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# A GOOD CITY FOR A TOURIST IS A GOOD CITY FOR ITS INHABITANT: CLIMATE CHANGE ADAPTATION FOR THE TOURISM INDUSTRY IN SALVADOR DA BAHIA

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## Abstract

**Objective:** This article suggests possible adaptation measures to climate change in order to mitigate physical and economic impacts on Salvador's tourism industry, as well as on the city as a whole. In fact, tourism and urban dynamics are tightly bound.

**Method:** The chosen method to identify the adaptation measures was characterized by a bold participatory process that allowed the co-creation of a climatic impact chain that involved representatives from Salvador's academy, municipal administration, civil society, and the tourism business sector. The 5th Assessment Report (AR5), developed by the 2nd Working Group of the Intergovernmental Panel on Climate Change (IPCC), provided the conceptual framework of the research.

**Originality/Relevance:** The impact chain allowed the identification of climatic signals that threaten Salvador's tourism, which touristic attractions and services are more exposed to those threads, which local vulnerabilities contribute to making some risks real, and which capacities are already settled in the City or need to be developed in order to prepare the tourism industry to cope and adapt to climate change impacts.

**Results:** The results of this research confirmed that any adaptation measure for tourism activity is inseparable from the adaptation measures for a city as a whole, reaffirming the maxim that "a good city for a tourist is a good city for its inhabitant."

**Social/management contributions:** Demonstrates how urban interventions which improves thermic wellbeing, shade, storm shelter, efficient drainage (and so on) in public spaces guarantee benefits to both inhabitants and tourists.

**Keywords:** Tourism. Climate change. Adaptation measures. Nature-based solutions.

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# CIDADE BOA PARA TURISTA É CIDADE BOA PARA SEU MORADOR: ADAPTAÇÃO ÀS MUDANÇAS DO CLIMA PARA O SETOR TURISMO EM SALVADOR DA BAHIA

## Resumo

**Objetivo:** Este artigo propõe possíveis medidas de adaptação às mudanças do clima que possam amenizar os seus impactos físicos e econômicos para o setor de turismo de Salvador e, consequentemente para a Cidade, como um todo, pois o turismo e as dinâmicas urbanas estão estreitamente entrelaçados.

**Método:** O método utilizado para a identificação das medidas de adaptação, se constituiu em um processo participativo de co-criação de uma cadeia de impacto climático, que envolveu representantes da academia, da administração municipal, da sociedade civil e do trade turístico de Salvador, seguindo o marco conceitual do 5° Relatório de Avaliação do (AR5) desenvolvido pelo 2° Grupo de Trabalho do Painel Intergovernamental sobre Mudanças do Clima (IPCC).

**Originalidade/Relevância:** A cadeia de impacto permitiu identificar os sinais climáticos que ameaçam o turismo de Salvador, quais atrativos e serviços turísticos estão mais expostos a tais ameaças, quais vulnerabilidades do contexto Soteropolitano contribuem para que certos riscos se concretizem, e quais capacidades já estão bem enraizadas na Cidade, ou precisam ser desenvolvidas para enfrentar e adaptar o setor de turismo aos impactos das mudanças do clima, facilitando o processo de identificação e de hierarquização de possíveis medidas de adaptação.

**Resultados:** Os resultados desta pesquisa confirmaram que qualquer medida de adaptação para a atividade turística é indissociável das medidas de adaptação para a cidade, como um todo, reafirmando a máxima de que "cidade boa para turista é cidade boa para o seu morador".

**Contribuições sociais/para a gestão:** Deduz-se que, intervenções urbanas de aprimoramento do conforto térmico, sombreamento, reparo das intempéries, drenagem eficiente (entre outros) em espaços públicos, garantem benefícios inequívocos tanto para moradores quanto para turistas.

**Palavras-chave :** Turismo. Mudanças do clima. Medidas de adaptação. Soluções baseadas na natureza.

# UNA BUENA CIUDAD PARA LOS TURISTAS ES UNA BUENA CIUDAD PARA SUS HABITANTES: ADAPTACIÓN AL CAMBIO CLIMÁTICO PARA EL SECTOR TURÍSTICO EN SALVADOR DE BAHÍA

## Resumen

**Objetivo:** Este artículo propone posibles medidas de adaptación al cambio climático que pueden mitigar sus impactos físicos y económicos en el sector turístico de Salvador y, en consecuencia, en la Ciudad en su conjunto, ya que el turismo y las dinámicas urbanas están estrechamente entrelazados.

**Método:** El método utilizado para identificar las medidas de adaptación consistió en un proceso participativo de co-creación de una cadena de impacto climático, que involucró a representantes de la academia, la administración municipal, la sociedad civil y el sector turístico de Salvador, siguiendo el marco conceptual del 5º Informe de Evaluación (AR5) desarrollado por el 2º Grupo de Trabajo del Panel Intergubernamental sobre Cambio Climático (IPCC).

**Originalidad/Relevancia:** La cadena de impacto permitió identificar las señales climáticas que amenazan el turismo en Salvador, qué atractivos y servicios turísticos están más expuestos a tales amenazas, qué vulnerabilidades en el contexto soteropolitano contribuyen a que se produzcan ciertos riesgos y qué capacidades ya están arraigadas en la Ciudad, o necesitan desarrollarse para enfrentar y adaptar el sector turístico a los impactos del cambio

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climático, facilitando el proceso de identificación y clasificación de posibles medidas de adaptación.

**Resultados:** Los resultados de esta investigación confirmaron que cualquier medida de adaptación de la actividad turística es inseparable de las medidas de adaptación de la ciudad en su conjunto, reafirmando la máxima de que "una buena ciudad para los turistas es una buena ciudad para sus habitantes".

**Contribuciones sociales/de Gestión:** Se puede deducir que las intervenciones urbanísticas para mejorar el confort térmico, sombreado, reparación de climas, drenaje eficiente (entre otros) en espacios públicos, garantizan beneficios inequívocos tanto para residentes como para turistas.

**Palabras clave:** Turismo. Cambio climático. Medidas de adaptación. Soluciones basadas en la naturaleza.
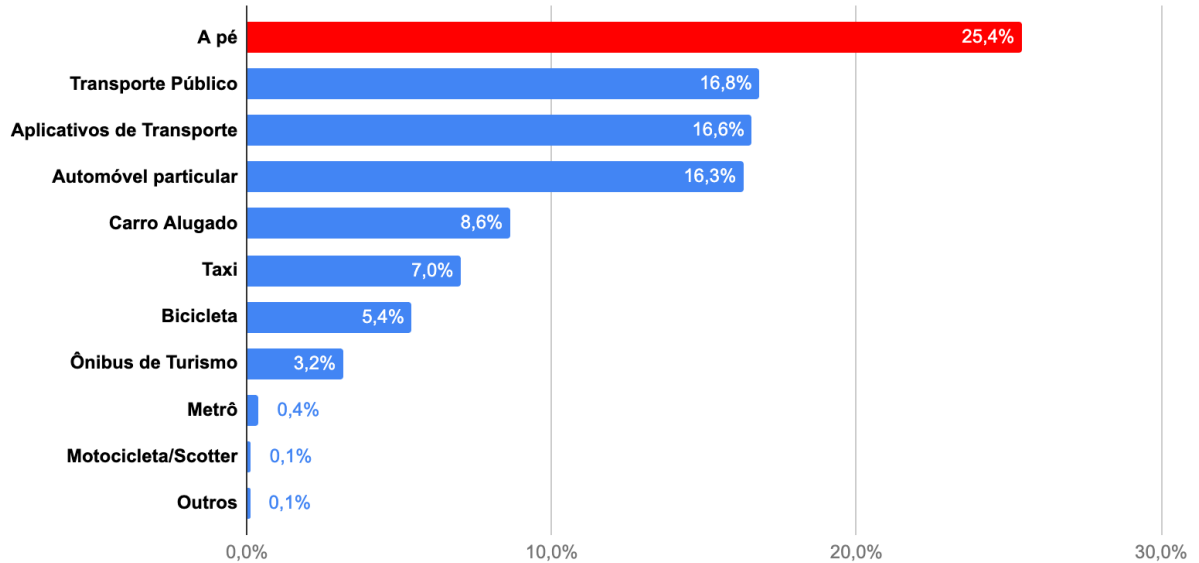
## Introduction

