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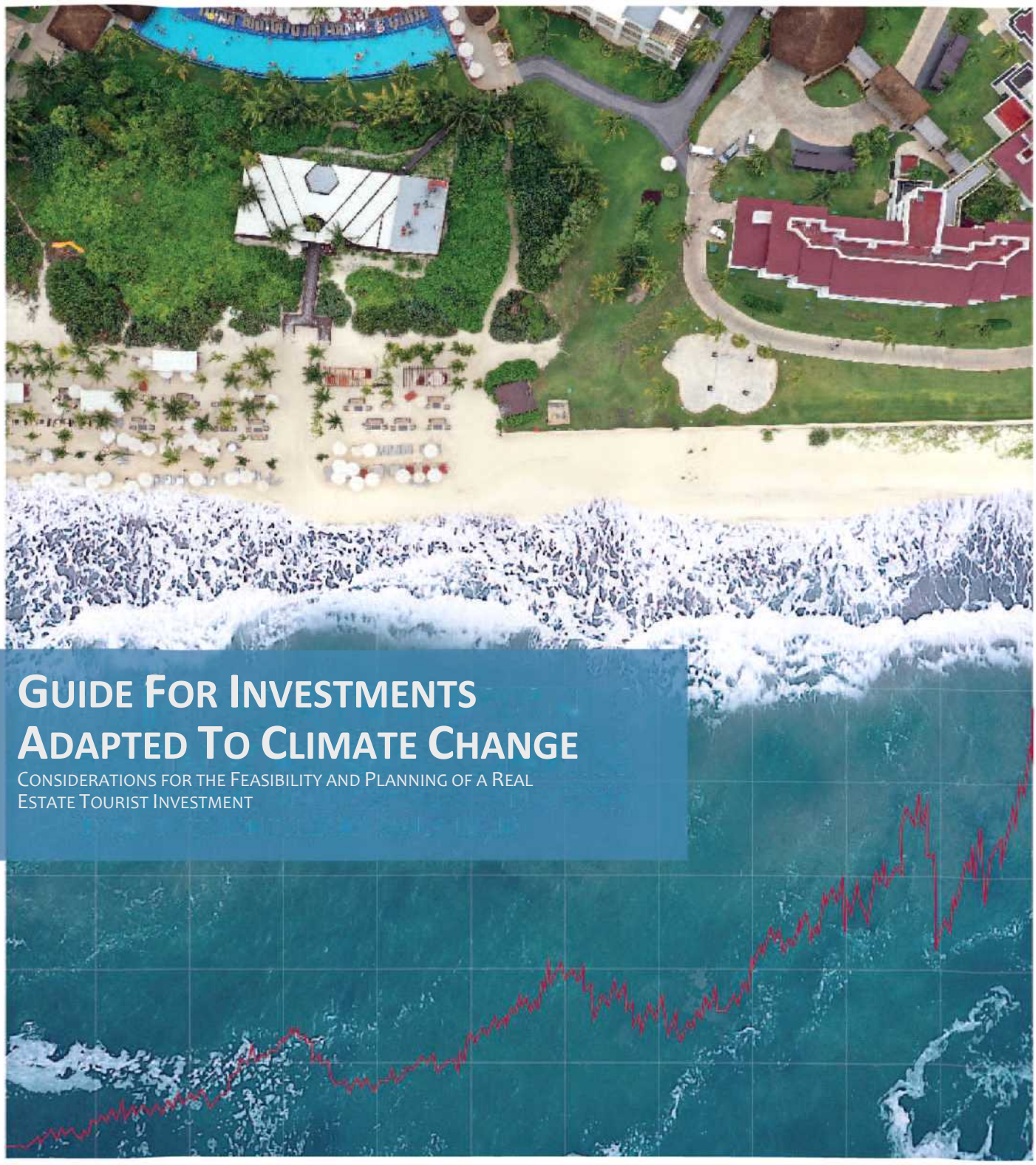

GUIDE FOR INVESTMENTS ADAPTED TO CLIMATE CHANGE

CONSIDERATIONS FOR THE FEASIBILITY AND PLANNING OF A REAL ESTATE TOURIST INVESTMENT

TURISMO
SECRETARÍA DE TURISMO

MEDIO AMBIENTE
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CONANP
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Por encargo del:
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GUIDE FOR INVESTMENTS ADAPTED TO CLIMATE CHANGE.
CONSIDERATIONS FOR THE FEASIBILITY AND PLANNING OF A REAL ESTATE TOURIST INVESTMENT.

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CONTENTS

ACRONYMS

AbE: Ecosystem-based adaptation

ARRC: Rapid Self-Diagnosis of Climate Risks

CENAPRED: National Center for Disaster Prevention / *Centro Nacional de Prevención de Desastres*

CMS: Soil Modification Coefficient

CONABIO: National Commission for the Knowledge and Use of Biodiversity / *Comisión Nacional para el Conocimiento y Uso de la Biodiversidad*

CONAGUA: National Water Comission / *Comisión Nacional del Agua*

CONANP: National Commission of Protected Natural Areas / *Comisión Nacional de Áreas Naturales Protegidas /*

COVID-19: Coronavirus Disease *2019* / *Enfermedad del Coronavirus 2019*

DHA: Department of Humanitarian Affairs *I Coordinación de Asuntos Humanitarios*

DNP: National Planning Department (Colombia)

FEMA: Federal Emergency Management Agency *I Agencia Federal para el Manejo de Emergencias*

GIZ: Deutsche Gese/ischaft für InternationaleZusammenarbeit / *Cooperación Alemana para el Desarrollo Sustentable en México*

INECC: National Institute of Ecology and Climate Change */ Instituto Nacional de Ecología y Cambio Climático*

IPCC: Intergovernmental Panel on Climate Change *I Panel Intergubernamental sobre el Cambio Climático*

ISO: International Organization for Standardization / *Organización Internacional de Normalización*

ITI: Tourist Real Estate Investment

IUCN: International Union for Conservation of Nature */ Unión Internacional para la Conservación de la Naturaleza*

LAN: National Waters Law

LEED: Leadership in Energy & Environmental Design */ Liderazgo en Energía y Diseño Ambiental*

LGDVS: General Wildlife Law

LGEEPA: General Law of Ecological Balance and Environmental Protection

LGCC: General Law on Climate Change

LID: Low-Impact Development*/ Sistema de Desarrollo de Bajo Impacto*

MIA: Environmental Impact Statement

NOAA: National Oceanic and Atmospheric Administration / *Administración Nacional Oceánica y Atmosférica*

OECD/OCDE: Organization for Economic Cooperation and Development / *Organización para la Cooperación y el Desarrollo Económico*

PE: Executive Project

GDP: Gross domestic product

PM: Master plan

PROFEPA: Federal Attorney for Environmental Protection

SECTUR: Ministry of Tourism

TCFD: Task Force on Climate-related Financial Disclosures/ *Grupo de Trabajo sobre las Declaraciones Financieras relacionadas con el Clima*

SEMARNAT: Ministry of Environment and Natural Resources

UNEP/PNUMA: United Nations Environment Program / *Programa de Naciones Unidas para el Medio Ambiente*

UNWTO/OMT: World Tourism Organization */ Organización Mundial del Turismo*

USGBC: US Green Building Council/ *Consejo de la Construcción Ecológica de Estados Unidos*

WMO/OMM: World Meteorological Organization / *Organización Meteorológica Mundial*

WEF: World Economic Forum */ Foro Económico Mundial*

WTTC: World Travel & Tourism Council */ Consejo Mundial del Viaje y el Turismo*

WWF: World Wildlife Fund */ Fondo Mundial para la Naturaleza*

1. Droughts and uncovered slopes in the Bajío region © ADAPTUR / Photo: Mariana Rodríguez Aguilera, **2**. Hurricane, satellite view © CommonCreativeLicense, **3**. Rising rivers and floods © CommonCreativeLicense, **4**. Physical damage to infrastructure by Hurricane Kena in Puerto Vallarta © Opina Vallarta, **5**. Forest fires in the state of Jalisco © Shutterstock, **6**. Sargassum problem in the Riviera Maya © ADAPTUR / Photo: Mariana Rodríguez Aguilera, **7.** Rest area in beach hotel © Shutterstock, **8**. Hail on the pavement after storm © Shutterstock.

FOREWORD

Images of burned or flooded land remind us again and again of the vulnerability of our tourism business; these are joined with portraits of beaches full of sargassum, dry landscapes, and tourist infrastructure destroyed by the last hurricane. Between 2000-2015, approximately $418,689 million pesos were lost due to disasters, highlighting climate-related ones. The above could be exacerbated under climate change scenarios.

We stumble from one emergency to the next, knowing that we need long-term strategies. Although we indeed have to attend to the urgent, at the same time, we have to prepare our business for a future with a more extreme climate. In other words, we have to invest in business and infrastructure well adapted to climate change.

In this respect, as stated by the Secretary of Tourism Miguel Torruco Marqués, "tourism should be part of the solution and not of the problem." Therefore, this Guide for Investments Adapted to Climate Change constitutes a transcendental step in the rebirth of post-Covid-19 tourism towards a more sustainable and resilient model.

Throughout this Guide, the reader will find technical elements and pragmatic solutions so that their investments have science as the best ally, which offers us the possibility of knowing future scenarios of what climate change could cause to infrastructure and tourist destinations.

This document is prepared in the context of the ADAPTUR Project, led by the Ministry of Tourism (SECTUR) and the Ministry of Environment and Natural Resources (SEMARNAT), the National Institute of Ecology and Climate Change (INECC), and the National Commission of Protected Natural Areas (CONANP), and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, commissioned by the BMU).

ADAPTUR gets its name from the abbreviation for adaptation to climate change based on ecosystems focused on the tourism sector. It represents the vision of the common good, where we all win; businessmen, the three orders of government, academia, and civil society channel actions, programs, sources of financing, and other mechanisms to conserve the natural capital of our destinations, protect local communities, and promote tourism infrastructure planning considering future climate effects.

Although we cannot travel in time and know precisely the future, we can anticipate and adapt, and at the same time, ride the wave of sustainable tourism in the world. This document shall serve as a tool for more players in the Tourism Sector to join this new vision.

Mr. César Daniel González Madruga
GENERAL DIRECTOR OF SUSTAINABLE
TOURISM PLANNING OF THE SECTUR

EXECUTIVE SUMMARY

An investment adapted to climate change results from a planning process that anticipates changes in climate conditions and their possible impacts on the new business (operation, infrastructure, market, etc.). As a result, a climate-friendly business can respond better to extreme events, recover faster from their effects, and in some cases, have a longer life cycle with lower maintenance and repair costs.

In other words, the investment or business is more resilient and has the potential to operate with a constant stream of income, and in turn, obtain a higher return on the original investment; in addition to the social and environmental benefits for the destination and the position, it could achieve in the tourism market.

This Guide for Investments Adapted to Climate Change is aimed primarily at investors and developers of tourism and real estate infrastructure (ITI) and associated consultants. At its core, the guide touts the following ideas and recommendations:

- Incorporate the climate change approach into the conventional ITI planning process. The guide is oriented to the traditional investment process and offers several entry points. For example, for a quick analysis of climate risks, we recommend the Self-Diagnosis tool in chapter 3.
- Consider solutions that integrate the ecosystems-based adaptation approach (green solutions) as an innovative option with more significant economic, social, and environmental benefits during a new investment's technical design. Specific examples are presented in Chapters 4 and 5.
- Strengthen the company's technical and organizational capacities so that decisions incorporate technical-scientific information from the first stages, and the planning of the operation is more efficient. For more information, see chapter 4 and 5.
- Link up with other players in the sector that face similar risks in the territory to design comprehensive solutions with a joint, regional, and long-term vision.

This document is the first of its kind. It provides elements to support the fulfillment of the objectives established in the national policy of the tourism and environment sectors, such as the Tourism Sector Program 2020-2024, the General Law on Climate Change (LGCC), and in particular the actions to adapt the Nationally Determined Contribution (NDC).

We are grateful for the participation of investment companies, government entities, and a multidisciplinary team. We hope that the guide will serve as guidance and inspiration for entrepreneurs, investors, and developers who choose tourism adapted for the future.

INTRODUCTION

The natural and cultural capital are the leading tourist offers that highlight the world's most visited countries. The value of natural resources and their environmental services, including landscape, water, clean air, forests, etc., are highly valued, but at the same time vulnerable to the effects of climate change; therefore, any alteration in the natural environment directly affects the economy and operation of the tourism sector.

In this respect, the Organization for Economic Cooperation and Development (OECD) has called on public sector institutions and private sector companies to develop policies and investments that are "proof of future ', that are innovative, flexible, co-created with beneficiaries, and based on scenarios, that is, resilient (OECD, 2018). In other words, we have to plan and execute our investments in a way that anticipates climate change and allows us to adapt the business, its operation, and infrastructure to the new conditions.

The Task Force on Climate-related Financial Disclosures (TCFD) requests financial institutions and investment companies to prepare for the transition to a low-carbon economy that maintains the global mean temperature below 2°C (TCFD, 2019).

Among the recommendations, the importance of having sufficient information on the effects of climate change and its impacts on investment processes stands out since these have been a watershed for investors worldwide. For example, the Group of Institutional Investors on Climate Change (IIGCC), the Principles for Responsible Investment (PRI) initiative and the Network to Green the Financial System (NGSF), have adopted them and leave them in the new way of making investments.

Therefore, in a Real Estate Tourism Investment (ITI) process, decisions made without incorporating climate change scenarios will represent an economic risk for the operation, possible disputes with communities for access to resources. natural or even the total loss of the business.

Likewise, environmental legislation and instruments for territorial ordering and planning in Mexico are articulated to order the development of the territory, so naturally and in response to the global situation, the tourism sector and other sectors should integrate specific climate change criteria. In this respect, both the public and private sectors should implement adaptation and mitigation actions.

Finally, it is worth mentioning that this document is part of the national goals established in the Tourism Sector Program 2020-2024, in compliance with the General Law on Climate Change. It also contributes to international targets, such as the Paris Agreement and the Objectives of Sustainable Development, to provide information to the private sector for decision-making in a context of constant change.

Purpose and scope of the guide

The objective of this ***Guide for Investments Adapted to Climate Change*** is to provide elements to incorporate the analysis of climate change and the design of adaptation solutions in the conventional and generic process of planning a Real Estate Tourism Investment (ITI), recognizing that each process is specific according to the type of project.

It is aimed at investors, developers, and technical advisers of the tourism-real estate sector (hotels, vacation clubs, second homes, golf courses, other properties, among others), but it can also be used in smaller-scale investments (e.g., ecotourism community projects). It is also a reference document for the definition of adaptation criteria in the national public sector's regulations, plans, and programs.

The geographical scope of its application includes the different climatic regions, from warm coastal zones to temperate and cold zones in the interior of the Mexican territory.

Its thematic organization is integrated as follows:

Chapters one and two analyze the current situation of ITI and its relationship with climate change; in chapter 3, a self-diagnosis is presented as a first approach to identifying climate risks.

Chapters four and five describe in a general way the two phases that comprise a generic investment process (feasibility and planning) and, in each of them, recommendations are presented to incorporate the elements of climate change and their adaptation to improve the understanding of an adapted Investment.

Chapter six outlines the final considerations and, additionally, the annexes section provides a glossary and information to facilitate the practical use of the guide.

The aforementioned recommendations are based on a generic and conventional process of an ITI, since it is recognized that each investment is planned uniquely, depending on its concept, target market, and its geographical location, among others; the latter being the most relevant characteristic since this will determine the specific climatic risks to which it will be exposed and, in turn, the design of solutions. Therefore, this document is for guidance and it is suggested to the Investor to have a specialized technical team that can refer the studies, tools and any other information necessary to achieve a resilient investment.

INVESTMENTS IN THE SECTOR OF TOURISM

CHAPTER 1

INVESTMENTS IN THE TOURISM SECTOR

Global situation and trends

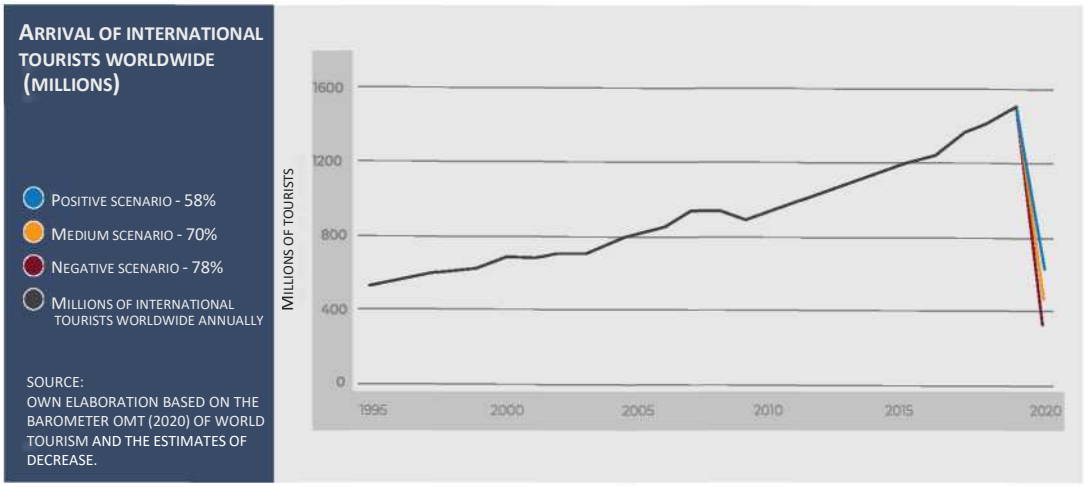
Tourism has been consolidated in the last 25 years as a priority activity in the global context. It is the third Industry in exports (recipient of foreign currency), only behind the oil and chemical products industry; generates around 10% of world GDP, produces one in eleven jobs, and represents 7% of global exports and up to 29% of exports specifically in the service sector (UNWTO, 2019).

In more than 60 countries, tourism is considered the primary export industry. In 150 countries, it is among the top five; it also represents the largest source of foreign exchange for a third of developing economies and for half of the least developed countries (UNWTO, 2012).

The growth of this activity had been positive until before 2020; for example, in 2012, more than one billion international tourists crossed borders, and by 2019 the figure had reached 1.5 billion. In addition, future estimates proposed growth of between 3% and 4% per year, to place us in 2030 at 1.8 billion tourists.

The pandemic generated by COVID-19 has changed the prospects for short-term growth significantly. The World Tourism Organization has warned that in the most pessimistic scenario (Figure 1), the arrival of international tourists towards the end of 2020 could decrease by up to 78% compared to 2019, representing the worst crisis of the sector (OMT, 2020). Significant damage has also been suffered in the Real Estate sector, and global investment activity is expected to slow down due to uncertainty in the markets.

Figure 1. The arrival of international tourists worldwide considering the probable impact of COVID-19 (millions of tourists).



Damages to infrastructure due to hurricane Odile - Los Cabos ©IMPLAN Los Cabos

However, tourism has shown on various occasions and after several crises (the 9/11, the wars in Afghanistan and Iraq —2002-2003— and the combined crisis due to the international financial debacle in 2008-2009) that it is a resilient sector, with ample recovery capacity, and confidence is likely to return given the benefits generated by investments in this type of asset. For example, a greater interest of developers is expected to manage their risks better and attract higher-value markets. Therefore, they will increase their sustainability and social responsibility actions (JLL, 2020).

This situation should be a red flag to redefine how tourism develops and prepare companies for an increasingly uncertain future. Since 2018, the OECD has emphasized that by 2030 tourism conditions will be increasingly changing; the effects of climate change and the availability and access to natural resources will cause significant changes in the sector in the medium and long term; i.e., the challenge will be to attend to the urgent versus the important[1].

Regarding the preceding, the need to work from the principles and criteria of adaptation of the conditions that will present themselves in the global sphere becomes evident. For their part, Megan Epler Wood and other specialists who have collaborated for The Travel Foundation in the study entitled ***"The invisible burden"*** (2019) postulate the importance of risk management, especially those derived from climatic hazards, through the analysis of the externalities generated by the tourism sector in the destinations where it operates.

Addressing issues related to international travel trends forces us to consider changes in the markets and their consumption and travel interests. For example, the global megatrends that the World Travel and Tourism Council (2019) have mapped show a change in the increase in the awareness of the tourist who travels and invests in tourist destinations, derived from the rise in global awareness. Amadeus (2015) has characterized the future tourist and has found that Interest in sustainability will be one of the segments that will grow the most by 2030.

