information. The World Bank recommends using 5 categories of information to build the frame of reference, which are adapted in this guide to a tourism context.

Table 13:
Matrix for defining reference frames

Data Category	Examples
Climate data	Climatic parameters such as temperature increase, drought index, ero-sion rate, etc.
Socio-economic data	Data on the economic and welfare of the visitor and resident: consump-tion/stress of water and energy, seasonality, health, benefits of tourism; etc.
Data on political and institutional processes	Institutional resources and capacities; existence of climate policies aimed at tourism and climate change.
Biodiversity and cultural heritage	The degree of impact of climate change on cultural and natural heritage.
Adaptation strategies	What strategies are currently being developed for climate change adap-tation in the region / district and reference institutional settings.

Step 3: Verification of results

Finally, offering information on the results obtained is essential to assess the degree of compliance with the adaptation strategy. The table below can be used as a starting point to build a verification methodology.

Table 14:
Matrix for the design of verifiable adaptation indicators

	Description	Example
Sector and sub-sector of activity-threat	Establish the type of threat-activity based on the vulnerabil-ity assessment, within the sec-tor (tourism).	Tourism and Water Con-sumption.
Dimensions of adaptation (adaptive capacity, adapta-tion actions, sustainable development)	What is specifically being meas-ured (not related to objectives that may include various out-comes)	Manage hotel's water foot-print
Objective	Select which strategic objective this indicator contributes to	Develop incentives and regulations to reduce the water footprint of a tourist destination.
Indicator	Description and measurement	Installation of technologies and implementation of programs to reduce water consumption in hotels.

Necessary information	Describe the information neces-sary to quantify the indicator	Number of hotels that apply water management systems; Consumption of litres of water / overnight / day.
Collection method	Describe how the necessary data will be collected	Hotel survey; Information on daily water meters for hotels (survey).
Cost	Estimate the cost of data collec-tion	Low

The verification of results should also include an evaluation of the impact of the adaptation strategy comparing the results of the intervention with the results of the non-intervention. The following table shows some evaluation methodologies.

Tabe 15:
Methods for evaluating the adaptation strategy

Method	Description
Repeat the vulnera-bility assessment	Comparison of vulnerability assessments over time.
Counterfactual anal-ysis	Compare the results of the strategy with another control tourist destina-tion that has not implemented these measures.
Dynamic reference framework	Adjustment of the framework of the initial diagnosis incorporating new factors that can influence the vulnerability of the destination to climate change.
Measurement of opportunistic out-comes	Comparison of the consequences of extreme events that occur during the duration of the strategy with the impact of similar events at the start of the strategy or simultaneously in comparable municipalities without adap-tation measures.
Universal metrics	Use of indicators to quantify the results of adaptation in an cross-sectional metric (e.g. the value of the protection of natural assets).

Avoid maladaptation actions

An adaptation strategy or actions that increases the vulnerability to climate change and/or reduces the future adaptive capacity can be considered as maladaptation. According to the IPCC, maladaptation is defined as being "any changes in natural or human systems that inadvertently increase vulnerability to climatic stimuli; an adaptation that does not succeed in reducing vulnerability but increases it instead."

The consequences of maladaptation can compromise the economic and institutional viability of a tourist destination that needs to provide responses that will make tourism more resilient to climate change. The level of investments necessary to adapt tourism infrastructure and resources to climate impacts and risks requires an adequate evaluation of adaptation options.

Possible consequences of maladaptation in destinations:

- The **de-seasonalisation** of tourism and the tourism diversification may result in a total increase in tourists and, therefore, in carbon emissions and natural resources consumption (e.g. water).
- The installation of **physical barriers** to restrain the rise in sea level can increase the level of vulnerability to flooding or other climate events on the long term.
- The subsidy of resorts highly vulnerable to climate change reduces governments' adaptive capacity, compromising resources that could be used for other alternatives.
- The measures to improve (relatively) resource efficiency without affecting the net (absolute) resource consumption, can lead to an increase in the destination's ecological footprint, increasing its vulnerability to climate projections.

Likewise, **maladaptation** may increase vulnerability to other sectors (water, energy, agriculture, biodiversity, etc.), or to another group (residents) in the future[20]. According to the IPCC, conflicts and tensions between different policies or groups can be considered examples of maladaptation[21].

Maladaptation can be avoided by evaluating all costs and benefits, including co-benefits, for all social groups, and being explicit about whom the beneficiaries and losers are and how borders can be better shared. Coherence between various policy frameworks at the local, regional and state levels is very important precisely to avoid counterproductive effects or political objectives opposed to adaptation. Likewise, political coordination makes it possible to integrate and optimise public resources, a key aspect for the sustainability of policies.

20 UNEP (2019) Frontiers 2018/19 Emerging issues of Environmental Concern. United Nations Environment Programme, Nairobi.

21 Idem.

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