Salvador is the primary tourist destination in northeastern Brazil. Its rich natural and historical-cultural heritage, along with its eternal summer climate, attracted nearly 10 million tourists in 2019, boosting the activity that today represents 5% of the city's GDP (Tridello et al., 2021). However, Salvador's Climate Action Plan (PMS & SECIS, 2020) has revealed alarming data for the city in terms of increasing atmospheric temperatures, prolonged droughts interspersed with extreme rainfall, and rising sea levels. These factors can trigger a series of negative impacts for residents and tourists, including thermal discomfort, proliferation of disease vectors, flooding, landslides, and loss of beach areas. Indeed, these impacts are already occurring in the city. It is estimated that in 2021, Salvador has already lost R$ 200 million due to the climate change impacts on its tourism sector, and this loss could reach R$ 3 billion by the year 2030 if no action is taken, rising to R$ 11 billion annually by 2050 and R$ 40 billion by 2100. In total, Salvador would lose approximately R$ 1.4 trillion over 80 years, which is two-thirds of Brazil's GDP in 2020 (Tridello et al., 2021). These losses are understandable as tourists are particularly exposed to adverse weather conditions due to their predominant mode of transportation within the destination being on foot, as indicated in Figure 1:

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**Figure 1**

*Travel preferences of potential tourists of Salvador*



| Mode | Percentage |
|------|-----------|
| A pé | 25,4% |
| Transporte Público | 16,8% |
| Aplicativos de Transporte | 16,6% |
| Automóvel particular | 16,3% |
| Carro Alugado | 8,6% |
| Taxi | 7,0% |
| Bicicleta | 5,4% |
| Ônibus de Turismo | 3,2% |
| Metrô | 0,4% |
| Motocicleta/Scotter | 0,1% |
| Outros | 0,1% |

**Source:** Tridello et al, 2021.

Added to this are the characteristics of Salvador's recent urban development, designed, as Gehl would say, "despite the climate",  where "extensive road systems, asphalt parking lots, and hard surfaces raise the air temperature from a 'high' level to an 'unacceptable' level, while trees, lawns, green roofs, and porous stone pavement can help reduce it (Gehl, 2010, p.173). A recent example of this trend was the completion in 2020 of the renovation work of the new Cayrú Square, which sparked outrage among the residents of Salvador on social media due to its aridity, especially when compared to images of its past as a densely tree-lined square in the 1960s. Figure 2 illustrates this comparison, highlighted on the right by the figures of two tourists seeking some thermal comfort, opting to sit on a wall in the shade of a surviving tree, instead of resting on the new sunny benches overlooking the marina.

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## Figure 2

*Salvador - Cayrú Square in the 1960s VS Cayrú Square, 2022*



**Source:** Own elaboration based on photos by Mário Pithon (left) and the "Fundação Mario Leal Ferreira" (right).

In this sense, Acuti et al. (2019) highlight the crucial role of social media shaping the image of a city and its place branding, demonstrating how green cities often have a positive influence on the attitudes of various stakeholders, including visitors. This suggests that not only green cities can attract more tourists, but also a specific visitor profile, who is more concerned with environmental preservation and interested in actively contributing to the regeneration of the destination. This trend goes beyond the so-called sustainable tourism, which according to Bellato et al. (2022), has been widely criticized for contributing to the same limitless economic development that devastates the environment and generates social inequalities. This is a new trend, inspired by both Western sciences and indigenous knowledge and practices, known as regenerative tourism (Bellato et al., 2022).

An effective and cost-efficient way to make cities greener is to invest in Nature-Based Solutions (NbS). According to Rice (2020), NbS are now part of the strategic development goals of cities that seek to be more hospitable, livable and attractive to tourists, as they bring well-being, economic vitality, and a healthier environment through interventions that harness the services naturally offered by local ecosystems. In cities like Stockholm, Kuala Lumpur, Wellington, and Seoul, NbS have become the most visited tourist attractions, demonstrating the emergence of "NbS Tourism" (NbST), or tourism driven by the presence of NbS in these city areas.

In the context of the climate crisis, NbS are also known as Ecosystem-based Adaptation (EbA) interventions, as they have demonstrated effectiveness in mitigating the impacts of climate change, such as urban heat islands, floods, waterlogging, landslides, erosion, and the

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proliferation of disease vectors, as the presence of vegetation reduces air and soil temperature, increases relative air humidity and decreases the incidence of winds (Bordim et al., 2022) among other benefits. The concept of EbA was first defined in 2009 at the 14th Conference of the Parties (COP14), promoted by the United Nations Framework Convention on Climate Change (UNFCCC) in the context of the Convention on Biological Diversity (CBD), as "the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people adapt to the adverse effects of climate change" (Secretariat of the Convention on Biological Diversity, 2009, p.10). As a result, it can be deduced that nature-based solutions offering adaptation to the impacts of climate change in public spaces, such as thermal comfort, shading, adverse weather repair, efficient drainage, among others, provide unequivocal benefits for both residents and tourists in Salvador, as "few factors are more important for comfort and well-being in the urban space than the perceived climate where someone is sitting, walking or cycling." (Gehl, 2010, p.168).

This article presents and discusses the partial results of the *Analysis and economic measurement of risks associated with climate change for the tourism sector, as well as the identification of adaptation measures in Salvador, Bahia*, which was developed by the authors between July 2020 and December 2021, thanks to the initiative of the Municipal Secretariat of Sustainability and Resilience (SECIS) of the Salvador City Hall (PMS) and with the support of the German Agency for International Cooperation (GIZ) through the ProAdapta project, which assists the Brazilian government in implementing its National Agenda for Adaptation to Climate Change.

The objective of this article is to present the main results of an extensive participatory process involving key stakeholders of Salvador's tourism sector, which led to the selection of the two most urgent climate change adaptation measures for this group, with the aim of demonstrating which urban interventions and policies can be regarded as more beneficial for the tourism sector. The current state of art of Salvador's tourism sector is presented within the context of the climate crisis, whose situation encouraged the development of the study that originated this article; then, the methodology employed to identify and prioritize adaptation measures to address the physical and economic impacts of climate change in Salvador's tourism sector, as a whole, is explained, so that it can be replicated in other tourist cities in Brazil and around the world. In the discussion of the results, the urban implications of the suggested measures are emphasized, demonstrating the interrelation between sustainable, resilient, and equitable urban development with a healthy and regenerative tourism economy. In the conclusion, a concise summary of the most significant findings of this study is presented, along with recommendations for possible future research.

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## Methodology

### Inclusive participation

The methodology employed for the discussion and identification of climate change adaptation measures for tourism in Salvador consisted of an extensive participatory and co-creation process, following the approach advocated by Beck and Storopoli (2021). These authors emphasize the importance of involving stakeholders in the formulation of sustainable urban strategies and the creation of an effective image for cities, especially when they serve as tourist destinations.

The concept of stakeholders originates from management sciences and emerged within discussions on corporate governance. Initially defined as "any group or individual who can affect or is affected by the achievement of organizational objectives" (Freeman, Harrison, Wicks, Parmar & Colle, 2010, p.26), it has been incorporated into other fields, such as urbanism and tourism

Regarding urbanism, Beck and Storopoli (2021) argue that the participation of urban stakeholders in the discussion and formulation of public policies, through a collaborative governance process, is essential to meet the expectations of all parties involved. However, in their extensive literature review on the subject, the authors considered that the existing intellectual production is still incipient, although some studies are emerging, particularly in three areas: a) sustainable urban strategy, b) the power of networks and engagement in building plural urban governance, and c) urban marketing.

In tourism, this reality is even more distant since the planning of the activity is often done in a centralized manner, either by public authorities or by the private sector, according to their own agendas and priorities. Byrd (2007) highlights that, however, sustainable tourism development can only be achieved with the involvement of stakeholders in the process. This understanding is reinforced by Clarkson (1995), who argues that any failures in identifying these stakeholders or their specific interests can lead to the failure of the entire process.