Skift, one of the companies that set trends in tourism, identifies in its megatrends reports (2020) a strong interest of tourists of today and tomorrow, in traveling to places where nature is conserved, where there is a greater physical and emotional well-being, and where you can have experiences of disconnection in contact with ecosystems, different from those you have in your places of residence.

1 For some years now, the World Tourism Organization has urged countries to develop policies and recommendations that address climate change.

In the new real estate investments in the international context, these trends have been internalized in recent years. More and more companies are betting on green infrastructure, bioclimatic design, and integrated natural environments, so the green building market is expected to be among the fastest-growing industries in the world.

Just for reference, in the United States, the number of LEED-certified projects[2] increased from 296 certifications in 2006 to more than 67,000 in 2018[3].

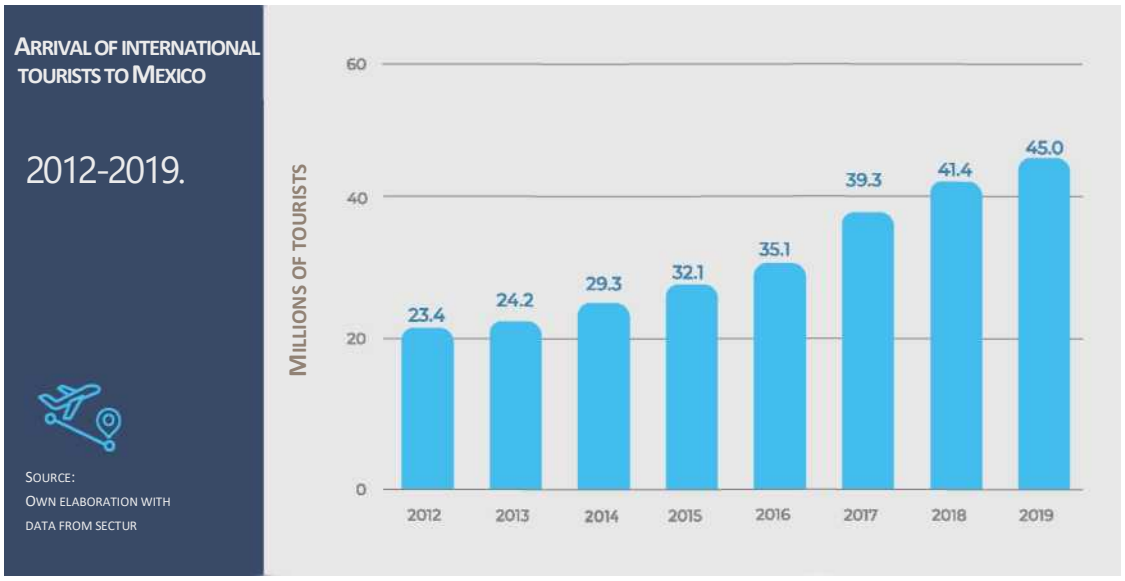
The case of Mexico

Mexico has an extraordinary natural wealth that is home to between 10% and 12% of the total species registered in the world, which, added to the vast cultural heritage, contributes to its position as one of the ten most visited countries on the planet (UNWTO, 2019).

The conservation of the country's natural, cultural, and social attributes is highly relevant for tourism. It is essential to highlight the value of its ecosystems, species, and the environmental services that derive from them since there is a direct dependence on the sector for the provision of water, scenic beauty, climate regulation, air, and water quality, in addition to recreation and health (WWF, 2020).

While at the end of 2019, Mexico reported the arrival of 45 million international tourists, which generated an economic spill of $24,562 million dollars (Figure 2); prospects are uncertain since it is not alien to the global climate situation or far-reaching health events.

Figure 2. The arrival of international tourists to Mexico 2012 - 2019 (millions of tourists).



2 Acronym for Leadership in Energy and Environmental

3 U.S. Green Building Council.

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Investments in the tourism sector are also uncertain in Mexico. Even though the World Travel & Tourism Council (2019) estimated that in 2018 the tourism sector attracted investments of $185.5 billion dollars, and annual growth in the country of 5.4% per year was expected for the next 10 years, aimed at reaching $330 billion dollars in 2029, there are statements from entrepreneurs in the sector, such as those of directors of AM Resorts or Grupo Xcaret, who have postponed investments and new openings.

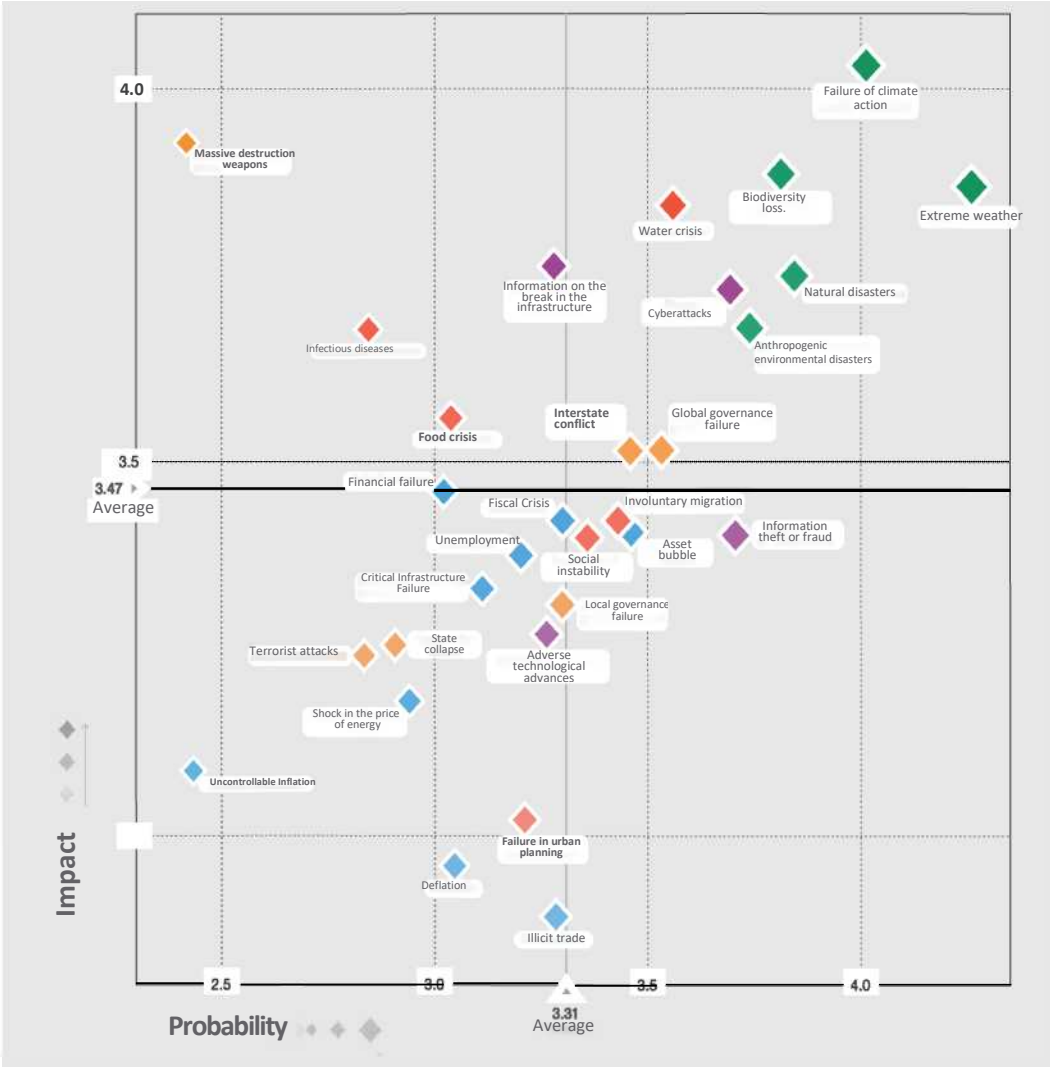
Although it is relatively easy to assess the immediate and direct impact of health events such as COVID-19 in the tourism real estate sector (due to event cancellations, travel restrictions, and a lower general purchasing power on the planet); in the case of climate change, the first efforts are just beginning to account for the economic risks that it will cause to tourist destinations, and it is recognized that damages will be greater and in some cases irreversible.

However, the economic risk due to the impacts of environmental phenomena can also be seen as an opportunity to dialogue and seek creative and comprehensive solutions that protect and benefit everyone. Undoubtedly, this may be a juncture to generate a change in the real estate and tourism development model focused on the comprehensive management of climate risk (including, of course, health) and respect for nature and local communities.

Risks in investments in the tourism sector derived from climate change

Annually, the World Economic Forum[4] (WEF) publishes its report entitled "Global Risk Report," which brings together the opinions of more than 700 global experts on their concerns for the current year.

Figure 3. Global risks are identified based on their probability of occurrence and impact.



GLOBAL RISKS IDENTIFIED BASED ON THEIR LIKELIHOOD AND IMPACT

Categories

- Economy
- Environment
- Geopolitics
- Social
- Technology

SOURCE: WEF, 2020.

4 International non-profit organization for Public-Private Cooperation involves the main political, business, cultural, and other society leaders to shape global, regional, and industrial agendas.
The meeting in Davos, Switzerland, is iconical as it sets the trend in world economic matters.

In 2020, for the first time in the survey's ten years, the top five global risks were environmental. The report sounds the alarm about:

1. Extreme weather events with significant damage to property, infrastructure, and loss of human life.
2. Failure of governments and companies to meet climate change mitigation and adaptation goals.
3. Human-caused environmental damage and catastrophes, including environmental crimes such as oil spills and radioactive contamination.
4. Severe loss of biodiversity and collapse of ecosystems (terrestrial and/or marine) have irreversible consequences for the environment, resulting in extreme resources depletion for humanity and industries.
5. Disasters caused by severe natural phenomena such as earthquakes, tsunamis, volcanic eruptions, and geomagnetic storms.

The previous chart (Figure 3) shows all the analyzed risks and their possibility of occurrence and impact, evidencing the "***climate failure,"*** that is, the countries' non-compliance with the global mitigation and adaptation commitments established in the Paris agreement[5].

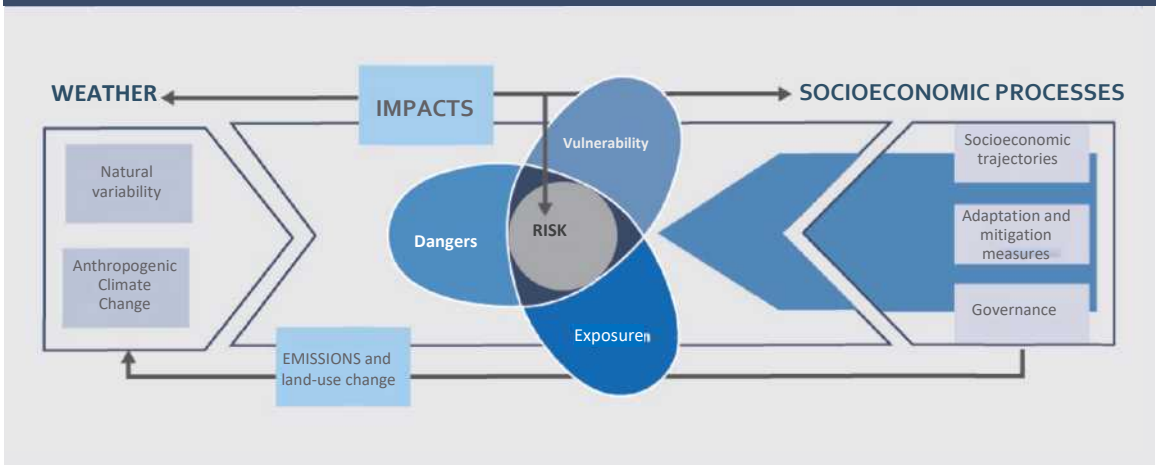
In this vein, the concept of ***"Climate risk"*** was specified in 2014 by the Intergovernmental Panel on Climate Change (IPCC) because it causes an impact on the environment and society, and the world economy. It is defined as ***"The potential for consequences where something of human value (including humans themselves) is in jeopardy with an uncertain outcome and results from the interaction of vulnerability, exposure, and hazard or threats."***

These risks can be reduced or exacerbated through socioeconomic processes, including adaptation and mitigation measures (Figure 4, for more information review concepts in the glossary). This concept makes a lot of sense in the tourism sector since many of its assets are located in exposed cities and can be highly vulnerable to climate change.

Figure 4. Model to represent the concept of risk and its relationship with adaptation and mitigation

MODEL REPRESENTING THE CONCEPT OF RISK AND ITS RELATIONSHIP WITH ADAPTATION SOLUTIONS

SOURCE: MORALES ET AL., 2020 BASED ON IPCC, 2014



5 At the Paris Climate Conference (COP21), held in December 2015, 195 countries signed the first binding global climate agreement. To avoid dangerous climate change, the Agreement establishes a global action plan that puts the limit of global warming well below 2°C.

Why is climate change an economic risk for investments?

In its report on the state of the world climate in 2018, the World Meteorological Organization draws attention by highlighting that, in that year, more than 35 million people were affected by floods, and more than 2 million were displaced by disasters and extreme weather events linked to climate (WMO, 2019).

In the Caribbean, in 2017, insurers paid a world-record sum of $135 billion dollars for damages caused by storms and natural disasters. Munich Re estimated that the total losses (insured and uninsured assets) reached $330 billion dollars (Tabuchi, 2018).

The following table published by the Urban Land Institute (2018) shows climate risk and its potential impact on the real estate sector:

TABLE 1. Climate risk and its potential impact on the real estate sector

	CATEGORY	POTENTIAL IMPACTS
PHYSICAL RISKS	**Catastrophic events** Extreme weather such as hurricanes and forest fires.	• Costs to repair or replace damaged or destroyed assets; impairment of value. • Property downtime and business interruption. • Possibility of higher insurance costs or reduced availability / non-availability of insurance.
	Decrease in precipitation patterns Gradual changes in temperature and precipitation —high temperatures, rising sea levels, increased frequency of rain and wind— are likely to exaggerate the impact of catastrophic events.	• Increased wear or damage to buildings, which increases maintenance costs. • Increased operating costs due to the need for more alternative resources (energy and water) to operate a building. • Cost of investing in actions to adapt infrastructure, such as raising buildings or incorporating additional cooling methods. • Possibility of further damage from catastrophic events. • Possibility of higher insurance costs or reduced availability / non-availability of insurance.
TRANSITION RISKS	**Market** The possibility that markets vulnerable to climate change will become less desirable over time. Increased capital costs to pay for the construction and maintenance of infrastructure to manage climate risks.	• Reduction of economic activity in vulnerable markets. • Lower demand for properties by occupants. • Reduced asset value. • Potential increase in property taxes.
	Policy and regulation Regulations to address climate change. For instance: "***disclosure***" from climate hazards, stricter construction standards, carbon prices, emission limits, changes in subsidies - as well as policy changes to funding infrastructure or reconstruction after major events.	• Increased cost of doing business due to new requirements and compliance measures. • Increase in taxes: those that result from public policies, such as carbon taxes, and those that finance adaptation infrastructure. • Loss of subsidies or other funding opportunities. • Additional capital investment to comply with stricter regulation.
	Resource availability Changes in the availability of critical resources such as energy and water, including water scarcity.	• Higher costs and lower net operating income due to higher water and energy prices. • Additional capital expenditures to adapt buildings to operate with reduced resources and/or invest in alternative energy.
	Reputation and position in the market The growing preference of stakeholders to work with companies that incorporate climate risk into investment decisions and the consumer's choice for Real Estate products that include climate mitigation in the construction and operation phase.	• Risk to the company's brand and reputation if adequate measures are not taken. • Low liquidity and/or less attractiveness of those who have not taken climate change into account in their development and promotion (through mitigation and adaptation strategies).

Source: Urban Land Institute (2018)

In the case of Mexico, the territory has become warmer, increasing 0.8°C (like the global increase) from 1901 to 2012 (Government of the Republic, 2015), and 273 municipalities are identified with a very high and high degree of vulnerability (Government of Mexico, 2020).

The National Center for Disaster Prevention (CENAPRED), in its publication "Socioeconomic impact of disasters in Mexico during 2015," mentions that the estimated damages and losses due to natural and artificial disasters that occurred in 2015 amounted to $17,781.7 million pesos. 96.2% of these damages were caused by hydrometeorological phenomena (CENAPRED, 2016).

In the future, climate change scenarios show that temperature could rise 4°C in the border area with the United States of America, and between 2.5 and 3.5°C in the rest of the country. This means that tourist destinations will face more direct impacts (destruction of infrastructure and interruption of operations) and the degradation of ecosystems and loss of biodiversity (the main tourist offer), which translates into an economic risk.

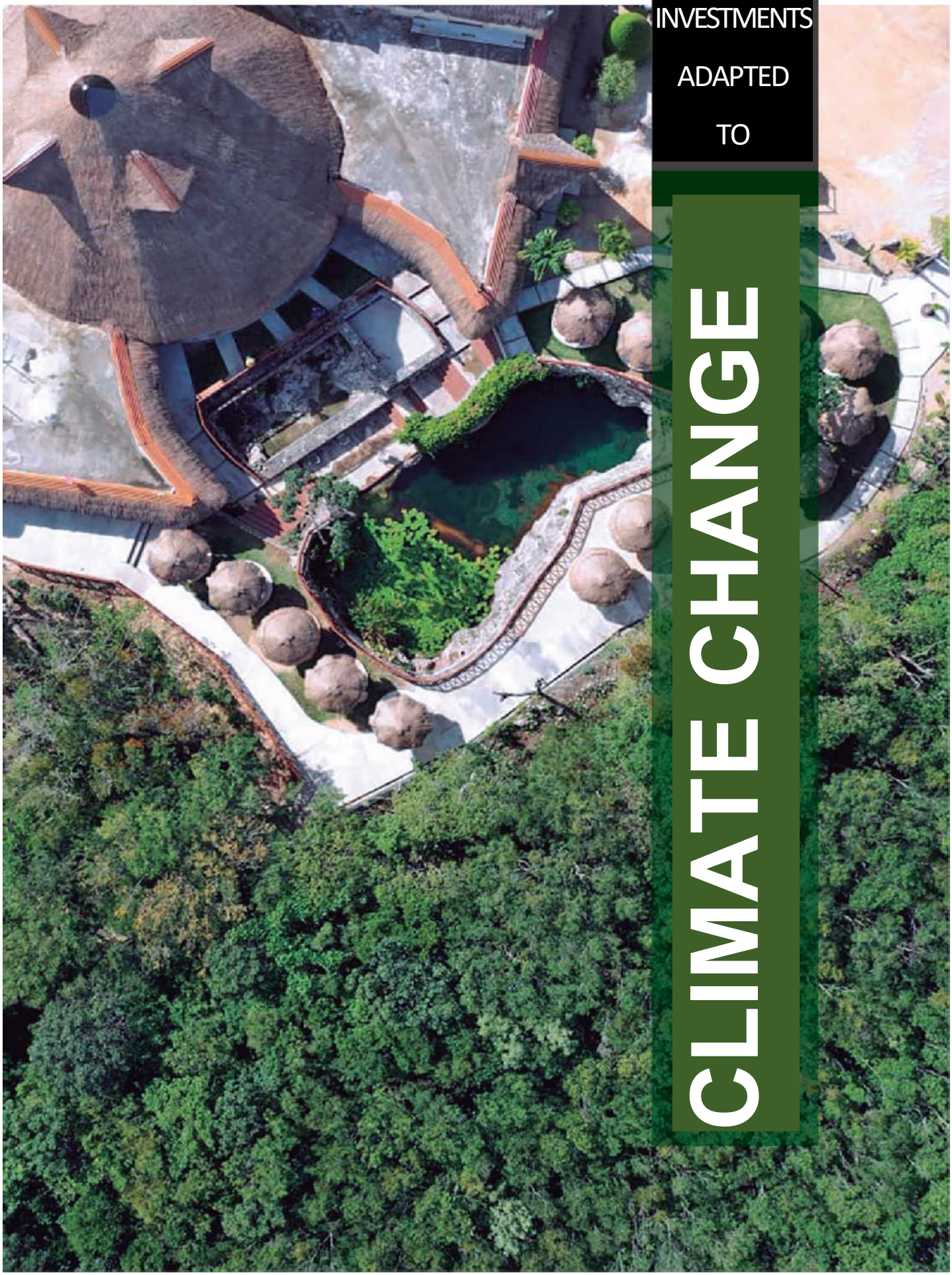
For example, in the Mexican Caribbean, the massive arrival of sargassum and diseases in the coral reefs triggered by increased temperature have alerted the sector. Only on the island of Cozumel, it is estimated that a decrease in the local economy of more than one-third could occur, which would represent losing $1,500 million pesos ($83 million dollars) per year (CONANP, 2019).