Also as a result of a literature review, Byrd (2007) lists the main advantages of including stakeholders in the tourism planning process:

a) The public is informed and educated about the topics and issues (Beierle 1998; Simrell King & Feltey 1998); b) Public values and opinions are incorporated in the decision making process (Beierle 1998; Carmin, Darnall, & MilHomens 2003); c) The quality and legitimacy of the decisions are improved (Beierle 1998; Fiorino 1990); d) New ideas are generated (Carmin, Darnall, & Mil-Homens 2003; Fiorino 1990; Steelman 2001); e) An increase in trust between all parties (Beierle 1998; Carmin, Darnall, & MilHomens 2003; La Porte & Metlay 1996; Simrell King & Feltey 1998); f) A reduction in conflict and lawsuits (Beierle 1998; Carmin, Darnall, & MilHomens 2003; Simrell King & Feltey 1998; Steelman 2001); g) A cost effective process (Beierle 1998); h) The promotion of shared responsibility (Carmin, Darnall, Mil-Homens 2003).

Byrd (2007) further emphasizes that stakeholder engagement in the process can be

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promoted through various forms and different approaches, considering that their levels of involvement and interests may vary..

In the study conducted to identify climate change adaptation measures for tourism in Salvador, the following steps were observed:

1. Stakeholder identification and their information;
2. Power x Interest analysis of selected individuals/groups;
3. Analysis of the balance of stakeholder list composition in terms of aspects such as gender and ethnic representation; and
4. Definition of an approach plan for each stakeholder group.

Step 1 began with a brainstorming session with the aim of generating a long list of potential stakeholders, divided into four categories: Municipal Administration, Tourism Trade, Academia and Civil Society, which reached an initial number of 109 potential agents.

In a second moment, the information that could be provided by each stakeholder was identified, as well as the nature of their relationship with the studied theme (quantification of the impact of climate change on tourism in Salvador), whether it was direct or indirect, their power of influence/relationship with the set of individuals and groups consulted and, finally, the extent of their involvement with the study's outcomes. The evaluation of each contact based on the listed criteria led to the elimination of some names and the prioritization of the remaining stakeholders in a hierarchical matrix based on the Power x Interest relationship proposed by Ackermann and Eden (2011).

By ***Power***, it was understood the ability of an individual, whether as a representative of a municipal administrative body, of a class entity or a technical expert related to the subject, to provide information, influence the study's outcomes (through critiques and suggestions), engage other participants, and/or contribute to the successful implementation of the proposed measures.

By ***Interest***, it was considered those stakeholders who directly deal with the tourism activity and who potentially would be affected by the effects of identified climate threats, as well as by planned adaptation actions. This interest can be motivated by the operation in some specific segment of the activity, by the study of the topic or by involvement as a public manager.

For all these agents, we sought to answer the following range of questions: a) Could the measures suggested by the study affect them in any way? B) Do they provide relevant information for the study in any form? C) Does their work impact the study? D) Could the decisions made by them affect the success of the measures suggested by the study? E) Do they have any relationship with the financial feasibility of the measures suggested in the study? And f) Do they influence other agents' engagement around the measures established by the study?

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The identification of Power x Interest relationships subsidized the classification of these stakeholders into four distinct categories according to the approaches with which they were managed, as shown in Figure 3 below:

**Figure 3**

*Power x Interest Matrix for selection of Stakeholders*



**LISTA STAKEHOLDERS**

1. REPRESENTAÇÃO DO TRADE
2. ADMINISTRAÇÃO MUNICIPAL DIRETA
3. ASSOCIAÇÕES
4. UNIVERSIDADE COM FOCO NOS 4 SEGMENTOS DE TURISMO INVESTIGADOS
5. UNIVERSIDADE COM FOCO EM MUDANÇAS CLIMÁTICAS E ECONOMIA
6. ONGS e ENTIDADES
7. ESPECIALISTAS
8. GUIAS
9. EMPRESÁRIOS
10. OUTROS ÓRGÃOS DA ADMINISTRAÇÃO MUNICIPAL
11. SOCIEDADE CIVIL
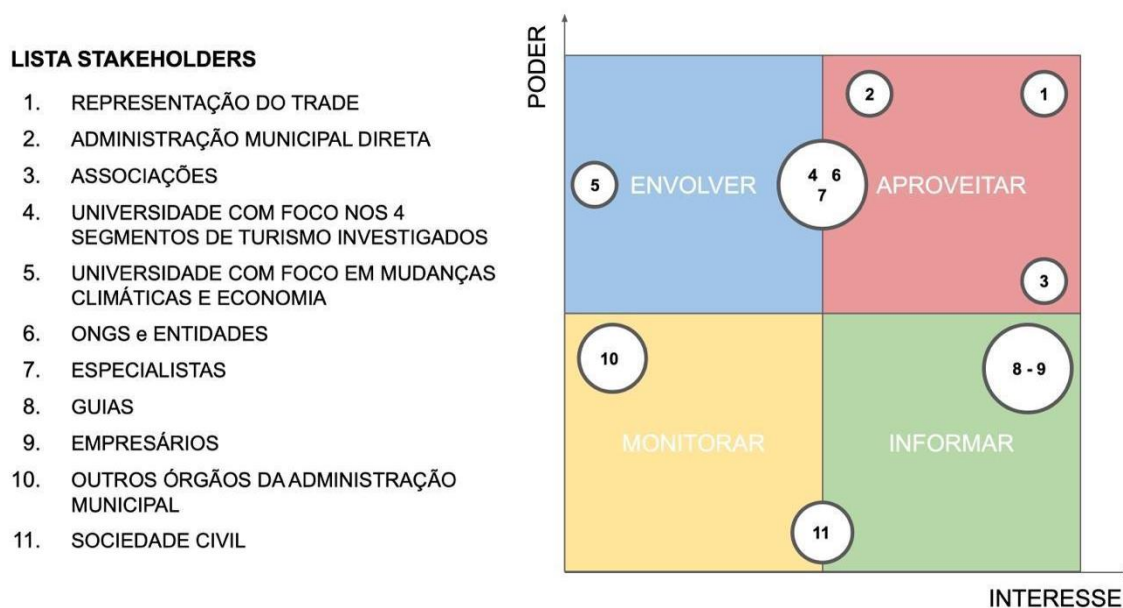
**Source:** Own elaboration.

The classification of the selected stakeholders into the quadrants of the Power x Interest Matrix resulted in five stakeholder groups:

1. The "Aproveitar" group encompasses stakeholders who were considered to have high power and high interest. The following set of stakeholders were classified within this quadrant:

   a) Representatives of the local tourist trade (ABIH, ABAV, ABEOC, ABRASEL, SEBRAE, Fecomércio, Salvador Destination, Centro de Convenções da Bahia, Sindicato dos Guias de Turismo, Associação das Baianas de Acarajé, Sindicato das Empresas de Turismo e Associação dos Mergulhadores Recreativos da Bahia). The representatives from each segment of the tourism industry constitute one of the most interested groups and with the greatest power of influence in the directions that the sector can take. The Sebrae and the representation of the Fecomércio Tourism Chamber were included due to their seats on the Municipal Tourism Council;

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b) Direct Municipal Administration - departments of the Municipal Administration most directly related to the topic[6] (SECIS, SECULT, SALTUR, FGM, SEMUR, SEDUR, FMLF, CODESAL, Prefeitura Bairro Subúrbio Ilhas). SECIS, in addition to being the contractor of this study, is the secretariat that conducts the Plan for Mitigation and Adaptation to Climate Change (PMAMC) and the Resilience Strategy for Salvador city. SECULT and SALTUR are responsible for the management of tourism in Salvador. The Fundação Gregório de Matos, linked to SECULT, is responsible for the administration of cultural centers and the preservation of cultural heritage. SEMUR was involved due to its participation in the Afro-Ethnic Tourism Action Plan, which is one of the studied segments. SEDUR and the Fundação Mário Leal Ferreira have a significant influence on the aspects of planning and monitoring the territorial dynamics of the activity and carry out important urban interventions in tourist areas of the city. The Civil Defense contributes through its expertise in monitoring and managing the climate risk of Salvador and the Prefeitura Bairro Subúrbio Ilhas is responsible for the decentralized administration of this area of Salvador, having been included to fill information gaps in the consulted sources;

c) Associations - this group included associations representing tourist areas less articulated with the activity and considered more susceptible to climate change (Associação de Pescadores Artesanais da Ilha de Maré and the collective of Turismo de Base Comunitária de Alagados), as well as associations focused on the operation of the activity such as the Associação de Blocos de Carnaval de Salvador.