Sargassum problem in the Riviera Maya ©ADAPTUR / Photo: Ana Lorena Gudiño Valdez

In the country's interior, in the tourist destination of San Miguel de Allende, a recent study has shown that the increase in temperature and the reduction of rainfall due to climate change could affect the forests and, consequently, the ecosystem service of water filtration to the aquifer. Therefore, there will be less water available but higher demand from residents and tourists. In the short term (2030), the cost of water production could increase by 26%, while in the medium term (2060), it could reach 185% more than the current cost, which would mean investing around 10 million dollars a year (Morales et al., 2020).

In the financial system, a report by Banco de México showed that 80% of credit institutions and 68% of asset managers perceive that in the next six years, their portfolios will be affected by risks derived from climate change (Banco de México & PNUMA, 2020), which could influence investors who depend on these credits.

In conclusion, the tourism sector will face essential consequences, since, although everyone is responsible for mitigating the emission of Greenhouse Gases (tourism activity is responsible for 8% of total emissions in the world (Lenzen, 2018)), the main challenge is adapting to the impacts of climate change in daily activities globally.



INVESTMENTS ADAPTED TO CLIMATE CHANGE

CHAPTER 2

INVESTMENTS ADAPTED TO CLIMATE CHANGE

Considering the above, the decisions in an investment process require incorporating the risks derived from climate change and the design and implementation of adaptation solutions, not only for creating an environment more aligned with the climate reality but also for the reduction of vulnerability and systematic management of identified risks.

Adaptation to climate change is defined as "measures and adjustments in human or natural systems, in response to climate stimuli, projected or real, or their effects, that they can moderate the damage or take advantage of its beneficial aspects" (LGCC, 2012).

Therefore, how can a conventional investment adapt to the current and future climate change scenario? Next, the usual investment process and a proposal of recommendations for its adaptation are presented.

The segmentation and the name assigned to each phase and their stages are generic and derive from the "conventionality" of the process; it is important to understand the essence of the process for their application.

Conventional real estate tourism investment

Usually, a Real Estate Tourism Investment (ITI) has two phases before its execution: Feasibility and Planning, which are essential to ensure the business model's success (Figure 5)[6].

PHASE 1: FEASIBILITY

Feasibility is a subjective result that derives from the analysis, investigation, and correlation of multiple variables. The desired business model, the interests of the investor group, and legal aspects stand out. If the development potential of said asset is attractive, then it is considered positive feasibility to carry out a commercial transaction. This phase comprises Due Diligence (as it is commonly known). It usually does not include investigating the risks of climate change to which the property or business could be subjected due to its location.

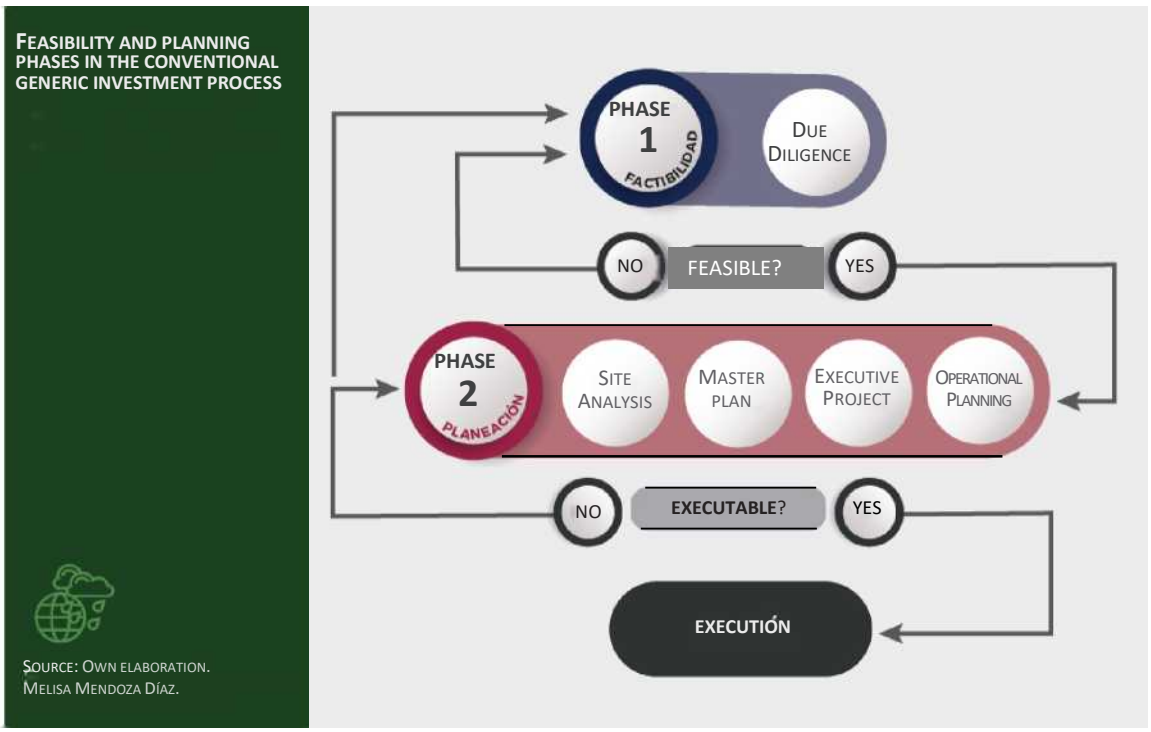
Method and Creativity. 6 The phases and stages of an ITI may vary according to the author. So the book Planning of Tourist Centers. The experience and practice of FONATUR (2006) in chapter 5. First edition, FONATUR contemplates three phases in the Conventional investment subsystem: Planning, Development, and Operation.

Arquitectura integrada al paisaje - Río Secreto ©ADAPTUR/Foto: Mariana Rodríguez Aguilera

PHASE 2: PLANNING

Planning in an ITI consists of carrying out the planning/organization of the investment's execution process (materialization) and is composed of developing the environmental analysis and the design of the master plan, the executive project, and the planning operational. In this phase, current climate risks are analyzed, but future climate change scenarios are rarely considered, and, to a lesser extent, adaptation solutions are integrated into the project design.

Figure 5. Feasibility and planning phases in the conventional generic investment process.



Real estate tourism investment adapted to climate change

Investment adapted to climate change comes from a concept called **Climate-Proof Investing**, which emerged as a solution to improve the decisions of the financial sector worldwide and avoid millionaire losses with its clients.

It is defined as a process in which the economic, social, and environmental risks that climate change causes to an investment project are identified. It allows defining preventive measures that reduce current and future risks to acceptable levels. With this approach, the aim is to reduce the risk before developing the project, with the premise that a later adaptation will be more expensive (ADB, 2015).

In an ITI process, this perspective allows more informed decisions to be made, helping to identify climate risks in the feasibility and planning stages and design adaptation solutions that reduce the risks to its profitability (Figure 6). In each stage, a specific analysis is required, depending on the characteristics of the project, so there is no single route to achieve an adapted model.

First, we must consider the physical risks that climate change will cause in buildings, in strategic infrastructure (roads, bridges, airports, etc.), in natural assets (forests, beaches, reefs, jungles, etc.), and in the environmental services they provide and that the business will depend on (water, raw materials, scenic beauty, etc.).

Likewise, transitory risks should be considered. In a classic model, they are not usually considered. Still, they represent a high economic risk, including new legal regulations on using resources, modifications to financial schemes, effects on the market, and brand reputation.

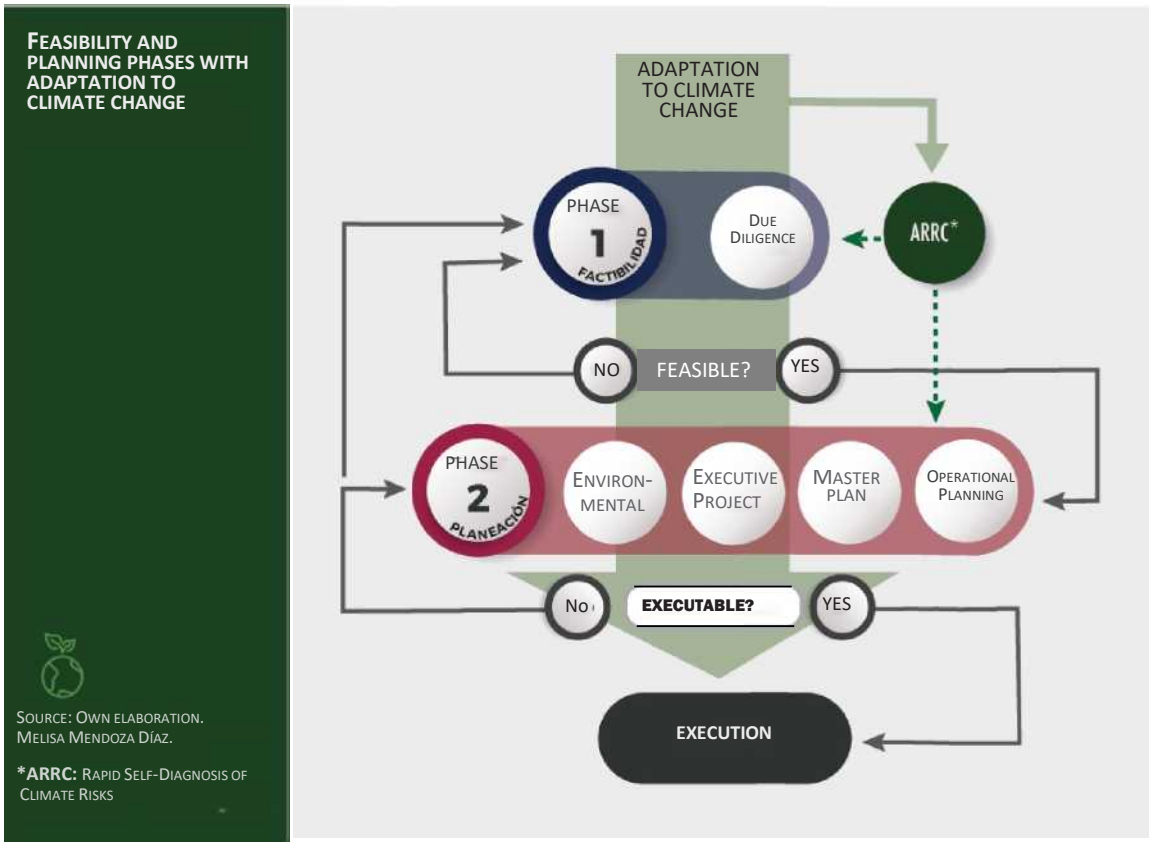
Natural bodies of water integrated into the Mayakoba tourist complex © ADAPTUR / Photo: Mariana Rodríguez Aguilera

For example, in a conventional investment feasibility study, financial performance indicators consider annual rates of return and success commissions based mainly on the appreciation of the property from the beginning of construction and the project duration horizon.[7]. This appreciation is based, in turn, on historical occupancy rates by destination, with estimates for periods that provide greater stability to the models. In other words, there is a clear tendency to monetize and rationalize investor decisions based on a strictly financial projection aspect in an environment of economic and market conditions.

However, the climate crisis brings with it little predictable variations under this analysis scheme. The calculation of financial profitability indicators, such as the Net Present Value (NPV) or the Internal Rate of Return (IRR)[8], will seek to verify the relevance of developing investments, focusing on maximizing these. Still, it will not directly consider these new climatic conditions that can eliminate positive scenarios even in the short term.

An investment adapted to the climate must incorporate externalities not only of an economic nature but also associated with the appearance of growing environmental and social risks due to the impacts of climate change. The recommendation is to assign an economic value in the investment horizon to the adaptation solutions to strengthen the classic financial profitability indicators.

Figure 6. Feasibility and planning phases focused on adaptation to climate change.



7 The terms may vary depending on the type of project and area in which it is located, considering estimated horizons of 3

8 Requested as essential information for the economic and social evaluation of investment projects, even in the public sector.

For the design of solutions, it is advisable to adopt two types of approach: Adaptation based on Gray Infrastructure and Ecosystems-based Adaptation (EbA). The first is an approach to increasing infrastructure works' adaptation capacity, considering more extended periods of return of climate threats (DNP, 2011). The second refers to biodiversity and environmental services to help people adapt to the adverse effects of climate change. (Lhumeau& Cordero, 2012).

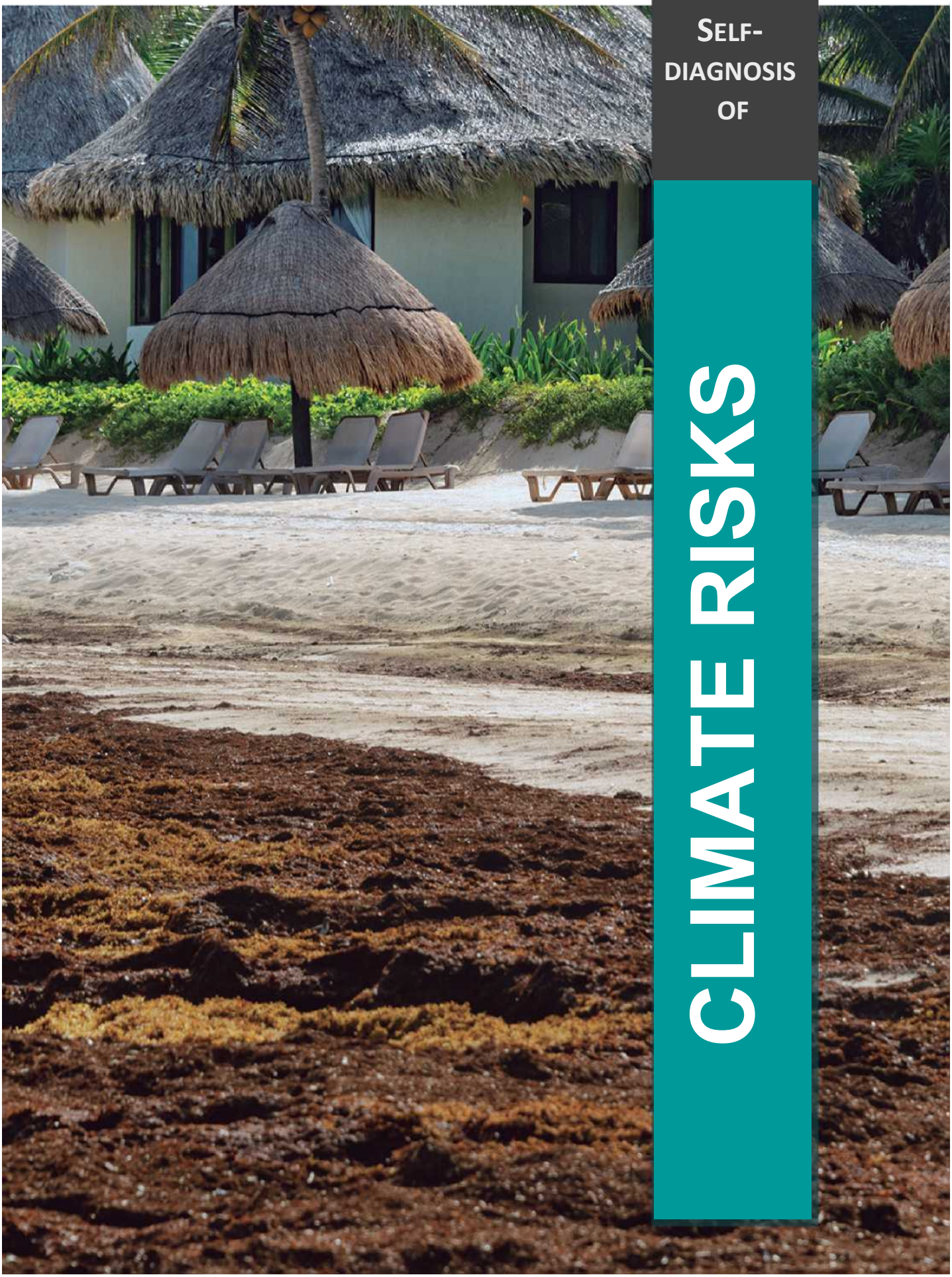
However, EbA has notable advantages over Gray Infrastructure, since the use of living systems allows: 1) an adaptation of no regrets; that is, in case the weather conditions change over time, the system will adjust itself; 2) a relatively cheaper investment with broader social and environmental benefits; 3) strengthening and involvement of local capacities; 4) mobilizing a regional public-private plan, as well as improving the value chain, among other benefits. In both cases, the aim is to reduce vulnerability to climate change. Therefore, a cost-benefit analysis will be necessary to prioritize and select adaptation solutions (Zorrilla & Kuhlman, 2018).

This last point is especially relevant in the context of an ITI since it has to go beyond the known sustainability aspects (green building, energy efficiency, saving resources, waste treatment) and to move towards Adaptation solutions based on Ecosystems so that their benefits to the project, the population, and the environment are enhanced in the long term.

For a successful implementation, it is essential to establish an enabling framework for adaptation, focused on improving organizational and structural processes of the company, the strengthening of personnel skills, and the link with other players.

Finally, it is essential to mention that it is possible to incorporate adaptation solutions once the project is built and is in operation; however, the cost will be much higher than if they are included in the early stages.

Bearing the preceding in mind, the first step will be to carry out a self-diagnosis that quickly dimension the risks that ITI will face. The following chapter describes a tool called Rapid Self-Diagnosis of Climate Risks (ARRC). Subsequently, the rest of the chapters address each stage of the investment process and examples of solutions, seeking practical tools for achieving an investment adapted to climate change.



SELF-DIAGNOSIS OF CLIMATE RISKS

CHAPTER 3

RAPID SELF-DIAGNOSIS OF CLIMATE RISKS

The Rapid Self-Diagnosis of Climate Risks (ARRC) is a tool used to internally analyze the risks that climate change could represent in an investment project. Given its versatility, it can be implemented in any of the phases and stages of the investment. However, the recommendation is to include it from the initial phase (for example, in Due Diligence) in a preventive manner to avoid it being corrective.

The tool consists of 16 key questions[9] that allow assessing climate risk in five dimensions:

1. **D1 Infra / Structure:** refers to analyzing the possible impacts on the property and/or infrastructure.
2. **D2 Operation:** aimed at analyzing the relationship between business activities with natural assets and their environmental services.
3. **D3 Social environment:** points to the visualization of future social conflicts.
4. **D4 Regulations:** indicates the provisions of the government and financial sector for the optimal use of natural assets.
5. **D5 Finance and market** describes the recognition of economic risk and changes in the market.

From this perspective, the objective is to identify the dimension where a considerable risk could arise from climate change and comprehensive analysis on searching for adaptation solutions.

This is achieved by using empirical knowledge about past climate events concerning the possible or final physical location of the investment (e.g., floodplain or drought, hurricane-prone, etc.), as well as the scenarios of climate change, which are found in official documents of the municipality, state or federal institutions, to assign a quantitative value in percentage to the 16 questions. The subtotal for each dimension represents the average of the set percentages.

It is essential to consider that the results will reflect the knowledge and perception of those who carry out the exercise, so the participation of technical specialists is relevant, remembering that the analysis can be adjusted or executed again if there is more information.

9 Based on the GIZ Climate Expert methodology, which incorporates climate risks in companies: https://www.climate-expert.org/en/home/


Sargazo en Tulum, México ©iStock

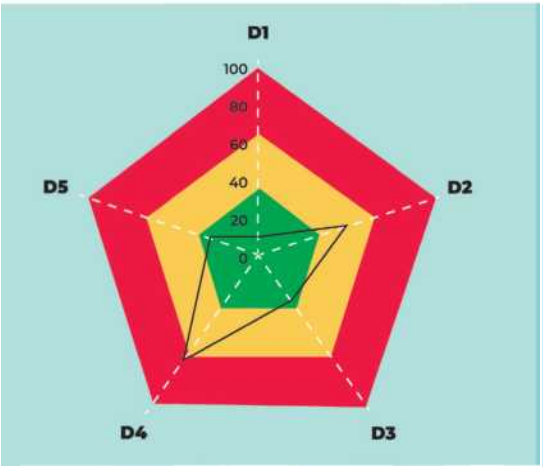
To perform the exercise manually, you can refer to Annex 1, and to do it digitally and free of charge, please use the following link: https://sire.eblocks.mx/autodiagnostico.