2. The "Aproveitar/Envolver" group brings together stakeholders who have less power to influence compared to the members of Group 1 and a moderate interest in the topic. This category includes the following set of stakeholders:

a) University - Researchers focusing on any of the 4 tourism segments considered in this study (UFBA, UNIFACS, UNEB, UEFS, IFBAIANO);

b) NGOs and entities related to the theme, such as Promar, Fundo da Folia, Baía Viva, and Pastoral do Turismo;

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[6] Secretaria Municipal de Sustentabilidade e Resiliência (SECIS), Secretaria Municipal de Cultura e Turismo (SECULT), Empresa Salvador Turismo (SALTUR), Fundação Gregório de Matos (FGM), Secretaria Municipal da Reparação (SEMUR), Secretaria Municipal de Desenvolvimento e Urbanismo (SEDUR), Fundação Mário Leal Ferreira (FMLF) and Defesa Civil de Salvador (CODESAL)

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c) Experts who work providing services, or as consultants in the studied sectors, such as event structure setup, heritage restoration, building projects, nautical projects, etc.

3. The "Envolver" group brings together stakeholders who were considered to have high power of influence and low interest. This quadrant includes the following set of stakeholders:

   a) University – researchers focused on the environment, climate change and economy in Salvador (UFBA, UNIFACS, UNEB, UEFS, UFRB, IFBA, IFBAIANO).

4. The "Informar" Group brings together stakeholders who were considered to have low power acting in isolation, but with high interest. In this category, the following set of stakeholders can be listed:

   a) Tourist guides registered in the Registry of Tourist Service Providers (CADASTUR);
   b) Entrepreneurs in the accommodation and travel agency sectors registered in CADASTUR.

5. The "Monitorar" group, which includes stakeholders with low power and low interest, for example:

   a) Other Municipal Administration Departments not directly involved with the theme but that may have some technical participation in the cost-benefit analysis phase of adaptation measures, such as the Secretaria de Mobilidade de Salvador (SEMOB), the Superintendência de Mobilidade (TRANSALVADOR), the Secretaria Municipal de Saúde, the Secretaria Municipal da Fazenda (SEFAZ), among others.
   b) Civil Society – other members of the community not involved in the previously mentioned categories.

The third stage of stakeholder selection involved the analysis of gender and ethnic balance. This criterion was used when there were multiple agents listed within the same group of stakeholders, such as Universities and Experts. The final list was composed of 63 contacts, divided as follows: 20 representatives from the academy, 14 municipal officials, 15

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representatives from civil society, and 14 entrepreneurs from the tourism trade sector in Salvador. Table 1 presents this distribution in detail.

**Table 1**

*Balance between gender, area of expertise, and institutional affiliation of the study participants*

| AFFILIATION | Tourism in General | | Entertainment Tourism | | Business Tourism | | Beach and Recreation Tourism | | Historical - Cultural and Religious Tourism | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | M | F | M | F | M | F | M | F | M | F | **Total** |
| ACADEMY | 3 | 1 | 2 | 6 | 3 | 1 | 3 | 1 | | | **20** |
| MUNICIPAL OFFICIALS | 3 | 3 | 1 | 1 | | | | 1 | 1 | 4 | **14** |
| CIVIL SOCIETY | | | 2 | | | 1 | 2 | 3 | 5 | 2 | **15** |
| TRADE | | 1 | | | 2 | 5 | 1 | 2 | 2 | 1 | **14** |
| **Total** | **6** | **5** | **5** | **7** | **5** | **7** | **6** | **7** | **8** | **7** | **30  33** |
| | **11** | | **12** | | **12** | | **13** | | **15** | | **63** |

**Source:** Own elaboration.

Finally, the approach strategies for each of these groups were established, as shown in Chart 1 below:

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**Chart 1**

*Categories of Stakeholders by approaches provided for in the study*

| CATEGORY | APPROACHES |
|---|---|
| APROVEITAR | • Semi-qualitative interviews<br>• Participation in participatory workshops I and II<br>• Interviews for cost/benefit analysis<br>• Participation in the workshop for selection/evaluation of adaptation measures<br>• Final presentation workshop |
| APROVEITAR/ ENVOLVER | • Semi-qualitative interviews<br>• Participation in participatory workshops I and II<br>• Interviews for cost/benefit analysis<br>• Participation in the workshop for selection/evaluation of adaptation measures (IV)<br>• Final presentation workshop |
| ENVOLVER | • Participation in participatory workshop I<br>• Complementary technical interviews<br>• Participation in the workshop on developing climate impact chains (III)<br>• Participation in the workshop for selection/evaluation of adaptation measures<br>• Final presentation workshop |
| INFORMAR | • Questionnaires |
| MONITORAR | • Interviews for cost/benefit analysis<br>• Possible contacts for information search |

**Source:** Own elaboration

The semi-structured interviews were conducted between August and September 2020, using the 3CX Virtual Platform, through a specific link previously sent to the participants. The interviews were recorded and automatically transcribed using the "dictate" device in Microsoft Word, and the main points of interest were then compiled into a single document for content analysis, according to Bardin's method (2011).

The involvement of different agents triggered a process of appropriation, by the tourism-related community in Salvador, of the collectively constructed results. This legitimization process provided credibility to the study and increased the chances of acceptance of the results. In this process, the role of the authors was that of facilitators and guides in the dialogue among the different contributions from the involved agents. The possibility of inserting suggestions from individuals with diverse experiences and backgrounds into the study provided the authors with a holistic view of the studied context and, at the same time, allowed for a profound analysis of local dynamics.

**Conceptual framework**

The research was based on the conceptual framework of the 5th Assessment Report (AR5) developed by the IPCC's 2nd Working Group, which encompasses the concept of

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climate risk, that is, a potential impact originally triggered by a climate event and amplified by the presence or exposure of valuable elements in vulnerable situations or locations affected by climate change. Therefore, risk is the result of the interaction of three distinct components: climate threat, exposure, and vulnerability, as shown in Figure 4 (IPCC, 2014).
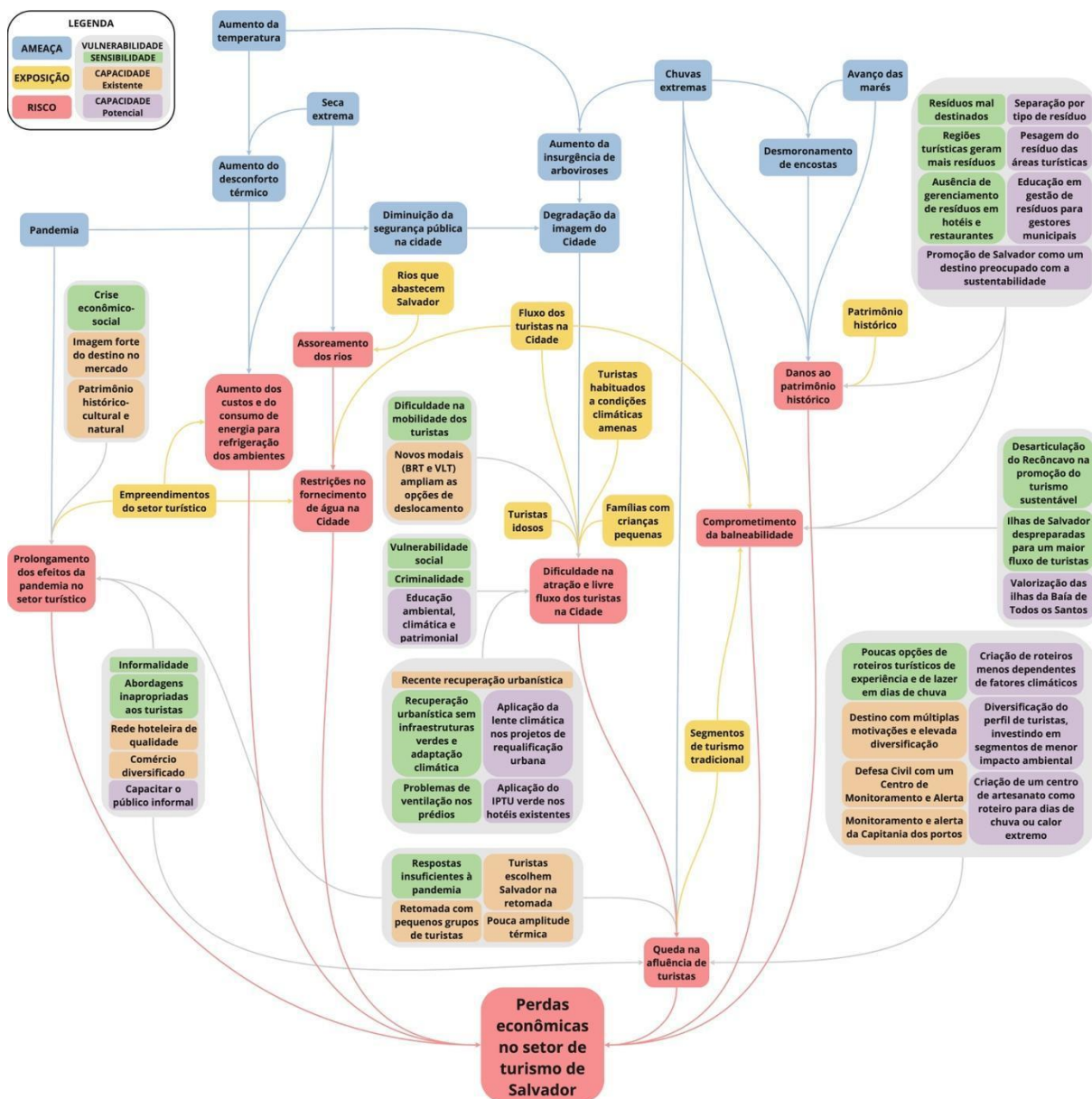
**Figure 4**

*Risk as a result of the interaction between climate threats, exposure and vulnerability*
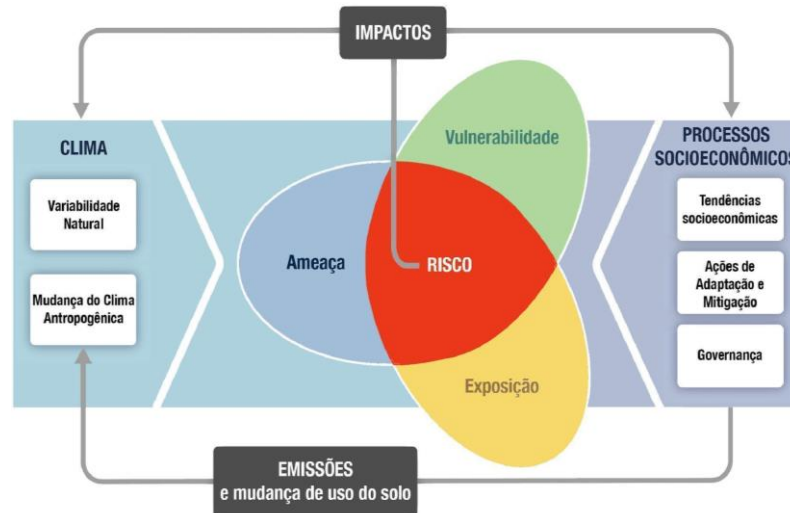


**Source:** IPCC, 2014, p.13. Translation and colors AUTHOR 1 et al., 2021.

Following the reasoning proposed by Figure 4, the study participants, with the assistance of the authors, identified the climate signals that threaten Salvador's tourism, which tourist attractions and services are more exposed to these threats and which vulnerabilities in Salvador's context that contribute to the occurrence of specific risks for the city's tourism sector. The factors identified were then organized into an impact chain, as illustrated in Figure 5, which facilitated the understanding of the causal relationships between them until reaching the risk of economic loss for Salvador's tourism sector.

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## Figure 5

*Climate impact chain of Salvador's tourism sector*



**Source:** Own elaboration based on AUTHOR 1 et al., 2021, p. 38.

According to the stakeholders, the main climate change threats to Salvador's tourism sector are increased temperature, extreme drought, heavy rainfall, rising sea levels, and the COVID-19 pandemic. These factors can lead to intermediate impacts, including thermal discomfort, an increased spread of arboviruses, degradation of the city's image, landslides, and reduced public safety.

The exposure factors, valuable elements for the tourism sector possibly impacted by the aforementioned threats, include the rivers supplying Salvador, the flow of tourists in the city (especially elderly tourists, families with young children, and tourists accustomed to mild weather conditions), traditional tourism segment activities, historical heritage, and tourist

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sector enterprises.

The risks for these groups include: river siltation and subsequent water supply restrictions in the city, difficulty in attracting and facilitating the free flow of tourists, decreased tourist influx, compromised beach water quality, damage to historical heritage, increased costs and energy consumption due to the need for continuous cooling of environments, and the prolonged effects of the COVID-19 pandemic on the tourism sector, resulting in economic losses for the city.

### Identification of adaptation measures

The research process of the system's vulnerabilities, that is, the susceptibility of the tourism sector in Salvador to be negatively affected by climatic threats, had to consider both sensitivity factors and the ability to cope and adapt.

According to GIZ & EURAC (2017), sensitivity factors are physical, economic, social, and cultural attributes that directly influence the consequences of climate threats. Stakeholders identified (in green in Figure 5) socio-economic, urban, and mobility sensitivities related to health issues such as the pandemic and waste management, but also connected to limited diversification of tourism itineraries and a high rate of informality within the sector.

The capacity factors, on the other hand, are the abilities of societies and communities to cope with and adapt to present and future climate impacts (GIZ & EURAC, 2017). Some of these capabilities, in orange in Figure 5, are already well-established in the city of Salvador. These includes the presence of:

1.  Um sistema de monitoramento e alerta da Marinha com a Capitania dos portos;
2.  A Civil Defense equipped with a well-equipped Monitoring and Alert Center to proactively address climatic events, ensuring safe planning of tourist activities;
3.  A small thermal amplitude due to Salvador's physical conditions, such as the proximity of the sea, where the breeze mitigates temperatures in the city and creates ideal health conditions for a post-COVID scenario;
4.  Research indicates the preference of domestic tourists for Salvador during the post-COVID recovery;
5.  The fact that this tourism recovery will occur through small groups of tourists, which is the reality of tourism in Salvador;
6.  The recent process of urban recovery in the city, particularly focusing on public squares and parks;
7.  The upcoming delivery of urban mobility projects, such as the Bus Rapid Transit (BRT) and Monorail, which will expand transportation options for visitors through public transportation;

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8.  The presence of a high-quality hotel network with establishments catering to both leisure and business tourism;

9.  The presence of a diverse commercial sector with large shopping centers, markets, popular fairs, and craft stores;

10. The richness of the historical, cultural, and natural heritage of the city;

11. The multiple motivations of the destination Salvador, with a high diversification of attractions and little dependence on a single tourism segment;

12. A strong image of the destination in the market, as Salvador positions itself as one of the most visited cities in the country, attracting both domestic and international tourists.

According to the study participants, there are other capabilities, presented in Figure 5 in violet color, that need to be developed for Salvador's tourism to become prepared and resilient to the impacts resulting from climate change. This is the case of:

1.  Creation of diversified tourist itineraries, based on experiences or activities that are less dependent on weather conditions;

2.  Diversification of the profile of tourists who seek the city by investing in segments/trends considered to have a lower environmental impact, such as diving tourism, nautical tourism, Afro-ethnic tourism, religious tourism, community-based tourism, "slow tourism", experiential tourism, and rural tourism;

3.  Creation of a city's handicraft center, similar to the "Centro de Artesanato de Pernambuco", which could provide a new alternative itinerary for tourists on rainy or extremely hot days;

4.  Enhancement of the destinations in the "Baía de Todos os Santos", especially the islands that are part of Salvador, for tourists and residents;

5.  Implementation of waste separation practices;

6.  Weighing of collected waste in tourist areas and providing access to data on waste collection in Salvador;

7.  Public education for all age groups, and municipal managers, on waste management;

8.  Development of a place-branding strategy (positioning of the destination in the market), that not only highlights the city's diverse attractions but also promotes it as a sustainable destination (green shift), an initiative also suggested by "Estratégia de Resiliência de Salvador" (PMS & SECIS, 2019);

9.  Application of a climate lens when developing the Terms of Reference for urban revitalization projects in the city, incorporating the need for creating shaded areas, maintain vegetation cover, ensuring soil permeability, and implementing green property tax norms in municipal buildings;

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10. Application of green property tax (IPTU verde) for existing hotels;

11. Conducting environmental education and heritage preservation campaigns, integrating climate change-related content into the curriculum of public schools;

12. Inclusion of the informal public: preparing and empowering these individuals to contribute positively to tourism and the overall community.