Hypothetical case study: real estate tourism project in the Bajío

To visualize the application of the ARRC, here is a hypothetical case study of a Real Estate Tourism Investment project (hotel and second residence houses) in Guanajuato, which is supposed to have been analyzed by the project team (director of the operation and technical advisers).

The property comprises an area of natural vegetation and extends towards the tributary of a river. The water from this tributary is used by two communities located 5 km apart, which have had conflicts with other productive sectors due to the dispute over the resource. Recently, the local government has published its Municipal Climate Change Program establishing adaptation and mitigation solutions for all sectors, since climate change scenarios show that there will be a temperature increase of 1.5 and 3°C and a decrease in rainfall of up to 20%.

Figure 7. Example of the analysis of a real estate tourism project using the Rapid Self-Diagnosis of Climate Risks tool.



Dimension	Risk level		
	Low 0-35%	Medium 36-65%	High 66-100%
D1 Infra/structure	10		
D2 Operation		50	
D3 Social environment	30		
D4 Regulations			70
D5 Finance and market	28		
Total		37.6	

EXAMPLE OF THE ANALYSIS OF A REAL ESTATE TOURISM PROJECT USING THE RAPID SELF-DIAGNOSIS OF CLIMATE RISKS TOOL (PERCENTAGES REPRESENT THE PERCEPTION AND KNOWLEDGE OF THE PROJECT TEAM).

SOURCE: OWN ELABORATION. GIZ-ADAPTUR

DIMENSION	CRITERION	KEY QUESTION	RISK LEVEL
			Low 0-35% / Medium 36-65% / High 66-100%
D1. Infra/structure	Location of infrastructure/structure	Is the infrastructure/structure of tourism development located in areas at risk from impacts of climate change? (e.g., floodplains)	10
		Subtotal D1	**10**
D2 Operation	Services for the operation	Could the availability of drinking water be reduced in the long term due to climate change? (e.g., less water is expected in the future, overexploitation of the aquifer, etc.).	70
		Could the availability of other services be interrupted or decreased due to the effects of climate change? (e.g., energy, transportation)	40
		How sensitive is the tourism business operation to the uncertainty of service availability? (e.g., by interruption of water, energy, etc.)	70
		Is there the capacity to evacuate personnel and transport goods in the event of an extreme weather event? (e.g., in the face of a hurricane, flood, etc.).	20
		Subtotal D2	**50**
D3 Social environment	Employees	Could employee productivity be affected by extreme weather events? (e.g., illnesses, interruption of access routes from their homes to the company).	10
	Communities	Could local communities be affected by climate change and cause a conflict in the tourism business? (e.g., social conflict over water)	70
	Providers	How much will local suppliers be affected by the effects of climate change? (e.g., disruption of roads, etc.)	10
		Subtotal D3	**30**
D4 Reculations	Regulations	Is the local government contemplating a royalty payment for the compensation of environmental services? (e.g., taxes for beach cleaning)	70
		Could the effects of climate change lead to the emergence of regulations regarding the use of ecosystems? (e.g., restrictions for visiting a beach or forest).	70
	Normativity	Is there an environmental regulatory instrument that is anticipated in the future that represents significant changes to the business? (e.g., PACMUN)	70
		Subtotal D4	**70**
D5 Finance and market	Product	Could climate change affect the attractiveness of your tourism product or offer? (e.g., loss of scenic beauty, beaches, biodiversity)	30
	Operating costs	Could climate change increase operating costs? (e.g., increase the price of water/energy, technologies)	50
	Market	Could the effects of climate change reduce business income? (e.g., cancellations of tourists, a lousy image in the market, etc.)	20
	Insurance (policies)	Is there a risk of an increase in the insurance premium and financial services due to the impacts of climate change?	20
	Real estate value	Could the real estate value of the tourism business decrease considering the current and future impacts of climate change?	20
		Subtotal D5	**28**

At the moment, the company is in its planning stage, specifically with its master plan developed; it has at its disposal the local risk atlas, the local climate change scenarios and has carried out environmental studies that make up the Environmental Impact statement. Considering the information collected and the empirical knowledge, the risk percentages that the team has assigned to the project are shown in Figure 7.

The results show that the highest risk is located in the Regulation dimension, followed by a medium risk in Operation. On the one hand, this means that the company did not consider the regulations on the use of water, since the municipal government recently arranged for new developments, the incorporation of infrastructure adaptation solutions (eco-technologies for saving water and rainwater collectors), as well as ecosystem-based solutions (restoration of soil and vegetation in the aquifer recharge zone). On the other hand, there is a latent risk in operation due to the scarcity of water.

Therefore, some conclusions and specific recommendations reached by the team are:

- In the financial plan, it is necessary to consider the increase in costs for the supply of drinking water and the allocation of budget for adaptation actions.
- Carry out a study on the water stress at the site and the essential areas for water catchment.
- Design and implement ecosystem-based adaptation measures to ensure water supply in the future, considering the participation of communities, e.g., restoration of forests and soil in water catchment areas.
- Link up with other public and private sector players to seek comprehensive solutions to the water problem.
- Analyze in greater depth the possible effects on the health of employees, customers, and suppliers.

The following chapters present the different planning phases into which ITIs are divided and the climate change matters that must be considered in each of these project stages. Several recommendations are also presented that should serve as an example to include the vision of climate change and adaptation in project decisions and design appropriate solutions for each process.

Pool with natural water and maintenance based on aquatic plants © ADAPTUR / Photo: Fabian Trejo Rojas

FEASIBILITY

PHASE 1

CHAPTER 4

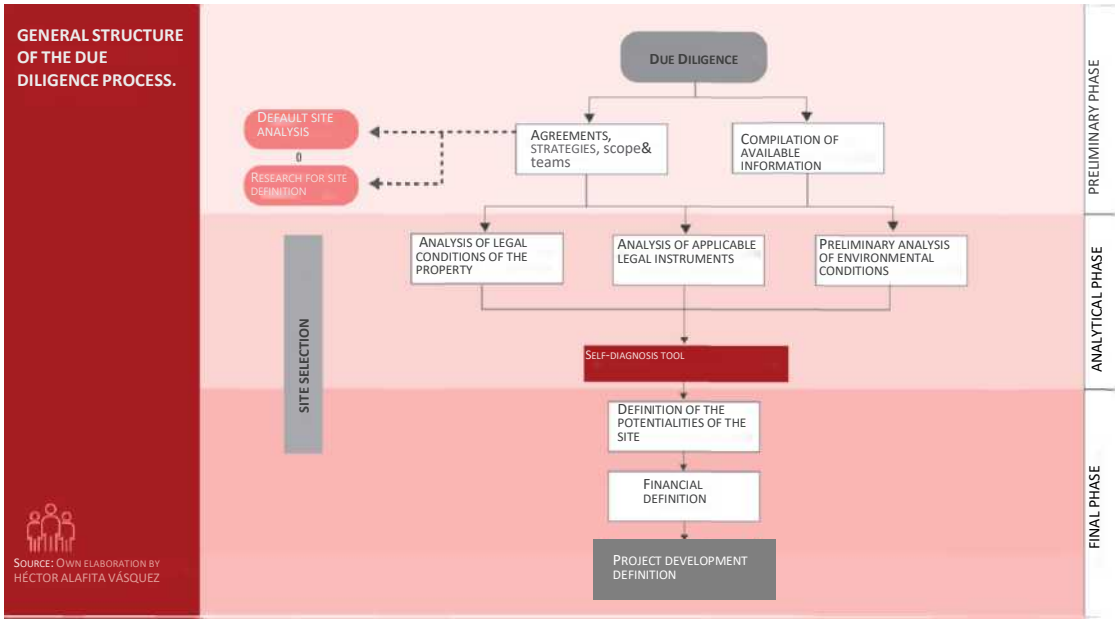
PHASE 1: FEASIBILITY

As mentioned before, the viability of the real estate tourism investment is determined in the feasibility phase. Therefore, adjusting to the conventional process of Due Diligence will focus on a comprehensive and long-term analysis of the environment.

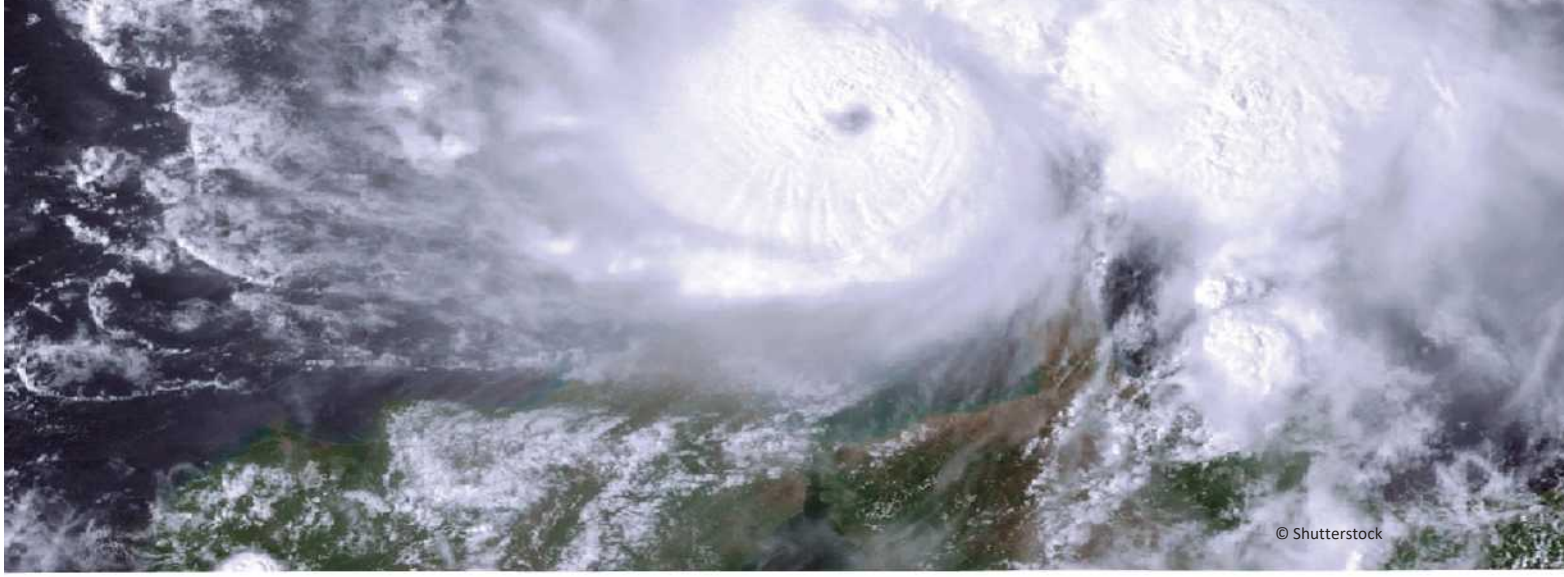
4.1. DUE DILIGENCE

Due Diligence is the analysis of the legal, administrative, environmental, economic, and physical circumstances, which must be performed to carry out any transaction, be it purely commercial, real estate, and in general, for any investment. In other words, it is an analysis that will provide essential information to determine the investment structure and the bases for the excellent development of the business, identifying and significantly reducing the risks of acquisition and start-up[10].

Figure 8. The general structure of the Due Diligence process.



10 The standard ISO 26000 (International Standards Organization, 2010) has defined it as "the exhaustive, proactive process to identify the actual and potential negative social, environmental and economic impacts of an organization's decisions and activities over the entire life cycle of a project or organizational activity, intending to avoid and mitigate negative impacts" This process is technically complex and must be developed under the supervision of specialists in the field. This section summarizes the general considerations, so it will be necessary to have adequate control to obtain the proposed results.



It is made up of three phases: Preliminary, Analytical, and Defining (Figure 8):

The preliminary phase is characterized by elaborating agreements and strategies, defining scope with investors, and consolidating work teams.

The analytical phase is of great technical relevance. It addresses legal issues, land tenure, and environmental conditions, including criteria and instruments according to the type of infrastructure to be developed.

The defining phase determines whether the project is feasible and desirable as envisioned or requires general modifications for its development.

The technical identification of climate change's current and future impacts will be critical for decision-making for the project's development, which is why the importance of the analytical and defining phases is highlighted below.

Analytical Phase

Preliminary analysis of environmental conditions

In this step, the Environmental System is delimited[11], and their physical, geological, biological, and social characteristics are analyzed in a preliminary and general way. In most cases, it is the first step for preparing technical legal documents such as the Environmental Impact Statement (MIA).

Due to its relevance, it is recommended to identify the Impacts of climate change observed at the regional level since their relationship with the biotic and abiotic components of the system will influence the project's design.

As an example of the above, in the study of **biotic components**, where the current state of conservation and the degree of protection of fauna and vegetation are identified, it is necessary to identify the future risks that an ITI could have due to the degradation of those Primary natural assets for the business, such as the loss of original vegetation cover in the aquifer recharge sites from which the water is extracted for the project.

11 It is defined by ecosystem interactions (abiotic and biotic components) and the socioeconomic subsystem (including cultural). In some cases, it may be regional (SEMARNAT, 2016),

Since these analyzes are preliminary, the information can be obtained from specialized bibliographic sources related to ecological processes[12], economic valuations of ecosystem services, climate change scenarios, among others.

Although formally Due Diligence does not consider **anthropic and sociocultural aspects,** these must be included. It is also necessary for its analysis to have a climate change approach. Naturally, there is competition for using natural assets with human populations in the region, leading to socio-environmental conflicts.

One of the most relevant features to analyze in this process is the location and general state of the natural resources that will potentially be shared with the inhabitants of the area, the population growth trend, and the position of the population regarding the project. These analyses may be integrated as part of the monitoring and management system proposed in the Environmental Impact Statement.

Another element to consider **is the geomorphological [13]** aspects, as long as detailed information on the property or the region is available. One of the essential elements is the stability of the soil aimed at foreseeing risks of landslides or subsidence; also processes such as erosion and accretion (Alafita Vásquez, 2017), since they help to determine certain relevant aspects for the project such as the distance of the infrastructure and buildings from the coastline or on the banks of a river.

@Shutterstock

12 The ecological process studies require that the information collected represents a natural cycle, so its duration is usually more significant than one year.

13 The geomorphological study includes the description of the forms (morphology), their origin, structure, history developmental, current dynamic

TABLE 2 Geographical scale of climatic analysis recommended according to the type of real estate tourism works to be designed

POTENTIAL EFFECTS OF CLIMATE CHANGE (EXAMPLE)	GEOGRAPHICAL SCALE OF ANALYSIS	WORK OR ACTIVITIES (EXAMPLES):					
		Multinational or international collaboration programs	Sector development planning	Medium and large-scale projects	Infrastructure development	Medium and small-scale real estate and/or tourism projects	Minor infrastructure
ALTERATIONS OF CURRENT SYSTEMS. INCREASE IN SARGASSUM PROLIFERATION MORE INTENSE AND FREQUENT HURRICANES	Supra regional	Indispensable	Indispensable	Necessary	Necessary	Desirable	Desirable
IMPACTS ON REEF SYSTEMS ATYPICAL FLOODS GENERALIZED ALTERATIONS DUE TO COAST EROSION RIVER AVENUES OR AFFECTATIONS TO DAMS	Regional	Necessary	Necessary	Indispensable	Indispensable	Necessary	Necessary
EFFECTS ON SPECIFIC ECOSYSTEMS EROSION ZONES SALT INTRUSION PROCESSES SLIDING OF SLOPES	Local	Desirable	Desirable	Indispensable	Necessary	Indispensable	Indispensable

Multinational or international collaboration programs are understood to be those that are cross-border with implications for shared resources; Planning of sectoral development related to industrial, mining, urban, etc .; Medium and large-scale projects such as large industrial parks or sizeable regional infrastructure projects; Development of infrastructure to roads, ports, linear infrastructure; Medium and small scale real estate and/or tourism projects: Projects like resorts and tourist complexes, as well as housing subdivisions. Minor infrastructure. Large houses, medium and small hotels, squares, small buildings, etc.

Source: Own elaboration. Hector Alafita Vasquez.

Considering the current panorama of changes in precipitation patterns and/or sea-level rise, future risks associated with climate change could worsen, so it is necessary to take them into account to reduce the risk of loss of investment. It is essential to highlight that the geographical scope of the analysis will depend on the type of real estate tourism work to be developed. As an example, Table 2 shows the type of recommended analysis scale (Alafita Vásquez, 2017).

The analysis of the table above shows that, for tourism and real estate investment projects, it is required to have at least information on the phenomena caused by climate variability such as winds, rainfall, floods, etc.; and information on phenomena caused by climate change such as the incidence of hurricanes, unconventional floods, heat waves, prolonged droughts, among others.

It is necessary that the information on changes in precipitation and temperature come from reliable sources such as the National Meteorological Service, the Geographic Information System on Risks of the CENAPRED, the Institute of Geography of the National Autonomous University of Mexico, the National Institute of Ecology and Climate Change (INECC) and the Climate Change Programs or Risk Atlas of local governments, among others.[14]

14 Complete information on the risk conditions in the country and its prevention can be consulted in http://www.atlasnacionalderiesgos.gob.mx

Analysis of applicable legal instruments

In this area, it is essential to point out that the applicable instruments will depend to a large extent on the location of the property, and that in addition to a regulatory framework established by the federal authority and represented by laws and regulations, in each state and municipality there may be additional regulatory instruments.

According to the previous, it will be necessary to verify the existence and applicability of several instruments, from which the Planning and Territorial Ordering stand out, such as the Ecological Ordering Programs (general of the territory, regional, local, marine), the Tourist Planning Programs of the Territory and Urban Development Plans or Programs (of municipal competence)[15], as well as the Climate Action Programs, Decrees and/or Management Programs for Natural Protected Areas (as applicable) or similar, of the state and/or municipal entity where the ITI is intended to be carried out since they contain relevant information and occasionally propose some solutions that can guide the development of the project.

DEFINING PHASE

One of the most relevant aspects of this phase is the **site selection** resulting from legal analysis of the property, the applicable legal instruments, and the existing environmental conditions, thereby constituting the necessary technical basis for decision-making for the project.

Typically, the results of the Defining Phase can be limited to:

1. Selection of another site that meets the necessary criteria for the development of a proposed business.
2. Possibility of developing the established project, with or without adjustments.

These results will be based on the analysis of information and the verification of project compliance with the technical and legal criteria derived from it since the definition seeks the protection of the ITI by determining the appropriate investment location based on the context of climate change among other factors. The information arising from this process feeds into the following stages in planning, or in some cases, may result in a complete rethinking of the business idea.