The latter can be defined as "potential capacities" which, if materialized into adaptation measures, are capable of reducing the levels of vulnerability and exposure of a system to climate risks, as indicated in Figure 6.

**Figure 6**

*Relationship between adaptation measures and other components of climate risk, according to AR5*
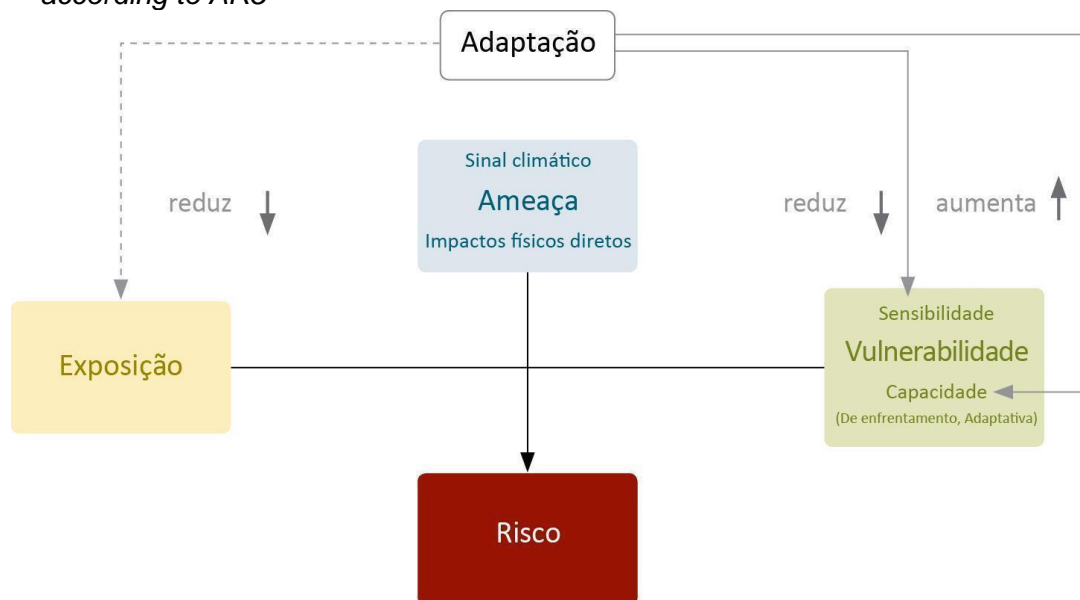


**Source:** Tridello et al, 2021, p. 21; GIZ & EURAC, 2017, p.19.

To transform the potential capabilities of Salvador's tourism into adaptation measures, these were submitted to three fundamental questions designed to verify their relevance to the research objective:

1. Is it directly related to tourism?
2. Is it directly related to climate change?
3. Does it refer to climate change adaptation or mitigation?

If the potential capability in question were directly related to the themes of tourism, climate change, and adaptation, it would be included in a long list. As a result, initially, 13 climate change adaptation measures for the tourism sector were identified, comprising: 4 projects, 2 programs, 2 campaigns, 1 product, 1 policy, 1 norm, 1 contest, and 1 platform,

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many of which are strongly related to urban themes.

## Evaluation and prioritization of adaptation measures

Such measures were organized into cards (Figure 7) and evaluated by stakeholders according to 9 criteria related to the measure's ability to provide:

1. competitiveness for the city's tourism;
2. environmental benefits;
3. economic and social benefits;
4. health and well-being;
5. urban infrastructure and mobility;
6. private sector engagement;
7. civil society engagement;
8. financial feasibility; and
9. feasibility of implementation.

The first 5 criteria were defined based on emerging topics from the sensitivity factors of the climate impact chain in Salvador's tourism sector, through a "theme clustering" activity that emphasized the most important themes using a brainstorming and prioritization method known as Kj. The other four parameters were added based on the authors' literature research on successful experiences in contexts similar to Salvador's. As shown in Table 2, higher weights were assigned to the first 3 criteria as they represent the main themes of the study. Therefore, in the process of prioritizing adaptation measures, these accounted for 50% of the measure's evaluation.

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**Table 2**

*Details of the evaluation criteria and their weights in prioritizing the adaptation measure*

| N. | Theme | Criteria | Description | Overall Weight | Weight within the theme | Individual weight |
|---|---|---|---|---|---|---|
| 1 | Main themes of the study | Competitiveness of Tourism | This criterion is related to the intensity with which the proposed measure, while contributing to making the Salvador destination more resilient in a climate change scenario, also helps enhance its competitiveness through strategies such as diversification and/or improvement of offerings, infrastructure enhancement, market repositioning, or better management, among others. | 0,5 | 0,333 | 0,166 |
| 2 | | Environmental Benefits | Salvador's environmental heritage is one of the city's greatest attractions, its beaches, bay, islands, coral reefs and mangroves account for a large part of the motivations for visiting the city. Measures that protect this heritage are particularly important because they reduce anthropogenic pressure on ecosystems, which are also impacted by climate change, thereby increasing their resilience to these impacts. | | 0,333 | 0,166 |
| 3 | | Economic and Social Benefits | The criteria for economic benefits can be derived from the implementation of measures such as job creation, increased income, and profitability of tourism businesses, but also social benefits such as reduction of inequalities and the empowerment and training of the workforce. | | 0,333 | 0,166 |
| 4 | City and Health | Health and Well-being | One of the main threats to tourists is related to experiencing extreme weather events. The criterion of health and well-being is directly associated with the environmental comfort of the city's tourists in the face of climate threats. Days of very intense heat and sun exposure (protection against heatstroke), as well as occurrences of heavy rainfall (landslides and floods). The healthiness of tourism spaces concerning infectious diseases (such as dengue and chikungunya) and contagious diseases (like COVID-19) is also assessed by this criterion. | 0,5 | 0,166 | 0,830 |
| 5 | | Urban Infrastructure and Mobility | The urban infrastructure criterion aims to highlight and emphasize actions that promote the improvement of the city's urban infrastructure for climate resilience, highlighting interventions that enhance the city's tourism sector's capacity to face environmental and climate impacts, making improvements in the quality of urban infrastructure (such as electrical network, sidewalks, among others) in the conditions for internal mobility and safety of tourists during large street events. | | 0,166 | 0,830 |
| 6 | Engagement | Private Sector | As a large part of the actions and investments to transform the sector need to take place in the private sphere, the engagement of the private sector is fundamental for the success of these efforts. This criterion aims to evaluate the level of participation and leadership of the private sector in advancing adaptation measures. | | 0,166 | 0,830 |
| 7 | | Civil Society | For Salvador's tourism to become more sustainable and resilient to climate impacts, active participation and guidance from the entire society are essential, thus, actions involving traditional communities, religious associations, alternative cultural groups, as well as other social organizations, have the potential for social transformation and inclusion. | | 0,166 | 0,830 |
| 8 | Feasibility | Financial Feasibility | Among the criteria for evaluating measures, it is essential to assess their feasibility, with the objective of identifying those that can be effectively implemented for the sector's adaptation. One of the most crucial components of evaluating a measure is its financial feasibility, ensuring that it aligns with the financial and investment capacities of both the public and private sectors, or can be funded through climate adaptation-related funds or initiatives. | | 0,166 | 0,830 |
| 9 | | Feasibility of Implementation | The second evaluation criterion relates to the feasibility of implementing the measure and refers to how easily it can be put into action. This criterion includes aspects such as the political, cultural, or management feasibility for the implementation of the measure, local experience with the issue, as well as the level of resistance and involvement of necessary partners. | | 0,166 | 0,830 |

**Source:** Own elaboration.

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The participants of the study were asked to evaluate each adaptation measure by attributing a score for each of the criteria detailed in Table 2, using a Likert-type scale, where 1 represented the lowest score and 5 the highest. The questionnaire was made available on the online platform Google Form from May 17th to May 24th, 2021.

The questionnaire results were discussed in a participatory workshop with the respondents, which took place on May 27th, 2021, where the participants had the opportunity to discuss the adaptation measures prioritized as the most urgent for Salvador's tourism sector and request potential adjustments to the prioritization order, providing their motivations for such changes.

The results of the participatory workshop were presented in a meeting with the representatives of the municipal administration of Salvador on June 14th, 2021, in order to assess the effective feasibility of the adaptation measures prioritized during the workshop.

These participatory evaluation steps enabled the identification of prioritized adaptation measures for Salvador's tourism sector. Table 3 presents the 13 measures in the order of prioritization, indicating that stakeholders evaluated solutions with a strongly urban nature as more urgent, whose cost-effectiveness fits as good or excellent.

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**Table 3**

*Climate change adaptation measures for Salvador's tourism sector in order of prioritization*

| N. | Title | Type | Theme | Description | Cost-effectiveness |
|---|---|---|---|---|---|
| 1 | "Lente climática na norma" | Rule | Nature-based solutions | Inclusion of the application of the climate lens in the development of plans, programs, projects, policies, and Terms of Reference for services and works in the City (PMS 2020, pg. 114). The winning companies of the bids would be obliged to "analyze the development objectives from the perspective of climate change, seeking to visualize how it can affect them, positively or negatively. [With] the purpose [...] of deciding whether climate change should be considered in the planning in question" (MMA 2018). A Technical Annex will bring together all the aspects that should be considered, supporting the work of both the municipal technicians and the interested companies. | Good/Excellent |
| 2 | "Ilhas de Frescor" | Project | Nature-based solutions Pandemic adaptation | Utilization of green infrastructure solutions, such as vertical parks, mobile trees, and green roofs, in heritage or densely urbanized tourist areas, as a form of shading, shelter, and rest for tourists and residents, creating islands of coolness on hot days. | Good |
| 3 | "Oásis urbano" | Project | Nature-based solutions Pandemic adaptation | Enhancement of thermal comfort in tourist areas through the maintenance of existing vegetation cover and reforestation in accordance with the guidelines of the Municipal Plan for the Atlantic Forest and the Master Plan for Urban Afforestation. | Excellent |
| 4 | "Pelas Ilhas" | Program and Campaign | Diversification of itineraries | Qualification of the tourist offer and promotion of the islands of Maré, Bom Jesus dos Passos, and dos Frades as part of Salvador city, highlighting their cultural attractions and manifestations. | Excellent |
| 5 | "Se for de paz pode entrar" | Campaign | Destination promotion | Creation and implementation of a campaign to promote and qualify tourism segments/trends with lower environmental impact, such as diving tourism, nautical tourism, Afro-ethnic tourism, religious tourism, community-based tourism, slow tourism, slow food travel, experiential tourism, and rural tourism. | Good/Excellent |
| 6 | "Clima de amanhã... desafio de hoje" | Program | Environmental education - Climate information | Implementation of training and campaigns aimed at raising awareness among society about the impacts of climate change on Salvador, as well as existing strategies for adaptation and mitigation. This would involve a diverse audience, including municipal administration professionals, educators, students, and the general public. | Good/Excellent |
| 7 | "Se liga no clima: centro de informação e alerta ao visitante" | Platform | Climate and environmental information Climate change awareness | An easily accessible platform for the tourism sector, which gathers and consolidates information, communications and official climate and environmental alerts, utilizing data from local meteorological services and monitoring stations for air quality and climate risks, such as landslides and sea-level rise, to be installed in strategic locations, as indicated by the "Plano de Tecnologia Salvador Cidade Inteligente" (currently under development). | Ok/Good |
| 8 | "Esverdeando Salvador" | Campaign | Destination promotion | Development of a place branding strategy (positioning the destination in the sustainable tourism market) for the city of Salvador, highlighting not only the diversity of attractions in the city but also promoting it as a destination committed to sustainability (green shift). | Good/Excellent |
| 9 | "Experiências em Salvador" | Product | Diversification of itineraries Destination promotion | Promotion and encouragement of the creation and dissemination of experiential tourism itineraries that diversify the city's offerings, providing alternative activities for very hot or rainy days. | Good/Excellent |
| 10 | "Revisão do IPTU Verde" | Policy | Tax incentives | Review of the IPTU Verde content, expanding the existing aspects that reflect environmentally-friendly attributes for establishments in the tourism sector, having as one of the main objectives greater thermal comfort and a lower demand for air conditioning. | Excellent |

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| 11 | "Hotel Coroa Competition" | Contest | Pandemic adaptation Nature-based solutions | Contest on ideas for the retrofit of Salvador's hotel sector to meet the new health requirements in tourism spaces, developing Nature-Based Solutions, harnessing Salvador's climatic conditions, and discouraging the use of air conditioning. | Good |
| 12 | "Telhado verde como a espera(nça)" | Project | Nature-based solutions Pandemic adaptation | Installation of green roofs on bus stops in tourist areas. | Ok |
| 13 | "Centro de Artesanato de Salvador e da Bahia" | Project | Diversification of itineraries | Creation of a city's handicraft center that has a virtual sales platform, curated by artists from Bahia and Salvador, guiding artisans and selecting pieces, as a promotion of the work of these artisans in the city and provide alternative options for diversifying itineraries on rainy days. | Excellent |

**Source:** Own elaboration.

### Discussion of results

This section provides a detailed analysis of the two priority measures for adapting Salvador's tourism sector to climate change, represented by a norm and an urban project (Figure 7). Both measures contribute to the resilience of the ecological and social systems of the city and the development of capabilities to address the challenges posed by climate change (Pahl-Wostl, 2007; Tompkins and Adger, 2004; Tompkins et al., 2010).

### Figure 7

*Adaptation measures "Lente climática na norma" (left) and "Ilhas de frescor" (right)*



**Source:** Tridello et al., 2021, pp.63-64.

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The first classified, "Lente climática na Norma" (Figure 7 on the left), suggests applying the climate lens in the development of plans, projects, infrastructure works, policies, programs, and services for Salvador.

This is a structuring measure, not only for adapting the tourism sector to climate change but also for the entire city. It is inspired by the first action outlined in the Salvador Climate Action Plan (PMS & SECIS, 2020), to which it adds the requirement of developing a technical annex that guides public and private companies in Salvador to:

1. Include the climate change variable in the analyzes that lead to the development of services of the most diverse nature provided for the city, and
2. Develop and opt for Nature-Based Solutions (NBS) whenever possible.

Applying the climate lens means:

"analyzing, from the perspective of climate change, the development objectives formulated for a plan, program, project, or policy, seeking to understand how it may positively or negatively affect them. The purpose of this step is to determine whether climate change should be considered in the planning process, which is done according to the involved systems of interest." (MMA, 2018, p.44)

In turn, NBS are solutions that utilize natural processes with the objective of mitigating and controlling the impacts of anthropic action on the planet's mechanisms, protecting the environment, and providing economic and social benefits (Fraga & Sayago, 2020; Gadda, Vellozo, Storbel & Diaz, 2019; Safatle, 2017; Lafortezza, Chen, Bosch & Randrup, 2018; IUCN, 2018; European Commission [EC], 2021). According to the European Commission (EC, 2021), these are cost-effective solutions that, through systemic interventions, benefit biodiversity and support the delivery of a variety of ecosystem services for cities and other environments where they are implemented.

Regarding cities, whether they are touristic or not, there is an understanding that they are the preferred locus for combating the effects of climate change, given that the planet has become predominantly urban (Lafortezza et al, 2018).