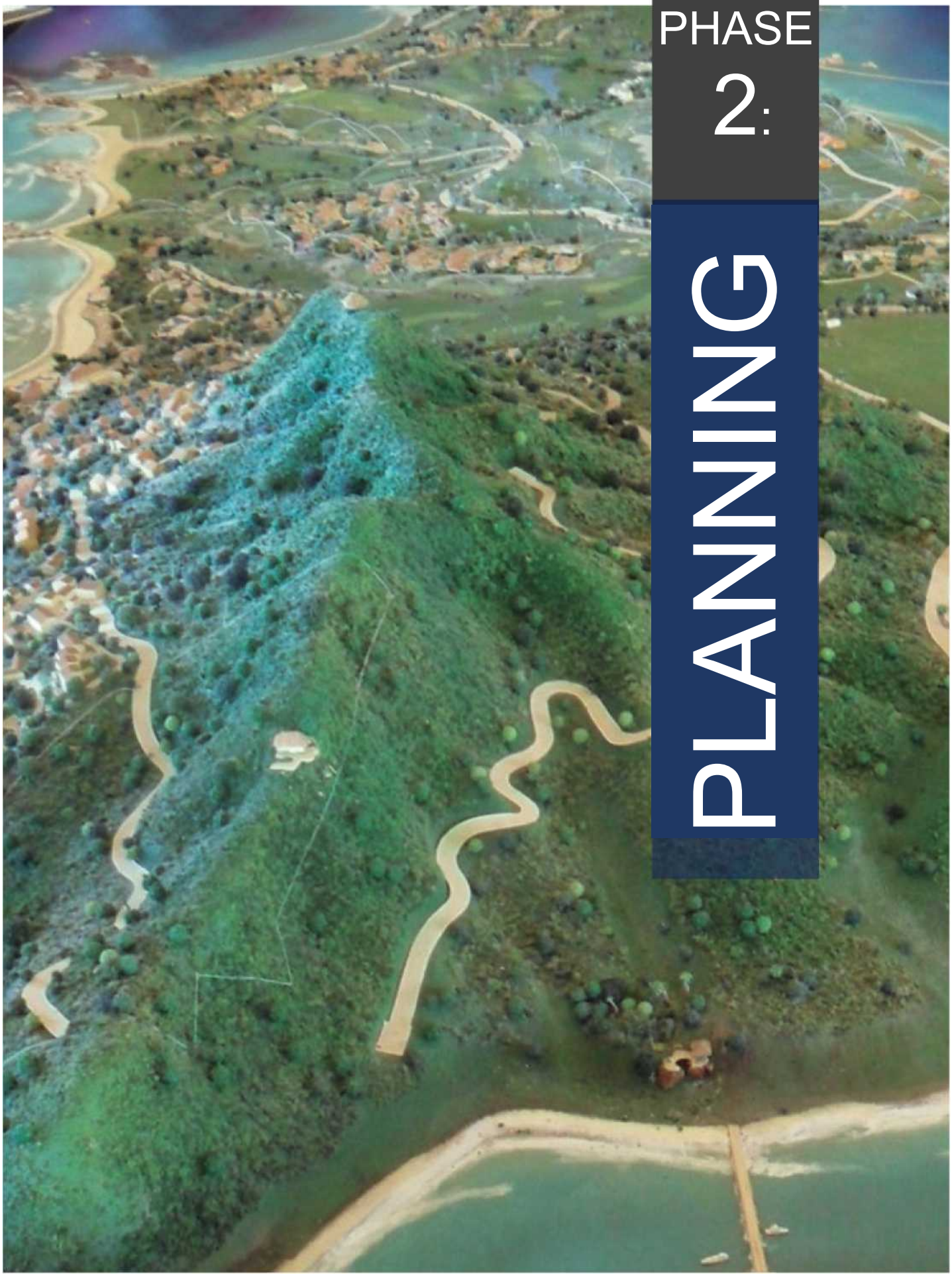
In conclusion, positive feasibility for the project's development means that the project:

- complies with the regulatory framework that applies to it at the three levels of public administration.
- Integrates the landscape, natural assets, and environmental services in the project's planning stage, avoiding their degradation.
- Contributes to the maintenance of the ecological processes that occur in the area, which have various benefits.
- Includes the local community and its cultural values as part of the project.
- Comes from a business model that considers climate risks.
- Allows verifying that the results from the implementation of the project have legal viability, given the background of the property and its assets.

Based on this analysis, the technical team will have sufficient elements to complete the planning stage of the ITI and the necessary legal and technical procedures, such as the studies for the Environmental Impact Assessment. Although not all the recommended studies and analyzes are indeed necessary, it is also true that the Environmental Impact Assessment technique requires the largest and best amount of data available, thereby contributing to sustainable development and the conservation of ecological processes, in addition to allowing the identification of risks, thus safeguarding investments.

Annex 3 includes a list of recommendations.

15 Annex 2 presents a general list of the instruments that could be applied to an ITI, depending on the location's geographic location and environmental conditions.



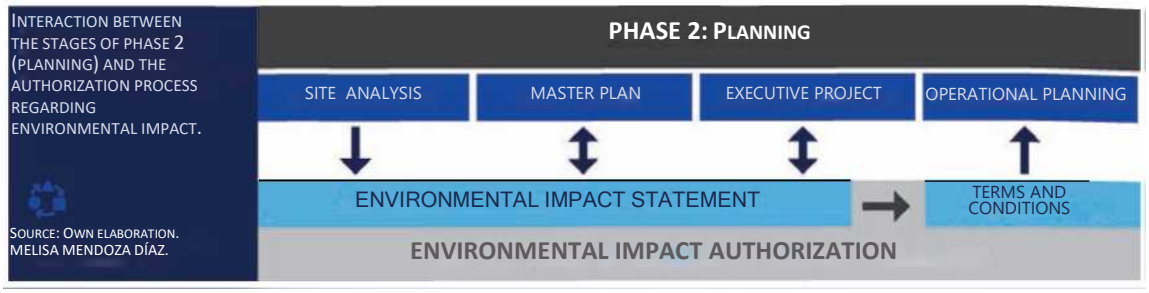
PHASE 2: PLANNING

CHAPTER 5

PHASE 2: PLANNING

As mentioned previously, this phase is used to determine the realization of the investment project. This phase integrates the environmental analysis of the Site, the design of the master plan and the executive project, and the operational planning. They are all essential inputs for the Environmental Impact Statement (MIA; Figure 9), the political instrument which objective is preventing, mitigating, and restoring damage to the environment, and the regulation of works or activities to avoid or reduce its negative effects on the environment and human health" (PROFEPA, 2019).

Figure 9. Interaction between the stages of phase 2 (planning) and the authorization process regarding environmental impact.



The following chapters describe the stages for planning the ITI and the additional elements recommended to incorporate to achieve an investment adapted to climate change. In this context, the solutions provided in the guide may enrich the design of the MIA and any other required technical documents.

5.1 SITE ANALYSIS

Once the project's legal, technical and social feasibility has been determined through Due Diligence and the site has been selected, an ***Environmental Site Analysis*** is carried out, comprising an in-depth study of environmental conditions, ecological processes, and current and future climate considerations.

Punta Mita Master Plan, Nayarit, Mexico © ADAPTUR / Photo: Fabian Trejo Rojas

The analysis starts at the Environmental System and is consolidated with data under the scientific method and following the guidelines and technical criteria of the laws and regulations required for regulatory compliance. Although there are not mandatory criteria, it is recommended that information from the Regional Environmental System be added to achieve a comprehensive, ethical, and technically helpful analysis.

Under this consideration, a geographical delimitation can be the hydrographic basins (Cotler et al., 2013), since they enable to spatially understand the interaction of natural assets and environmental services on which the project will depend, the impacts of climate change, and how these influence tourist attractiveness, for example, water availability or the degradation of natural assets. Besides, considering the physical environment built, for example, the surrounding urban/rural structure, accessibility, connectivity, urban/rural image (materials + construction systems), etc., will help deepen the social context identified in the Due Diligence stage and identify opportunities.

Environmental characterization

The first step is the Environmental Characterization, in which the natural elements, ecological processes, and environmental conditions that exist on the Site are identified and described.

The characterization must be carried out through specialized studies that have reliable, precise information, provide scientific certainty, and field studies, which must be carried out by a multidisciplinary team and collated with information from official agencies of the environmental sector.

The types of studies will depend on the geographic location, the size of the Site, the configuration of the natural elements, and the kind of ITI to be carried out. The following table shows some recommendations:

TABLE 3 - Type of study and analysis recommended by environmental category.

Environment	Category	Further study/analysis
BIOTIC ENVIRONMENT	Flora and fauna	• Review and analyze information on the effects of climate change on species of flora and fauna present at the Site (vegetation, forests, mangroves, reefs, birds, mammals, reptiles, etc.).
ABIOTIC ENVIRONMENT	Weather	• Know the extreme hydrometeorological phenomena observed historically in the area (hurricanes, floods, storm surges, prolonged droughts, heat waves). • Review and analyze the climate change scenarios at the national level, and where appropriate, at the state or municipal level (see Annex 4). • Carry out climate vulnerability models, such as a sea-level rise or saline intrusion in coastal areas.
	Geomorphology	• Analysis of slopes and risks due to landslides. • Analysis in coastal areas such as sedimentary balance, coastal dynamics models.
	Soil	• Review and analyze studies on the permeability and infiltration rate of the soil. • Carry out soil erosion studies. • Carry out sedimentary dynamics studies in coastal dunes.
	Water	• Review and analyze studies that identify priority areas for water recharge at the basin level to restore priority areas. • Review and analyze the current state of exploitation and recharge of the aquifers that will provide water to the Site and future projections (greater than 30 years). • Hydraulic modeling of streams and floods considering climate change scenarios.
	Urban	• Analysis of the transport and communications infrastructure. • Analysis and diagnosis of the built physical environment. • Analysis of the urban, rural, and natural landscape.

Source: Own elaboration. Aarón E. Hernández Siller.

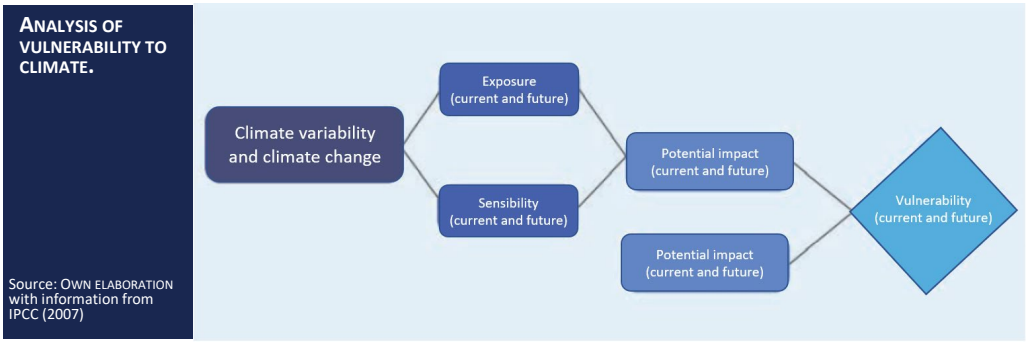
Environmental diagnosis

Derived from the environmental characterization, a set of conclusions is reached called Environmental diagnosis, reporting the site's current condition, its ecosystemic fragility, and climatic vulnerability.

The diagnosis considers the biotic and abiotic environment. In both cases, their current conservation status and trends in the use of natural resources are interpreted. For example, in mountain areas, the state of temperate forests and some other species sensitive to climate change should be observed, both in the upper and lower basins.

Here, the conclusions will indicate the climatic vulnerability, for which it is essential to carry out the ***climate vulnerability analysis*** (Figure 10). This allows to know the degree of exposure of the Site due to climatic threats (increase in temperature, alteration in precipitation patterns, extreme hydrometeorological events, etc.), the degree of sensitivity of the system to its exposure, and its capacity to adapt.

Figure 10. Analysis of vulnerability to climate.



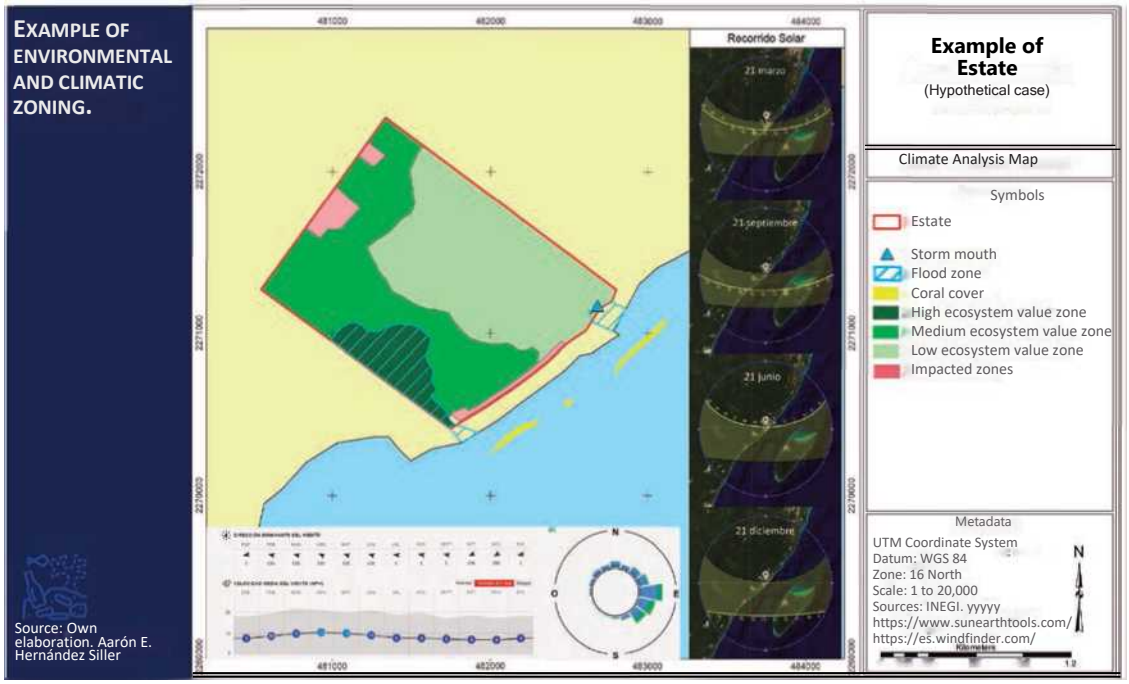
There are already vulnerability studies or publications that contemplate climate change scenarios (for example, vulnerability studies of tourist destinations published by SECTUR).

However, if its preparation is necessary, it is recommended to consult the *"Methodological Guide for the Evaluation of Vulnerability to Climate Change."* (INECC, 2012).

Another product suggested to obtain at this stage is the ***environmental zoning map,*** which will be based on the evaluation and analysis of various environmental studies to show the conserved areas, deteriorating, at risk, and climate vulnerability.

This plan aims to guide the development of the master plan, emphasizing the distribution of the works on the ground and the particular measures. The map must be complemented with a series of climatic recommendations deduced from the analysis and interpretation of the results.

Figure 11. Example of environmental and climatic zoning.



In conclusion, the results obtained in the feasibility studies and in the environmental diagnosis should be crossed with the architectural project, to design the mitigation and adaptation solutions to climate change in the different stages of the project. Additionally, these may be incorporated as part of the measures proposed in the MIA. In Annex 5 you can consult the recommendations in worksheet format.

5.2 MASTER PLAN

Represents the strategic and organized distribution of the construction components and free areas in the property acquired for the Investment. For the development of this stage, it is indispensable that the team of architects, urban planners, and engineers of the project have the analysis of the previous information (due diligence and site analysis) since said Information locates the safest sites and those exposed to risk for the location of the buildings within the property. In addition, it is suggested that the permanent advice of the technical team that participated in the site analysis be maintained since they will be the ones who will be able to provide the additional required information.

Zoning

In this step, the suggested information to be considered is the following[16]:

- Risk analysis and safe zones (low-flood areas, probabilistic risk models, surface and underground water bodies, location and total footage of permeable and low-permeable regions, climate change scenarios on rainfall and temperature, hydrological behavior of the site).
- Analysis of the environmental diagnosis (areas with the highest and lowest contribution of environmental services and impacted areas, zoning map).
- Restrictions and requirements following the regulations and the applicable planning and land use instruments.
- Bioclimatic analysis study of the Site.

The objective of integrating the above information is to provide elements to determine the distribution of the areas (services, facilities, and controls, etc.) considering the areas that are naturally of lower risk within the property; in case of an extreme event, the system will respond with its original dynamics even though they have been modified. Likewise, this will allow the zoning and the architectural concept to be carried out sustainably, guarantee the maintenance of the environmental services provided by natural assets, and benefit the ITI, such as the protection of infrastructure, among others (Table 4).

TABLE 4 Examples of natural assets and environmental services that bring benefits to a real estate tourism investment (ITI).

Natural assets	Benefit to ITI	
	Passive benefits	Active benefits
REEFS	• Coastal protection • Sand production • Biodiversity reservoir	• Infrastructure protection • Beach maintenance • Protection of the coastline • Tourist attraction • Provision of food
COASTAL DUNE AND SEAGRASSES	• Erosion control • Coastal protection • Biodiversity reservoir • Carbon sinks	• Infrastructure protection • Sediment stabilizers (beach maintenance) • Microclimate regulation • Air purifiers
MANGROVES / WETLANDS	• Coastal protection • Natural drains • Improves the water quality • Climate regulation • Breeding site and species protection	• Infrastructure protection • Flood control • Provision of water • Improvement of the microclimate and comfort • Air and water purifiers • Tourist attraction • Provision of food
TROPICAL FORESTS / DRY FORESTS / TEMPERATE FORESTS / SEMI-DEEP SCRUBS	• Ground protection • Climate regulation • Supply of raw material • Maintenance of biodiversity • Breeding site and species protection	• Provision of water • Improvement of the microclimate and comfort • Infrastructure protection • Raw material for services • Tourist attraction • Air purifiers

Source: Own elaboration. GIZ-ADAPTUR and Melisa Mendoza Díaz

16 The suggested information is indicative and responds to generalities in the context of the Mexican territory.

Recommendations

Once the base zoning and vulnerability to climate change have been determined, the team of architects, engineers, and landscapers will continue with the design of the Master Plan and is therefore recommended to design adaptation solutions. Table 5 lists some examples of recommendations that could apply for an investment project, considering the two types of adaptation: Adaptation based on Gray Infrastructure and Ecosystems-based Adaptation.

TABLE 5 General recommendations for adaptation to climate change for the design of the Master Plan.

RECOMMENDATIONS	Climate threats						
	Wind / Hurricane	Rising sea levels	Floods	Sliding of slopes	Extreme droughts	Heatwaves	Frost / Snowfall
Adaptation based on gray infrastructure							
LOCATE THE BUILDINGS IN THE SAFE AREAS OR WITH THE LOWEST RISK WITHIN THE PREMISES.	X	X	X	X			X
DISTRIBUTE THE BUILDINGS CONSIDERING THE NATURAL CONFIGURATION OF THE LANDSCAPE.	X	X	X	X		X	X
MAINTAIN NATURALLY FLOODABLE AREAS (STORM MOUTHS, ETC.) ACCORDING TO THE HYDROLOGY OF THE SOIL.		X	X	X			X
INCORPORATE THE ELEMENTS OF THE CLIMATE IN THE DESIGN OF THE PROJECT (BIOCLIMATIC DESIGN).	X	X	X	X	X	X	X
INCORPORATE THE USE OF ECOTECHNOLOGIES FOR THE USE OF RAIN WATER AND ENERGY (SOLAR, WIND, ETC.)			X		X	X	X
Ecosystem-based adaptation:							
CONSERVE NATURAL ASSETS THAT PROVIDE PROTECTION AGAINST EXTREME EVENTS (MANGROVE BARRIERS, DUNES, FORESTS, ETC.).			X	X		X	X
ALLOCATE AREAS FOR THE CONSERVATION OF BIODIVERSITY AND THE REGULATION OF THE MICROCLIMATE.	X		X	X	X	X	X

Although the development of the Master Plan (PM) and the Executive Project (PE) are somewhat parallel processes that feedback each other, the former provides essential criteria for developing the latter.

The PM development process will yield a series of intervention criteria that must be integrated into the following stages of the project. In this sense, it is recommended for their control that these Intervention criteria be duly recorded using an action plan or "climatic" intervention program, which must be following the sequence and programming for each stage. In turn, the following stages (PE and PO) may integrate specific intervention subprograms for each activity.

It's worth noting that the recommendations above are generalized and indicative, given that its location essentially conditions the vulnerability of the ITI, and the design of solutions must respond to such specific needs. Therefore, it is suggested that the advisory team refer the necessary studies and solutions to the investor. Their priority will react to a cost-benefit analysis. In Annex 6, you will find the worksheet with the recommendations in this chapter.

5.1 EXECUTIVE PROJECT

It is the set of information contained in plans, documents, and specifications that indicate the architectural, engineering, and construction solution to execute the building of a project in a correct, orderly and coordinated manner.

Therefore, for practicality in using this guide, the information will be presented in such a way that adaptation solutions to climate change are provided in line with architectural, engineering, and sustainable landscape management solutions (assets natural), and using the existing elements on the site in favor of the investment.

It is also necessary to have a multidisciplinary team accompany and advise during the process. In addition to having architects and engineers, it is suggested that the permanent advice of the team that participated in the site analysis and the PM be maintained, as they will be the ones who will be able to provide the additional required information.

Recommendations

For the development of the PE, besides the needs of the project, it is recommended to consider the following information[17]:

- Definition of the location of each building according to the master plan.
- Restrictions and requirements following the regulations and the applicable planning and land use instruments.
- Bioclimatic analysis study of the Site.
- Recognition of natural assets within the property.

Integrating the information above provides elements to determine the shape, orientation, materials, and interaction of the buildings with the environment, using natural assets as protection elements towards the infrastructure and the interior of the buildings.

Table 6 shows some examples of recommendations that could be used in the PE design under two precepts: Adaptation solutions based on gray Infrastructure and Ecosystems-based adaptation solutions.

17 The suggested information is indicative and responds to generalities in the context of the Mexican territory.

TABLE 6. General recommendations for adaptation to climate change for the design of the Executive Project.

RECOMMENDATIONS	Climate threats						
	Wind / Hurricane	Rising sea levels	Floods	Sliding of slopes	Extreme droughts	Heatwaves	Frost / Snowfall
Adaptation based on gray infrastructure							
DESIGN THE SERVICE SUPPLY NETWORK (ENERGY, ELECTRICITY, TELECOMMUNICATIONS) UNDERGROUND AND IN AREAS WITH LESS RISK.	X		X	X		X	X
USE OF TECHNOLOGY TO GENERATE CLEAN ENERGY THROUGH ALTERNATIVE SOURCES (WIND, SOLAR, ETC.)	X				X	X	X
DESIGN LOW-IMPACT DEVELOPMENT TECHNOLOGIES (LID[18]) FOR THE USE OF WATER.			X		X		
CALCULATE AND DESIGN THE ENGINEERING CONSIDERING THE PROGRESSIVE CHANGE OF THE CLIMATE AND EVENTS SUCH AS HEATWAVES, COLD FRONT, ETC.	X	X	X		X	X	X
USE BIOCLIMATIC ARCHITECTURE FOR THE DESIGN OF ARCHITECTURAL ELEMENTS (BUILDINGS AND EXTERIOR SPACES).	X	X	X	X	X	X	X
DETERMINE THE ELEVATION OF THE ARCHITECTURAL ELEMENTS BASED ON THE HYDROLOGICAL STUDY.	X	X	X	X			
IMPLEMENT THE CONCEPT OF "XERISCAPE OR XEROGARDENING" [19] FOR LANDSCAPE DESIGN.				X	X	X	X
INCORPORATE THE USE OF EQUIPMENT AND TECHNOLOGY TO TREAT WASTEWATER AND THE USE OF THE RESULTING TREATED WATER.							
Ecosystem-based adaptation							
CONSERVE BODIES OF WATER AND WETLANDS ON THE PREMISES.	X		X		X	X	
RESTORE NATURAL ASSETS (E.G., DUNES, REEFS, FORESTS) AS A STRATEGY FOR PROTECTION AGAINST THE IMPACTS OF CLIMATE CHANGE.	X	X	X	X			X
RESTORE UNSTABLE SOILS WITH NATIVE VEGETATION AND RESISTANT TO HEAVY RAIN.	X			X	X	X	X
ALLOCATE AREAS FOR THE CONSERVATION OF BIODIVERSITY AND THE REGULATION OF THE MICROCLIMATE.	X		X	X	X	X	X

Source: Own elaboration. Melisa Mendoza Díaz.

It is essential to mention that some of the recommendations in this stage have continuity in the operational planning stage since they involve financial, time, and personnel resources. Likewise, solutions should be designed and prioritized to respond to the vulnerability identified in the Site and, in turn, offer a better cost-benefit ratio. In Annex 7, you can see the recommendations in worksheet format.

Just as the PM produced a series of "climatic" intervention criteria, the EP will identify specific criteria for each of its activities, so it is recommended for their control that these intervention criteria are duly registered through a particular intervention subprogram.

18 Low Impact Development - LID.
19 Xeriscape, a concept that promotes water conservation through gardening aimed at reducing water use by 50% and70%.

OPERATIONAL PLANNING

When talking about the operation of a tourist project, the actions and processes carried out every day are included to fulfill its ultimate objective: the service to the client that satisfies the expectations of quality and sales that maintain and increase profitability and competitiveness. This operational planning must be carried out considering all the aspects previously analyzed in the business plans, which determined the project's viability in the beginning.

The main operational areas of a project include:

- Rooms: provides direct hosting service to clients (for projects that offer this option).
- Food and beverages provide direct service for the preparation, sale, and consumption of food to customers.
- Maintenance: verifies the correct operation of the equipment that is part of the property and the clients who benefit from the maintenance service. It is also in charge of keeping the property and infrastructure in perfect condition, including cleaning green areas, gardens or golf courses.
- Finance and purchases: administrative area responsible for providing resources and inputs and charging for services sold to customers.
- Human Resources: provides service to project collaborators.
- Management and/or operations, security: the adjective areas whose functions are transversal and manage the positions of all the others to obtain results.

During the last fifteen years, one of the managements that has begun to be more common in tourism projects is the one dedicated to sustainability. Its level of responsibility is related to 1) the level of commitment of the company's managers to environmental and social aspects; 2) increase regulatory requirements in environmental matters; 3) the need to implement strategies to reduce operating costs; 4) the market trend that expects more and more actions and results in favor of the environment; 5) the need to implement risk analysis that includes climate change as a factor; 6) maintaining the relationship and continuous dialogue with stakeholders, the ability to represent the project and make decisions on its behalf before other companies or government institutions on environmental issues.

Operation management

Even though climate change has been considered an essential factor in the tourism sector, it is uncommon for it to be included as an issue per seen in the field and inserted in the management of the tourism and real estate operation. In some cases, financial items have only been included for the attention of contingencies and the conservation of ecosystems. However, it was not until a few years ago that the first companies began to carry out climate change mitigation and adaptation activities.

However, as mentioned by the World Tourism Organization, companies must move beyond sustainability and seek low-carbon tourism, which allows them to mitigate their greenhouse gas emissions and, at the same time, adapt to climate change. Therefore, the management dedicated to sustainability must be transverse and be linked to all departments, including the financial one.

Figure 12. The general operational structure of a tourism project includes the main areas of work and transversal aspects

Based on the risk analysis derived from climate change carried out previously, an action plan focused on reducing the risks for the company in all its dimensions (social, economic, environmental, market, operational, etc.) and producing social and ecological benefits, including Adaptation actions based on gray infrastructure (engineering, ecotechnologies), as well as Ecosystem-based Adaptation. Regarding the latter, tourism-property projects could invest and promote initiatives for the conservation and restoration of natural assets (beyond the property) that help reduce vulnerability, together with local communities, government, and civil society, aimed at obtaining multiple benefits, including economic (job creation), social (inclusion of communities) and environmental (adaptation to climate change and conservation of biodiversity and ecosystem services).

The management system must include all those regulatory requirements, international standards, and operational processes established in the plan to ensure compliance. In addition, it will be crucial to incorporate adequate communication of progress against climate change, taking into account that tourists with an awareness of sustainability are increasing, and the supervision of civil society is increasingly closer.

Therefore, it is recommended to design a communication plan that shows the benefits of the implemented adaptation solutions, mainly when the interventions are carried out outside the study site and involve community allies.

A good communication strategy must consider different types of communication and adapt them to the target audiences. Capriotti (1999) identifies at least four that should be considered:

- Internal communication with the company's collaborators to generate in the work team awareness of the importance of establishing measures to adapt to climate change and seek to get them involved in the process.
- Commercial communication is done with consumers whose objective is to make them choose the property (to buy or spend their vacations) due to its commitment to sustainability.
- Industrial communication, aimed at establishing the links that generate commitment in suppliers and allies to achieve adequate EbA measures.
- Institutional communication, directed to the social environment (public opinion), seeks to achieve the organization's acceptance, credibility, and trust as a leader in sustainability and resilience to climate change.

The document "***The effective communication for adaptation to climate change***" published by GIZ[20] introduces a selection of success factors, which are shown below:

TABLE 7 Success factors for communicating adaptation to climate change

Type	No.	Success factors for communicating adaptation to climate change
Content	1	"Translate" what climate change means for everyday life and every audience
	2	Explain concepts and terms in an understandable way
	3	Talk about adaptation measures as solutions to the problem
	4	Use sound scientific data and be technically correct
	5	Connect to the identity and local knowledge of the collaborators
	6	Relate the content to good examples of climate change adaptation solutions
Target audiences	7	Frame and communicate the topic according to the audience
	8	Use trusted messengers and opinion leaders for the target audience
	9	Use appropriate communication formats and channels for the public
	10	Attract and keep the public's attention by telling good stories or involving them directly in an adaptation solution, e.g., ecosystem-based.
	11	Use existing groups and networks where the target audience interacts.
Motivation	12	Use images and visualizations that raise awareness about the effects of climate change.
	13	Arouse emotions, for example, that awaken the sense of security that adaptation solutions provide.
	14	Refer to existing social norms and values, relating adaptation to the values that motivate the public (sustainability, responsibility, prevention).
Evaluation	15	Evaluate the impacts of communication and, if necessary, improve the materials and messages.

Source: Adapted from Wirith et al. (2014)

These messages can be transmitted to clients through various means. The most commonly used in tourism projects are videos on digital media (screens, tablets, web pages, and social networks), signage (informative, restrictive, preventive), posters and printed infographics, and interactive media such as recordings on guided tours, Information in Referred line with QR codes in aids of interest, panoramic photographs with informative elements, among others.

Recommendations

The operation of a tourism project can significantly impact the natural and human capital of the area where it is developed, depending on the policies and measures that are applied every day. To assist operational decision-making, below are several examples of recommendations that could reduce vulnerability to climate change. These recommendations are grouped into two main sections (Adaptation based on Infrastructure and Ecosystems-based Adaptation) and a cross-section to generate the enabling framework for adaptation.

Additionally, the operational departments that could be responsible for the implementation and monitoring are also indicated. However, it is essential to remember that climate change adaptation solutions must respond to current and future vulnerability diagnosis specific to site conditions and local capacities.

20 Document that is delivered within the support kit of the ABE school course

TABLE 8 General recommendations for adaptation to climate change for Operational Planning.

RECOMMENDATIONS	Generic departments for the operation of an ITI						
	Maintenance	Management (inc. environmental management)	Procurement	Operations	Security	Finance	Human Resources
Adaptation based on gray infrastructure							
Ensure that the anchoring of equipment and machinery found in exposed areas is solid and in perfect condition.	X						
Use the anti-hurricane protection systems (canvas, special glasses, etc.).	X		X				
Use efficiently removable mobile equipment and infrastructure in the beach area to avoid losses of material and sand.	X	X	X				
Carry out proper management of sargassum (rake in the sea-beach direction, recover sand before collecting it, dispose of it only in official sites, etc.).	X	X					
Ensure an effective seal in gray and black water tanks so that rainwater is not integrated into the drain and a system to prevent the treatment plant from being saturated when the water tanks are filled with heavy rain (only in an open plant).	X						
Identify floodplain areas and enable rain collection systems to be channeled to sanitary systems.	X	X					
Implement a system that channels surface runway towards naturally floodable and/or low green areas, as they help to capture and absorb excess water.	X	X					
Establish a comprehensive program for separating and managing waste that reduces the volume of waste disposed of in landfills.		X		X		X	
Install a water recycling system in the laundry so that the water from the second wash cycle is used for the first cycle of the next load of clothes.	X			X			
Implement a periodic leak detection program, either electronic or manual, through the pipeline lines' physical inspection.	X						
Install Hawaiian curtains in the refrigeration and freezing chambers, as well as an automatic door closing system, together with an internal opening system and alarm to avoid accidents in case of being trapped.	X			X			
Ensure that lighting and air conditioning equipment are high efficiencies and low energy consumption.	X	X	X				
Use the refrigeration chambers at their established capacity to avoid overloading and underutilization.				X			
Install hydration stations in all guest and employee areas.				X			
Implement an effective disinfection process in areas of both guests and employees.	X			X			
Install or purchase refrigeration equipment with energy-saving technology and low cO_2 emissions.							
Implement a preventive maintenance program for all the project equipment that allows their optimal operation.	X						
Carry out pest and virus control through disinfection and fumigation with natural products.	X			X			X

TABLE 8 General recommendations for adaptation to climate change for Operational Planning. (Continuation)

RECOMMENDATIONS	Generic departments for the operation of an ITI						
	Maintenance	Management (incl. environmental management)	Procurement	Operations	Security	Finance	Human Resources
Ecosystem-based adaptation							
INVEST IN THE RESTORATION OF REEFS, DUNES, MANGROVES, FORESTS, SEMIARID FORESTS, ETC., IN COLLABORATION WITH TECHNICAL EXPERTS AND LOCAL COMMUNITIES	X	X			X	X	
DESIGNATE NATURAL AREAS FOR THE CONSERVATION OF BIODIVERSITY.	X						
MAINTAIN BODIES OF WATER AND NATURAL VEGETATION BETWEEN BUILDINGS TO IMPROVE THE MICROCLIMATE.					X	X	
INCORPORATE THE RESTORATION OF NATURAL ASSETS (EX. DUNE, REEFS, FORESTS) TO PROTECT BUILDINGS AND INFRASTRUCTURE.	X	X	X	X			
RESTORE UNSTABLE SOILS WITH NATIVE VEGETATION AND RESISTANT TO HEAVY RAIN.	X			X	X	X	
INCLUDE IN THE VEGETABLE PALETTE NATIVE SPECIES ADAPTED TO LOCAL CONDITIONS, WHICH ARE ADDITIONALLY A FOOD SOURCE FOR THE LOCAL NATIVE FAUNA.	X	X				X	
LINK THE GREEN AREAS MANAGEMENT PROGRAM WITH THE NEARBY URBAN GARDENING OR REFORESTATION PROJECTS TO GENERATE URBAN BIOLOGICAL CORRIDORS.	X	X					
LINK THE GREEN AREAS MANAGEMENT PROGRAM WITH THE NEARBY URBAN GARDENING OR REFORESTATION PROJECTS TO GENERATE URBAN BIOLOGICAL CORRIDORS.	X	X				X	
Enabling framework for adaptation							
PURCHASE INSURANCE POLICIES WITH EXTENSIVE COVERAGE FOR INFRASTRUCTURE AND EQUIPMENT, INCLUDING FOR EXTREME CLIMATE CONDITIONS AND FIRE		X			X	X	
PURCHASE INSURANCE POLICIES WITH EXTENSIVE COVERAGE FOR THE WORKFORCE, INCLUDING SALARY COVERAGE IN CASE OF TEMPORARY CLOSURE.		X			X	X	X
HAVE A COMPREHENSIVE CARE PLAN FOR RISKS, WHICH CONSIDERS MEASURES TO SAFEGUARD THE INTEGRITY OF PROPERTY, ASSETS, STAFF, AND GUESTS.	X	X		X	X		
ALLOCATE BUDGET AND PERSONNEL TO DEVELOP THE ACTIONS OF DISSEMINATION AND TRAINING THAT ALLOW ACHIEVING SUSTAINABLE, LOW-CARBON, AND ADAPTED TOURISM.		X			X		
MODIFY STAFF'S WORKING HOURS OF PERSONNEL WHO PERFORM THEIR FUNCTIONS OUTDOORS AND DO NOT GIVE ATTENTION TO THE CUSTOMER (E.G., GARDENING) ACCORDING TO THE TEMPERATURES AND PRECIPITATIONS PRESENTED.	X			X			X
INCORPORATE INTO FINANCIAL PLANNING THE INCREASE IN EXPENSES OR LOSS OF INCOME THAT COULD ARISE FROM THE IMPACTS OF CLIMATE CHANGE (EXAMPLE, AN INCREASE OF WATER COSTS, CANCELLATION OF TOURISTS, ETC.), AND REGULAR MONITORING OF THESE CHANGES.		X				X	
SELECT UNIFORMS FOR PERSONNEL ACCORDING TO THE CURRENT WEATHER, WITH UNIQUE ACCESSORIES FOR EXTREME CLIMATES.							X
ORGANIZE PREVENTIVE HEALTH CAMPAIGNS (VACCINES, MEDICAL CHECKS, ETC.) TO DETECT AND PREVENT DISEASES AMONG EMPLOYEES.							X

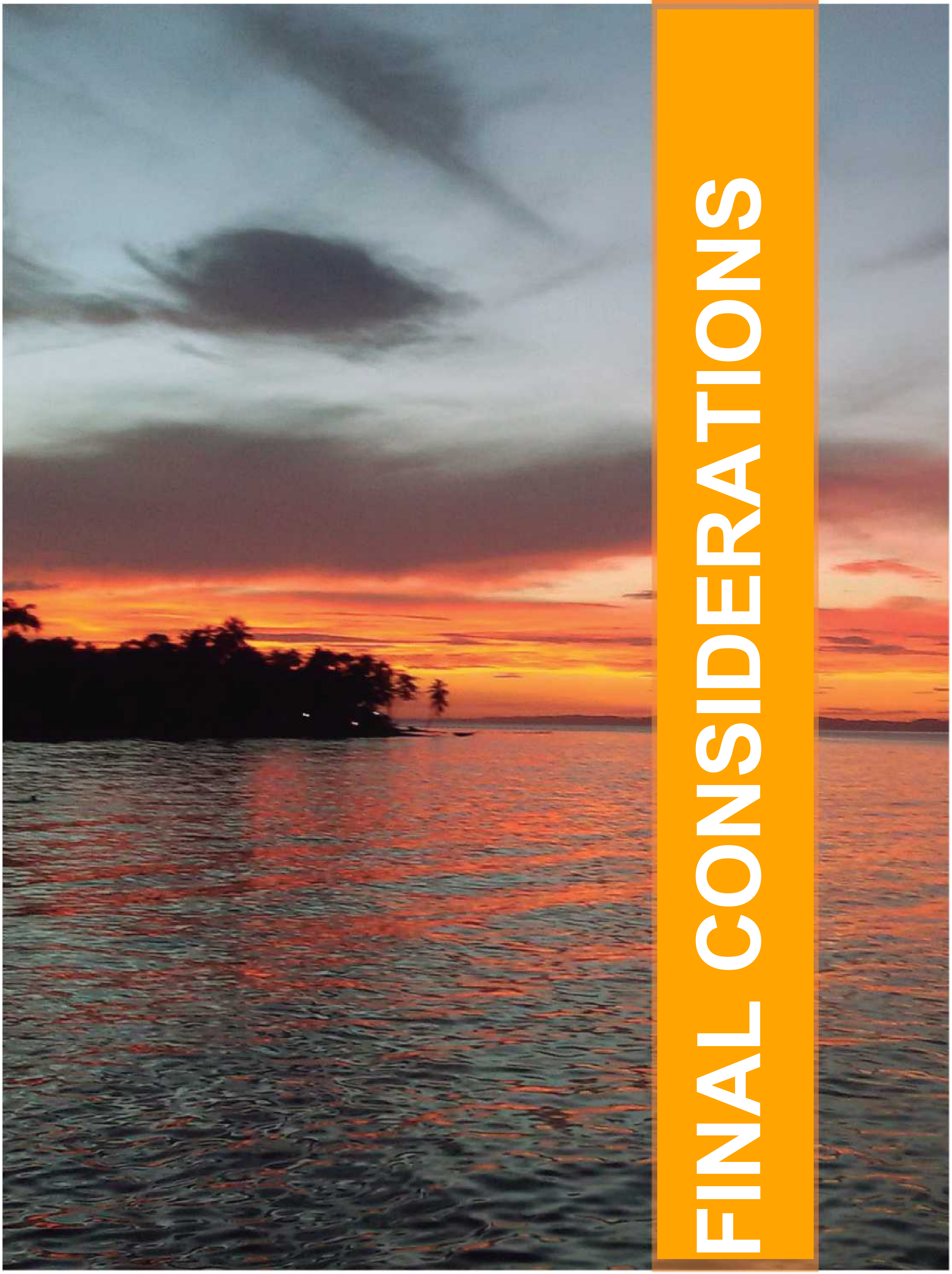
Source: Own elaboratoin. Lyn O. Santos Rodríguez

For more recommendations focused on energy efficiency, it is suggested to consult the *"Guide to energy efficiency in the design, construction, and operation of hotels in hot climates,"* published by SEMARNAT and GIZ (2020).

It is essential to periodically monitor and evaluate the carried-out actions since this will continuously improve the adaptation process. In the same way, risk analyzes must be carried out frequently, considering the updates of climatic conditions in the area, the results obtained, and new circumstances that may arise. In addition, the representative personnel from all regions and all levels should be consulted through a dialogue exercise with collaborators since, in the daily operation, they are the ones who will more easily detect any impact or challenge that climate change has for the project.

Unlike the PM and PE, the climatic intervention criteria must be identified before the operation to determine an intervention program that allows its implementation and the control of said criteria to protect the investment. The recommendations proposed in this chapter can be consulted in Annex 8.