The implementation of the "Lente Climática na Norma" measure can signify a paradigm shift for the Municipal Administration, where regardless of the project intended for Salvador, it must prioritize resilience, that is, the ability to provide balance with efficiency after one or more impacts of climate change (Silva et al., 2022). It also implies the development of a culture of cooperation and partnership between the public entities involved in city management and the entrepreneurs responsible for project execution, whether directly related to tourism or not (Grimm, 2019), since aspects such as:

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1. the current and future climate in the project's area of influence, through the use of historical data series and climate projections;

2. the possible present and future impacts of climate change on the objectives that the project wants to achieve; and

3. the stakeholders to be involved in the development of the project, representatives of the various social, academic, political and institutional groups potentially impacted or benefited by the intervention.

This approach should also be adopted in the review of existing plans, policies, programs, and infrastructures, so that necessary adjustments can be made to prepare them for the impacts of climate change.

In addition to significant benefits in terms of climate change adaptation, the "Lente climática na Norma" brings various co-benefits for tourism competitiveness (Mihalic, 2000; Crouch & Ritchie, 2000), to the environment (Wilby, 2007; Emilsson & Sang, 2017), to human health and and well-being (Bowen & Friel, 2012; Thomas, Sabel, Morton, Hiscock & Depledge, 2018), and to the urban infrastructure and mobility in the city (Wilby, 2007; Demuzere et al., 2014), significantly contributing to achieving the goal of the Climate Action Plan (PMS & SECIS, 2020) for a carbon-neutral Salvador by 2049. The synergies of this measure also extend to other municipal initiatives such as the Salvador 500 Plan (PMS & FMLF, 2020), the Master Plan for Smart City Technologies (Salvador Smart City Consortium, 2020), and complement other existing tools for sustainable urban development, such as the Urban Tree Planting Manual (PMS & SECIS, 2018), and the Introduction to Green and Ecosystem-based Solutions in Buildings Handbook (Schoeler, 2021).

The implementation costs of the "Lente climática na norma" include economic costs, which are indirect costs that construction and hospitality companies may incur due to the implementation of the measure; and costs related to the professionals involved in the implementation, a lawyer specializing in environmental law and a specialist in climate change.

The result of the analysis of these costs compared to the benefits mentioned above, defined the cost-effectiveness level ranging from good to excellent. If implemented in 2021, until 2050, the "Lente climática na Norma" would be able to avoid an accumulated economic loss of R$ 31.320.125.

The second prioritized measure is "Ilhas de Frescor" (Figure 7 on the right), proposing nature-based solutions such as vertical parks, mobile trees, or green roofs to provide rest and shelter for residents and tourists on hot days, creating true islands of freshness in protected tourist areas or densely urbanized regions.

This second measure can be seen as a continuation of the first one, as nature-based solutions have proven to be effective climate change adaptation measures in urban areas,

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contributing to both the city's sustainable development and its tourism (Rice, 2020; European Commission [EC], 2021).

There are many examples of mobile or seasonal Nature-Based Solutions in historic heritage areas, such as the *Green Oasis* installed in a former parking lot in front of the City Hall of Poznan, Poland, where benches and planters with wheels allow for easy configuration of the public area according to the needs: the modules can be combined in small groups or even form a single amphitheater. Plants of various sizes have their roots in these mobile urban furnishings, making them heavy enough not to be accidentally moved while providing shade without the need to drill the pavement (Atelier Starzak Strebicki, 2019). Another example of local climate change adaptation is the *Mobiles Grünes Zimmer* in Ludwigsburg, Germany, from the European Union's TURAS project (Transition to Urban Resilience and Sustainability). The walls of these Mobile Green Rooms are covered with ornamental and fruit-producing plants such as strawberries and kiwis. They provide shade, filter the air, serve as habitats for plants and animals, reduce noise, cool the area through evaporation, and enhance the quality of stay for citizens and tourists (Helix, 2016). A more traditional NBS that never ceases to surprise each season with the colors of its lush foliage is the MFO Vertical Park in Zurich, Switzerland, which its authors define as "an oscillating figure between park and square, [...] full of light plays and fleeting aromas, devoid of purpose, open to all the senses." (Raderschall, 2001).

The above-mentioned examples of NBS were used to illustrate some possibilities for implementing the "Ilhas de Frescor" measure, which nature allows for easy integration into various initiatives of the PMS, such as the Climate Action Plan (2020), the Municipal Plan for Conservation and Recovery of the Atlantic Forest of Salvador (2020), the Urban Tree Planting Master Plan (Law No. 9187, 2017), and the Salvador 500 Plan (2020).

These synergies emphasize the co-benefits of this second measure, which, like the first one, not only provides climate change adaptation but also enhances competitiveness for the tourism sector, brings environmental benefits, improves human health and well-being, and upgrades the urban infrastructure of the city (Mihalic, 2000; Crouch & Ritchie, 2000;Wilby, 2007; Emilsson & Sang, 2017; Bowen & Friel, 2012; Thomas, Sabel, Morton, Hiscock & Depledge, 2018; Demuzere et al, 2014).

The implementation of this measure will involve the hiring costs of professionals, such as an agronomist, a NBS specialist, a landscape architect, and an urban planner. Additionally, there will be infrastructure and maintenance costs estimated at 10 million reais, based on investments for similar interventions from the CDP Cities 2019 database (CDP, 2021).

These costs, compared to the benefits and co-benefits mentioned above, have defined a good cost-effectiveness for the "Ilhas de Frescor" measure. If implemented in 2021, until 2030, "Ilhas de Frescor" would be able to avoid an accumulated economic loss of R$ 428,769 due to climate change in Salvador.

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## Conclusion

This article demonstrated how the co-creation of a climate impact chain with key tourism stakeholders in Salvador enabled the identification and prioritization of adaptation measures for the sector, whose benefits reverberate in the city as a whole. This confirmed the authors' hypothesis that any adaptation measures for tourism activity would be inseparable from adaptation measures for the city, reaffirming the maxim that "a city that is good for tourists is also good for its residents".

Indeed, the two prioritized adaptation measures by stakeholders are cost-effective Nature-Based Solutions capable of driving significant urban changes towards a greener and more resilient city. This suggests that key agents in Salvador's tourism sector are aware of the fact that greener cities influence positive attitudes towards them, contributing to increased tourist demand and attracting a more sophisticated profile of tourists who are environmentally conscious and interested in being part of the destination's regeneration.

The methodology used demonstrated that it is possible to address complex topics such as the concept of climate risk and climate change adaptation in participatory workshops, whether in person or virtually, through the use of simplification and organization tools such as impact chains.

It was demonstrated how ideas for potential adaptation measures can emerge from the "potential capacities" of a climate impact chain and how it is possible to identify possible criteria for evaluating these measures based on the themes addressed by the "vulnerabilities" of the studied context, as adaptation measures have the ability to reduce the vulnerabilities of a system. Asking stakeholders to evaluate the measures based on these criteria is equivalent to assigning a power of vulnerability reduction to the specific adaptation measure in question.

The two adaptation measures that received the highest evaluations from the study participants were a norm and a project, both of which had a strong urban character, and they underwent a feasibility and a cost-benefit analysis, which indicated that the implementation of "Lente climática na norma" and "Ilhas de frescor" would be advantageous in the short and medium term.

This article contributes to the literature on urban studies by outlining a step-by-step, participatory, and uncomplicated methodology for identifying climate change adaptation measures in urban centers. It also highlights how tourism-focused initiatives can provide foundational environmental, economic, and social benefits in the cities where they are implemented.

The work also provides an excellent case study for urban managers and policymakers concerned with sustainable and resilient development. The participatory process of identifying adaptation measures for Salvador's tourism sector can be adapted and applied to other tourist

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cities or other economic sectors, as well as the adaptation measures presented here can serve as inspiration for other cities seeking similar solutions.

This article is limited to suggesting possible adaptation measures, and its level of detail is not sufficient to enable their implementation.

Therefore, future directions for this research heavily depend on the development of an executive project and the effective implementation of the above-mentioned adaptation measures, as this would allow monitoring the effectiveness of these initiatives.

It is worth noting that a pilot project for such measures could be developed by the academic community through an applied research project, which would allow for close and continuous monitoring of all stages of design, implementation, and monitoring.

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