FINAL CONSIDERATIONS



CHAPTER 6

FINAL CONSIDERATIONS

Biodiversity of San Miguel de Allende © ADAPTUR / Photo: Mariana Rodríguez Aguilera

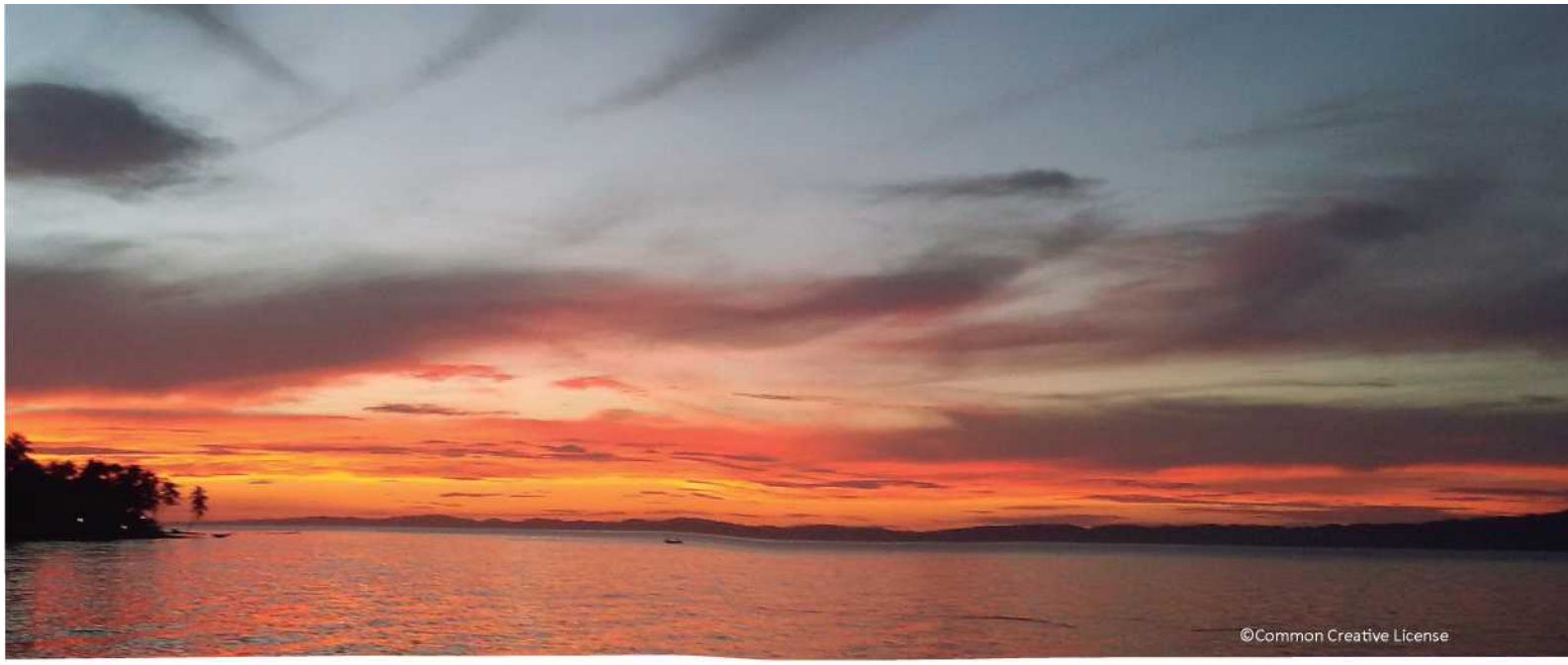
Investments in the tourism sector are determined by global trends that dictate the economic, social, and environmental direction. One of them, represented by the increasingly frequent, intense, and visible impacts of climate change, has made the world reflect on the future and how it does business in a changing environment.

Currently and in the future, tourism real estate investments that seek to survive and consolidate in changing scenarios should consider the following:

- Flexible plans in a volatile, uncertain, complex, and ambiguous business environment.
- Solid risk management and a financial mechanism that addresses the impacts of climate change and reduces business risk.
- Awareness of sustainability issues and concern for investments that help the planet, the climate, and local communities, under an increasingly supportive market.

The COVID-19 pandemic has established a "*New Reality,*" and it already offers new forms of consumption; it is adapting to revalue experiences with natural landscapes and healthy spaces, which highlights the opportunity to adjust the investment model, as well as the design of products and services

Facing climate change is an aspect to analyze across the investment. Although this document includes recommendations based on the conventional process, vulnerability to climate change should be explicitly studied in each project.



Although the Initial Investment to adapt may appear to be higher and could represent an organizational challenge, the application of this new approach is an opportunity for companies to obtain several benefits, including 1) make more informed and early decisions, 2) reduce the economic risk in their business and ensure their return on investment in the long term, and 3) become a benchmark in the country for other productive sectors that do not yet have such tools.

For the public sector, this new vision could also become a reference for the instruments of planning and territorial ordering, that is, the general environmental regulatory framework, to incorporate the criteria of climate change in a particular way of adaptation, and with this help to give certainty to public and private investments.

The adaptation solutions discussed in this document result from an in-depth analysis of various ITI projects, with their limitations and particularities. They serve as a starting point for the design and consolidation of strategies that benefit the project and, in turn, promote the link between the public and private sectors to achieve sustainable and climate-resilient tourism.

Biodiversity of San Miguel de Allende © ADAPTUR / Photo: Mariana Rodríguez Aguilera

Natural assets: All those natural resources (ecosystems and emblematic species) that allow the operation of a company and are part of its tourist offer.

Adaptation: Measures and adjustments in human or natural systems in response to projected or actual climatic stimuli or their effects, which can moderate the damage or take advantage of its beneficial aspects (LGCC, 2012).

Ecosystem-based adaptation: The use of biodiversity and ecosystem services, as part of a broader adaptation strategy, to help people adapt to the adverse effects of climate change (Lhumeau & Cordero, 2012).

Adaptation based on gray infrastructure: It is an approach that seeks to increase the adaptability of infrastructure works that play a decisive role in economic development. It consists of modifying the structure design process considering more extended return periods and the risk scenarios derived from them (DNP, 2011).

Climate threat: See definition of danger. In this guide, it is considered a synonym for the concept of danger.

Natural Protected Areas: The areas of the national territory and those over which the nation exercises its sovereignty and jurisdiction, where the original environments have not been significantly altered by human activity or that require to be preserved and restored and are subject to the regime provided in the Law (LGEEPA, 1988).

Climate Change: Identifiable variation in weather conditions (e.g., by testing statistics) in the variations of the mean value and/or in the variability of its properties, which persists for long periods, generally decades or longer periods. Climate change can be due to natural internal processes, external forcings, or persistent anthropogenic changes in the atmosphere's composition or land use (IPCC, 2014).

Adaptive capacity: Set of capabilities, resources, and institutions of a country or region that would allow the implementation of effective adaptation measures (SEMARNAT, 2013).

Weather: Synthesis of meteorological conditions at a given location, characterized by long-term statistics of the meteorological elements at that location (WMO, 2012).

Watershed: It is the unit of the territory, differentiated from other units, normally delimited by a water part or watershed —that polygonal line formed by the highest elevation points in said unit— where water occurs in different forms, and this is stored or flows to an exit point that can be the sea or another inland receiving body, through a hydrographic network of channels that converge into the main one, or the territory where the waters form an autonomous unit or differentiated from others, even without flowing into the sea. In this space delimited by a topographic diversity, water, soil, flora, fauna, other natural resources related to them and the environment coexist (LAN, 1992).

Due diligence: The exhaustive and proactive process to identify the actual and potential negative impacts of social, environmental, and economic nature of the decisions and activities of an organization throughout the entire life cycle of a project or activity of the organization, to avoid and mitigate these negative impacts (International Organization for Standardization, 2010).

Ecosystem: The basic functional unit of the interaction of living organisms with each other and the environment in a given space and time (LGEEPA, 1988).

Scenarios of climate change: Plausible and sometimes simplified representation of future climate, based on an internally coherent set of climatological relationships explicitly defined to investigate the possible consequences of anthropogenic climate change, which can be entered as input data in impact models. Climate projections are often a starting point for defining climate scenarios, although these usually require additional information on the current observed climate. A climate change scenario means the difference between a climate scenario and the current climate (IPCC, 2013).

Exposure: The presence of people, livelihoods, environmental services and resources, infrastructure, or economic, social, or cultural assets in places that could be negatively affected by the impacts of climate change (CENAPRED, 2020).

Hurricane: Generic term to designate a non-frontal synoptic-scale cyclone that originates over tropical or subtropical waters and presents organized convection and cyclonic circulation characterized by the surface wind (WMO, 2012).

Impact of climate change: Effects of climate change caused in human and natural systems (IPCC, 2014).

Strategic infrastructure: the infrastructure of communications, transportation, tourism, energy, sanitation, water, and waste management (Gobierno de la República, 2015)

Heavy or torrential rains: Atmospheric phenomena produced by the condensation of clouds. It consists of the precipitation of drops of liquid or overcooled water; maximum rainfall in mm accumulated in 24 hours, greater than 150 mm (CENAPRED, 2010).

Environment impact manifestation: Document considered the environmental legislation through which the environmental, significant, and potential impact that a work or activity would generate is disclosed, based on specialized technical studies, and how to avoid or mitigate it if negative (LGEEPA, 1988).

Storm surge: The abnormal rise in water level caused by storm surge and astronomical tide (NOAA, 2010).

Mitigation: Measures to minimize the impact of the disaster, but which can be implemented at any time: before the disaster, which would also include long-term preparedness and prevention measures [Conflict Prevention, Disaster Prevention] (UNDP-DHA, 1994).

Heatwave: The wave or heatwave is a period of excessive temperature, almost always combined with humidity, which is maintained for several consecutive days (CENAPRED, 2019).

Ecological planning of the territory: The environmental policy instrument whose purpose is to regulate or influence land use and productive activities to achieve the protection of the environment and the preservation and sustainable use of natural resources, based on the analysis of trends in deterioration and the potential for their use (LGEEPA, 1988).

Danger: The potential occurrence of a physical event or trend of natural or human origin, or a material impact, which can cause loss of life, injury, or other adverse effects on health, as well as damage and loss of property, infrastructure, livelihoods, benefits of services, ecosystems and environmental resources.
In this report, the term danger generally refers to physical events or trends related to climate or physical impacts (IPCC, 2014).

Resilience: Capacity of social, economic, and environmental systems to cope with a dangerous event, trend or disturbance by responding or reorganizing in such a way that they maintain their essential function, identity, and structure while preserving the capacity for adaptation, learning, and transformation (IPCC, 2014)

Restoration: Activities aimed at recovering and reestablishing the conditions that favor the evolution and continuity of natural processes (LGEEPA, 1988).

Risk: Potential for consequences in which something of value is in jeopardy with an uncertain outcome, recognizing the diversity of values. Risks result from the interaction of vulnerability, exposure, and danger. Risk is often represented as the probability of dangerous events or trends multiplied by the impacts should such events or trends occur. In this report, the term risk is used mainly about the risks of climate change impacts (IPCC, 2014).

Climate sensitivity: Denotes the change in equilibrium conditions (constant state) of the global mean surface temperature due to doubling the atmospheric carbon dioxide-equivalent concentration (IPCC, 2013).

Environmental services: The tangible and intangible benefits generated by ecosystems, necessary for the survival of the natural and biological system as a whole and to provide benefits to the human being (LGEEPA, 1988).

Environmental system / Regional environmental system: Set of elements that interact and are interdependent. The interrelationships can modify the other system components within the region where the Project will be developed. This means that the way a system acts is not predictable by analyzing its parts separately; the system's structure determines the results (Acosta de Añez & Fernández, 1997). The finite space is defined from the interaction between the abiotic, biotic, and socioeconomic environments of the region where the project will be implemented, made up of a set of ecosystems and where environmental and use problems, restrictions, and potentials will be analyzed (SEMARNAT, 2016).

Vulnerability to climate change: Level to which a system is susceptible or cannot withstand the adverse effects of Climate Change, including climate variability and extreme events. Vulnerability depends on the character, magnitude, and speed of climatic variation to which a system is exposed, its sensitivity, and adaptive capacity (LGCC, 2012).

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ANNEXES

Annex 1. RAPID SELF-DIAGNOSIS OF CLIMATE RISKS

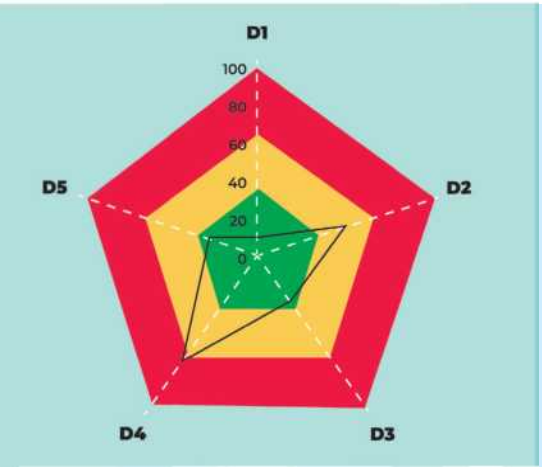
The exercise consists of 16 key questions that assess climate risk in five dimensions: Infrastructure, operation, social environment, regulations, and finance and market. The objective is to identify the dimension where a considerable risk could arise from climate change and a depth analysis on searching for adaptation solutions.

Empirical knowledge about the climatic events observed in the past and currently in the Investment site (for example, Floods, hurricanes, droughts) is used, and the future climatic information, which can be found in documents municipal or state officials. It is important to remember that the results reflect the knowledge of the person who performs the exercise, so it can be repeated with the participation of project experts.

To get started, read each question carefully and assign a value on a percentage scale from 1 to 100. In each dimension obtain the average value of the percentages, and at the end you can concentrate the values in the table and draw them on the radial graph.

DIMENSION	CRITERION	KEY QUESTION	RISK LEVEL		
			Low 0-35%	*Medium* 36-65%	*High* 66-100%
D1. Infra/structure	Location of infrastructure/structure	Is the infrastructure/structure of tourism development located in areas at risk from impacts of climate change? (e.g., floodplains)			
		Subtotal D1			
D2 Operation	Services for the operation	Could the availability of drinking water be reduced in the long term due to climate change? (e.g., less water is expected in the future, overexploitation of the aquifer, etc.).			
		Could the availability of other services be interrupted or decreased due to the effects of climate change? (e.g., energy, transportation)			
		How sensitive is the tourism business operation to the uncertainty of service availability? (e.g., by interruption of water, energy, etc.)			
		Is there the capacity to evacuate personnel and transport goods in the event of an extreme weather event? (e.g., in the face of a hurricane, flood, etc.).			
		Subtotal D2			
D3 Social environment	Employees	Could employee productivity be affected by extreme weather events? (e.g., illnesses, interruption of access routes from their homes to the company).			
	Communities	Could local communities be affected by climate change and cause a conflict in the tourism business? (e.g., social conflict over water)			
	Providers	How much will local suppliers be affected by the effects of climate change? (e.g., disruption of roads, etc.)			
		Subtotal D3			
D4 Reculations	Regulations	Is the local government contemplating a royalty payment for the compensation of environmental services? (e.g., taxes for beach cleaning)			
		Could the effects of climate change lead to the emergence of regulations regarding the use of ecosystems? (e.g., restrictions for visiting a beach or forest).			
	Normativity	Is there an environmental regulatory instrument that is anticipated in the future that represents significant changes to the business? (e.g., PACMUN)			
		Subtotal D4			
D5 Finance and market	Product	Could climate change affect the attractiveness of your tourism product or offer? (e.g., loss of scenic beauty, beaches, biodiversity)			
	Operating costs	Could climate change increase operating costs? (e.g., increase the price of water/energy, technologies)			
	Market	Could the effects of climate change reduce business income? (e.g., cancellations of tourists, a lousy image in the market, etc.)			
	Insurance (policies)	Is there a risk of increasing the insurance premium and financial services due to the impacts of climate change?			
	Real estate value	Could the real estate value of the tourism business decrease considering the current and future impacts of climate change?			
		Subtotal D5			

THE RISK LEVEL IS:



DIMENSION	RISK LEVEL		
	Low 0-35%	Medium 36-65%	High 66-100%
D1 Infra/structure			
D2 Operation			
D3 Social environment			
D4 Regulations			
D5 Finance and market			
TOTAL			

Interpretation of results

Once the results are obtained, it is essential to understand what they mean for the Investment and how they can be used to identify adaptation solutions. Below is a general description of high risk and some recommendations contained in the Guide:

- **D1 Infra/structure:** High risk refers to that the Site in the future will have severe impacts on the Properties and/or the strategic access infrastructure (roads, bridges), for which it requires a deep analysis of the territory. For recommendations, you can consult the Due Diligence and Environmental Characterization chapter of this Guide.

- **D2 Operation:** Analyzes the close dependence of the business activities on the natural assets and their ecosystem services in the region, not only those within the property (vegetation) but also those provided in the basin (drinking water). If a high risk is identified, it means that it requires strengthening or modifying some operating networks. Some concrete recommendations can be found in the Operational Planning chapter.

- **D3 Social environment:** visualize future conflicts that could occur with various social groups, e.g. for the fight of water or forests. A high risk means that the investment must strengthen those actions that integrate local knowledge, as well as the uses and customs of the communities, their workers, and their local suppliers.

- **D4 Regulations:** Highlights the provisions of the government and financial sector for the optimal use of natural assets, for example, restricted access to islands of ecological importance, additional taxes for the use of the beach, incorporation of energy or water saving technologies, among others. High risk means that it is necessary to analyze the compatibility of the business and the provisions of the new regulations in greater depth. A broader context can be found in the Climate Change Regulations and Due Diligence chapters.

- **D5 Finance and market:** This dimension recognizes the economic risk that climate change will cause to the business and points out the need to integrate the increase in operating expenses or insurance policies and the reduction in income due to the closure of operations, market impacts, or the decrease of real estate value. Look for more recommendations in the Master Plan and Executive Project chapters.

Aspects to consider

As mentioned before, if you want to carry out a deep analysis, it is suggested to take into account the following aspects:

- **Consider the hydrometeorological events that have occurred at the site:** Hydrometeorological events, including hurricanes, floods, droughts, heatwaves, storm surges, etc. that have caused damage to the tourist destination, and other types of events that could put the return on investment at risk and be linked to climate change, for example, beach erosion, sargassum, diseases in reefs and forests, forest fires, among others.

- **Consult the climate change scenarios in the municipality and state where the project is located:** It is worth considering the change in temperature and precipitation in a critical scenario, that is, identify whether there will be high temperatures, decreased rainfall, dry periods, or prolonged rains. For reference, according to IPCC Research, a temperature rise of 1.5°C could affect the ecological well-being.

- **Know the technical information of the project:** understand technical data according to the planning or operation stage in which the project is located, such as environmental and social-technical studies, financial feasibility analysis, market analysis, or, where appropriate, operation plans.

- **Promote the participation of those responsible for other areas:** Commitment to climate change is a task that is not only the responsibility of the environmental area since its impacts have environmental, economic, technical, and social implications. Hence, it is essential to ensure that those responsible for the financial, risk management, administrative, engineering, or similar areas participate in the exercise and provide accurate inputs.

If you want to do the exercise online, you can access the tool for free at the following link: https://sire.eblocks.mx/autodiagnostico

Annex 2. Synthetic list[21] of instruments related to investment projects

International treaties

- United Nations Framework Convention on Climate Change
- Rio Declaration on Environment and Development
- Federal Laws.
- Political Constitution of the United Mexican States
- General Law of Ecological Balance and Environmental Protection (LGEEPA)
- General Wildlife Law (LGVS)
- General Law for the Prevention and Comprehensive Management of Waste (LGPGIR)
- General Law on Climate Change (LGCC)
- General Law of Sustainable Forest Development (LGDFS)
- National Waters Law (LAN)
- Federal Environmental Responsibility Law (LFRA)
- General Law of National Assets
- Federal Law of the Sea

Regulations of general and federal laws

- Regulation of the LGEEPA on Environmental Impact Assessment (REIA LGEEPA).
- Regulation of the General Law for the Prevention and Comprehensive Management of Waste (RLGPGIR).
- Regulation of the General Wildlife Law (RLFVS).
- Regulation for the Use and Exploitation of the Territorial Sea, Navigable Roads, Beaches, Federal Maritime Terrestrial Zone and Land Gained from the Sea.

Official Mexican Standards

- NOM-002-SEMARNAT-1996, which establishes the maximum permissible limits for pollutants in wastewater discharges to urban or municipal sewerage systems.
- NOM-052-SEMARNAT-2005, which establishes the characteristics, identification procedure, classification and lists of hazardous waste.
- NOM-054-SEMARNAT-1993, which establishes the procedure to determine the incompatibility of two or more hazardous wastes.
- NOM-161-SEMARNAT-2011, which establishes the criteria for classifying waste that need special handling and determining the ones subject to a handling plan: a list of them, the procedure for inclusion to said list, and the elements and procedures for the formulation of handling plans.
- NOM-081-SEMARNAT-1994, which establishes the maximum permissible noise emission limits from stationary sources and their measurement method.
- NOM-059-SEMARNAT-2010, Environmental protection – Native species of Mexico forest flora and fauna – Categories of risk and specifications for their inclusion, exclusion or change – List of species at risk. .
- NOM-022-SEMARNAT-2003 establishes the specifications for preserving, conserving, sustainable utilization and restoring coastal wetlands in mangrove swamp zones.

21 Indicative list of instruments in the framework of climate change for Mexico.

Other binding instruments

- Decrees and Programs for the Management of Natural Protected Areas
- Ecological Planning Programs
- General Ecological Planning
- Marine Ecological Planning
- Regional Ecological Planning
- Local Ecological Planning
- National Development Plans
- Municipal Development Plans
- Regional Development Programs
- Partial Development Plans

Other binding instruments

- Priority Land Regions (RTP)
- Priority Marine Regions (RMP)
- Priority Hydrological Regions (RHP)
- Areas of Importance for Bird Conservation (AICAS)
- Priority Conservation Sites
    - o Priority Land Sites (SPT).
    - o Priority Marine Sites (SPM).
    - o Epicontinental Aquatic Priority Sites (SPAE).
- RAMSAR sites
- Climate Change Adaptation Programs
- Certificates of Voluntary Designated Areas for Conservation

Annex 3. Recommendations for the Due Diligence stage

PHASE	ACTIVITY	RECOMMENDATION	CHECK BOX
Preliminary	Integration of agreements, strategies, teams, scopes	Guarantee the seriousness and capacity of the work teams responsible for each action by establishing selection criteria and monitoring the teams' success.	
		Integrate the team of external specialists with internal teams to achieve rapport, positioning, and common objectives.	
		Establish a real and objective scheduled program with indicators of success.	
	Information gathering	Create a list of the minimum information necessary to be obtained.	
		Create a list of information sources and the contact directory.	
Analytics	Analysis of legal conditions of the property	Verify the correct sources of the information and obtain certified copies.	
		Cross review the information obtained.	
		Integration of independent conclusions from at least two specialists and production of the comparison.	
	Analysis of applicable legal instruments	Verify sources and versions of the instruments (it must be ensured that they are the latest versions).	
		Include in the file a copy of the publication of the instrument.	
	Preliminary analysis of environmental conditions	Define the methodology to be developed according to the conditions of the Site - region.	
		Guarantee that experts develop the works on the subject.	
		Guarantee that the integration and interpretation of data are carried out considering a comprehensive vision of the process (environmental, legal, operational, etc.).	
Definitive	Definition of the potentialities of the Site	Base the definition on at least three scenarios where the extremes are a lower impact on the environment and a higher economic performance. A third party would be defined as intermediate (all the scenarios must comply with the regulatory framework and environmental definitions).	
		Request the specialists to analyze the scenarios with a climate perspective.	
		For each scenario, propose a package of mitigation and adaptation measures to climate change.	
	Financial definition	Consider the scenarios from the previous point for financial models.	
		Request the parametric valuation of the costs of mitigation and compensation measures for the entire useful life of the project.	
		Consider imponderables.	
Other recommendations		Do not start project planning processes without the participation of at least one subject matter expert.	
		Ask the specialist for a list of key concepts to be internalized by the work team as a whole.	
		Create a "Critical Climate - Environmental Route" that remains visible to all team members.	
		Request active and permanent communication with everyone involved.	

Annex 4. Climate change scenarios in Mexico

As a complement to the environmental characterization, it is recommended to specifically expand the chapter on the ***weather***, analyzing the different climate change scenarios for Mexico, reviewing those prepared by the UNAM-INECC (Climate Atlas), and an analysis of the characteristics and specific impacts for the Site.

There are several models of future scenarios, and all of them reflect essential changes in the climate; for example, regarding temperature, there are models that predict an increase of more than 4°C (IPCC, 2014) by 2100, altering our entire environment; looking at it from an economic/operational point of view, how much would it cost us to cool a property by 4°C? To learn more about climate change, it is recommended to consult the Sixth National Communication made by SEMARNAT & INECC (2018).

Figure 01. Change in global mean surface temperature (a) and global mean sea level rise (b) from 2006 to 2100 determined by multi-model simulations. All changes are relative to 1986-2005. Projection time series and measurement uncertainty (shaded) are shown concerning the RCP2.6 (blue) and RCP8.5 (red) scenarios. The mean and associated uncertainties, averaged between 2081 and 2100, are shown in all PCR scenarios indicated by colored vertical bars in the right margin of each graph. The number of models from the fifth phase of the Coupled Model Intercomparison Project (CMIP5) used to calculate the multi-model mean is also indicated (IPCC, 2014).

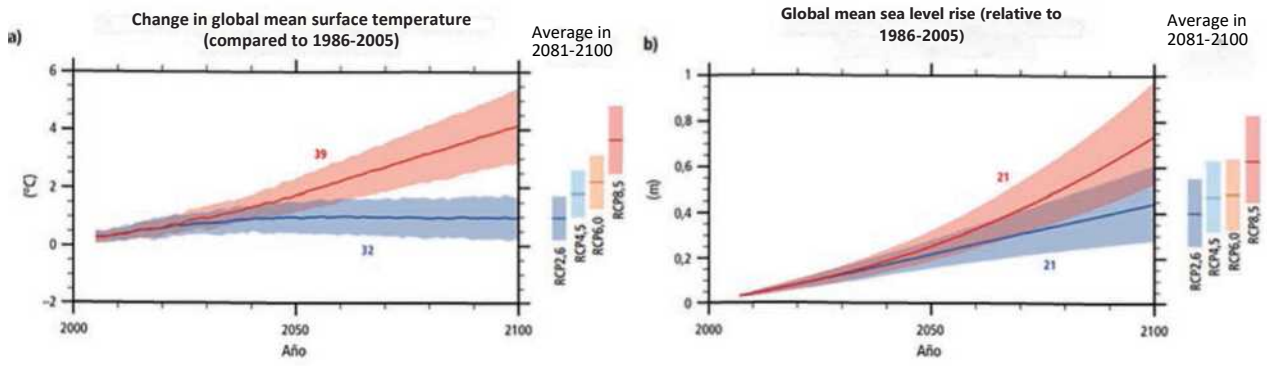
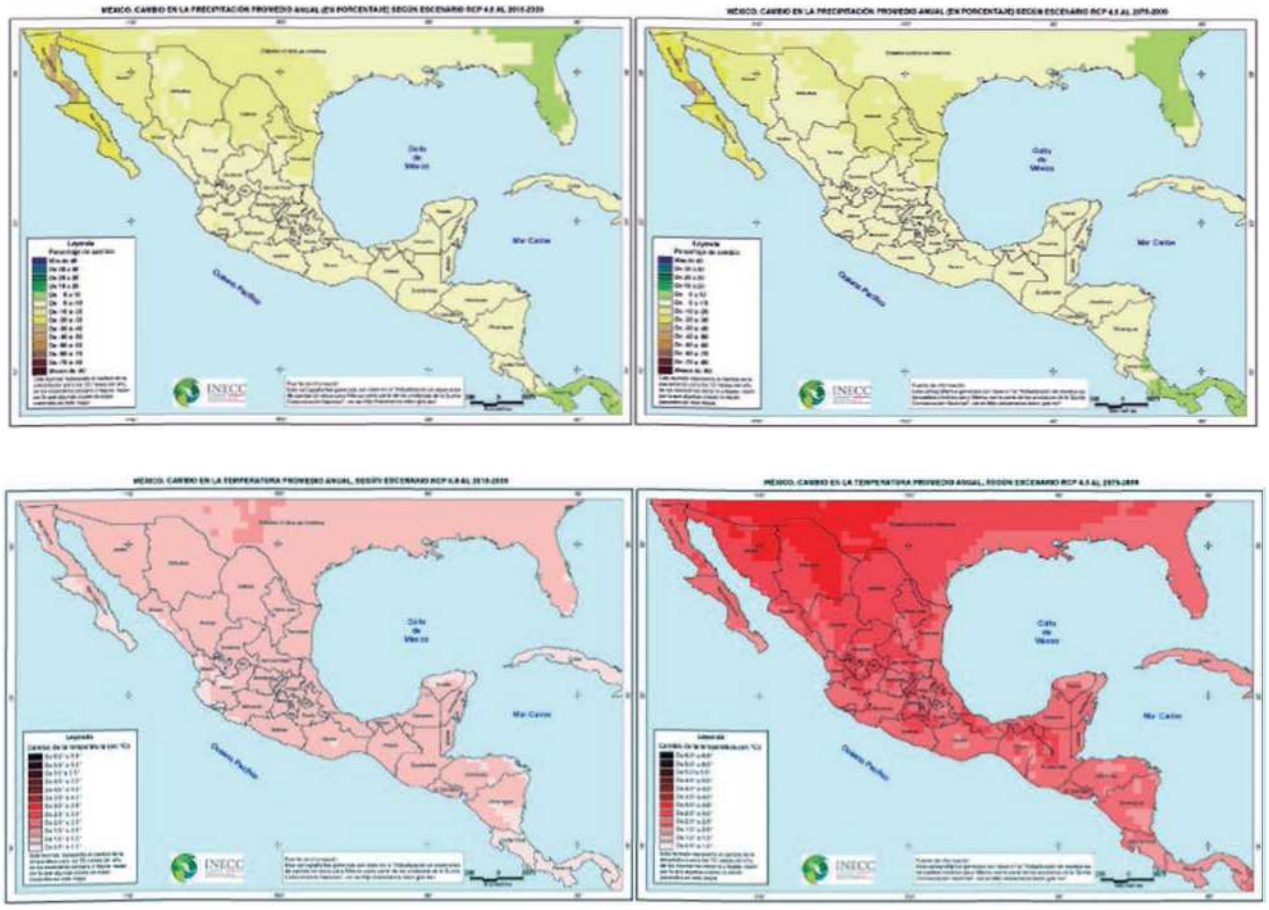


Figure 02. Change in average annual temperature and change in average annual precipitation based on model RCP 4.5 projections for the years 2015-2039 (left) and 2075-2099 (right) (INECC, 2016; INECC 2016b).



In addition to climate change models and scenarios, there is a great diversity of tools to know, understand and implement actions on climate change, including:

1. Climate Atlas, which contains the most current climate change scenarios for Mexico *http://atlasclimatico.unam.mx/AECC/servmapas*
2. Investor Guide: Understanding the physical climate risks and opportunities *https://www.iigcc.org/resource/understanding-physicalclimate-risks-and-opportunities-a-guide-for-investors/*
3. General information tools and cooperation networks. *For example, Climate change knowledge portal (CCKP) http://ndcpartnership.org/toolbox/climatechange-knowledge-portal*
4. Databases of climatic events, *e.g., Mesoamerican regional visualization and monitoring system (SERVIR) https://www.servir.net/*
5. Vulnerability analysis. *For example, SimClim https://www.climsystems.com/simclim/*
6. *Tool for climate change and mean sea level rise. (Climate change and sea level rise tool) from the University of Arizona* https://coastal.climatecentral.org/
7. Methodology for the implementation of adaptation measures against climate change. Ecosystem-based Adaptation approach, https://www.gob.mx/semarnat/documentos/metodologia-para-la-priorizacion-de-medidasde-adaptacion-frente-al-cambio-climatico

Annex 5. Recommendations for the Site's Environmental Analysis stage

STAGE	RECOMMENDATION	CHECK BOX
Climate Scenarios	Review and analyze the Climate Change scenarios according to the location of the property.	
	Document and analyze extreme meteorological phenomena (Hurricanes, Torrential Rains, Storm Tides, Prolonged Droughts, and Heat Waves).	
	Carry out the analysis of solar radiation (Insolation).	
	Perform the dominant talent analysis.	
	Develop local climate models (InVEST Natural Capital Project).	
Watershed	Prepare the delimitation study of the basin.	
	Prepare the study of hydraulic dynamics.	
	Carry out the hydraulic modeling of streams and floods in the basin.	
	Prepare the delimitation study of the basin.	
	Prepare the landslide and earth movement risk study.	
	Avoid the location of works at the outlet points of the basin.	
	Avoid the location of works in permanent and temporary surface runoff areas (rivers and streams)	
	Avoid the location of works in areas at risk of landslides and earthworks.	
Abiotic Environment	Prepare the topographic study and the analysis of the topoforms, slopes, and exposures.	
	Prepare the study of permeability and soil saturation.	
	Prepare the geohydrological study.	
	Prepare the study of soil mechanics.	
	Perform erosion and sedimentary balance analysis.	
	Prepare the study of tides and currents.	
	Perform saline intrusion modeling.	
	Perform flood modeling due to sea-level rise and storm surges.	
	Avoid works that promote erosion.	
	Avoid works that promote saline intrusion.	
	Avoid construction in low-lying areas, susceptible to flooding.	
Biotic Environment	Prepare the characterization study of the vegetation of the property.	
	Prepare the analysis of resilient ecosystems and environmental services.	
	Prepare the analysis of the health of the wetlands (connectivity, hydroperiod, nutrient saturation).	
	Prepare the analysis of the vegetation of the coastal dune.	
	Prepare the reef and seagrass health analysis.	
	Avoid construction on wetlands and sensitive ecosystems.	
	Avoid interrupting the flow of wetlands.	
	Conserve coastal dune vegetation.	
	Optimize the design of the field works to take advantage of the resilience capacity of the ecosystems (nutrient saturation).	
General	Prepare document of recommendations for watershed management, regional resilience.	
	Prepare a document of general climatic recommendations to be considered in the general design of the project.	
	Prepare a zoning map based on ecosystems (state of conservation-deterioration) and climatic resilience.	
	Prepare a document of climatic recommendations to be considered in the distribution of works on the ground.	

Annex 6. Recommendations for the Master Plan stage

RECOMMENDATIONS	CHECK BOX FOR CLIMATE THREAT						
	Wind / Hurricane	Rising sea levels	Floods	Sliding of slopes	Extreme droughts	Heatwaves	Frost / Snowfall
Adaptation based on gray infrastructure							
Locate the buildings in safe areas or with the lowest risk within the premises.							
Distribute the buildings considering the natural configuration of the landscape.							
Maintain naturally floodable areas (storm mouths etc.) according to the hydrology of the soil.							
Incorporate the elements of the climate in the design of the project (bioclimatic design).							
Incorporate ecotechnologies for the use of rainwater and energy (solar, wind, etc.)							
Ecosystem-based adaptation							
Conserve natural assets that protect against extreme events (mangrove barriers, dunes, forests, etc.)							
Allocate areas for the conservation of biodiversity and the regulation of the microclimate.							

Annex 7. Recommendations for the Executive Project stage

RECOMMENDATIONS	CHECK BOX FOR CLIMATE THREAT						
	Wind / Hurricane	Rising sea levels	Floods	Sliding of slopes	Extreme droughts	Heatwaves	Frost / Snowfall
Adaptation based on gray infrastructure							
Design the service supply network (energy, electricity, telecommunications) underground and in areas with less risk.							
Use of technology to generate clean energy through alternative sources (wind, solar, etc.)							
Design low impact development technologies (LID[22]) for the use of water.							
Calculate and design the engineering considering the progressive change of the climate and events such as heatwaves, cold front, etc.							
Use- architecture for the design of architectural elements (buildings and exterior spaces).							
Determine the elevation of the architectural elements based on the hydrological study.							
Implement the concept of "xeriscape or xerogardening" [23] for landscape design.							
Incorporate the use of equipment and technology to treat wastewater and the use of the resulting treated water.							
Ecosystem-based adaptation							
Conserve bodies of water and wetlands on the premises.							
Restore natural assets (e.g., dunes, reefs, forests) as a strategy for protection against the impacts of climate change.							
Restore unstable soils with native vegetation and resistant to heavy rain.							
Allocate areas for the conservation of biodiversity and the regulation of the microclimate.							

22 Low Impact Development - LID.

23 Xeriscape, a concept that promotes water conservation through gardening aimed at reducing water use by 50% and 70%.

Annex 8. Recommendations for the Operational Planning stage

RECOMMENDATIONS	CHECK BOX BY DEPARTMENT						
	M	G	C	O	S	F	HR
Adaptation based on gray infrastructure							
Ensure that the anchoring of equipment and machinery is found in exposed areas in solid and in perfect condition.							
Use hurricane protection systems (canvas, special glass, etc.).							
Use efficiently removable mobile equipment and infrastructure in the beach area to avoid losses of material and sand.							
Carry out proper management of sargassum (rake in the sea-beach direction, recover sand before collecting it, dispose of it only in official sites, etc.).							
Ensure an effective seal in gray and black water tanks so that rainwater is not integrated into the drain and a system to prevent the treatment plant from being saturated when the water tanks are filled by heavy rain (Only in an open plant).							
Identify floodplain areas and enable rain collection systems to be channeled to sanitary systems.							
Implement a system that channels surface runway towards naturally floodable and/or low green areas, as they help to capture and absorb excess water.							
Establish a comprehensive program for separating and managing waste that reduces the volume of waste disposed of in landfills.							
Install a water recycling system in the laundry so that the water from the second wash cycle is used for the first cycle of the next load of clothes.							
Implement a periodic leak detection program, either electronic or manual, through the pipeline lines' physical inspection.							
Install Hawaiian curtains in the refrigeration and freezing chambers, as well as an automatic door closing system, together with an internal opening system and alarm to avoid accidents in case of being trapped.							
Ensure that lighting and air conditioning equipment are high efficiency with low energy consumption.							
Use the refrigeration chambers and freezing at their established capacity to avoid both overloading and underutilization.							
Install hydration stations in all guest and floodplain areas.							
Implement an effective disinfection process in guests and employees areas.							
Install or purchase refrigeration equipment with energy saving technology and low emissions.							
Implement a preventive maintenance program for all the project equipment, that allows their optimal operation.							
Carry out pest and virus control through disinfection and fumigation with natural products.							
Ecosystem-based adaptation							
Invest in the restoration of reefs, dunes, mangroves, forests, semiarid forests, etc., in collaboration with technical experts Fr local communities							
Designate natural areas for the conservation of biodiversity.							
Maintain bodies of water and natural vegetation between buildings to improve the microclimate.							
Incorporate the restoration of natural assets (e.g. dune dune, reefs, forests) as a strategy for protecting buildings and infrastructure.							
Restore unstable soils with native vegetation and resistant to heavy rain.							
Implement vertical gardens, green roofs/walls, which allow increasing plant coverage and contribute to the regulation of microclimates.							
Include in the vegetable palette native species adapted to local conditions, which are additionally a food source for the local native fauna.							
Link the green areas management program with the nearby urban gardening or reforestation projects, to generate urban biological corridors.							

M = Maintenance; G = Management (includes Environmental Management); C = Purchases; O = Operations; S = Security; F = Finance; HR = Human Resources.

(Cont.) Recommendations for the Operational Planning stage

RECOMMENDATIONS	CHECK BOX BY DEPARTMENT						
	M	G	C	O	S	F	HR
Enabling framework for adaptation							
Purchase insurance policies with extensive coverage for infrastructure and equipment against various extreme climate events, including fires.							
Purchase insurance policies with extensive coverage for the workforce, including salary coverage in case of temporary closure.							
Have a comprehensive care plan for risks, which considers measures to safeguard the integrity of property, assets, staff, and guests.							
Allocate budget and personnel to develop the actions of dissemination and training that allow achieving sustainable, low-carbon, and adapted tourism.							
Modify staff's working hours of personnel who perform their functions outdoors and do not give attention to the customer (e.g., gardening) according to the temperatures and precipitations presented.							
Incorporate into financial planning the increase in expenses or loss of income that could arise from the impacts of climate change (example, an increase of water costs, cancellation of tourists, etc.), and regular monitoring of these changes.							
Select uniforms for personnel according to the current weather, with unique accessories for extreme climates.							
Organize preventive health campaigns (vaccines, medical checks, etc.) to detect and prevent diseases among employees.							

M = Maintenance; G = Management (includes Environmental Management); C = Purchases; O = Operations; S = Security; F = Finance; HR = Human Resources.

An investment adapted to climate change is the result of a planning process that anticipates changes in climate conditions and their possible impacts to the new business (operation, infrastructure, market, etc.). This ***'Guide for Investments Adapted to Climate Change*** urges investors and developers of tourism and real estate infrastructure and associated consultants, to incorporate this new approach.

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