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Results Report: Qualitative Analysis of Focus Groups on Risks and Vulnerability in the Border Coastal Zone

Project:

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TABLE OF CONTENTS

1. Introduction

2. Objectives

3. Focus Group Planning and Design

4. Analysis Methodology

5. Results
   - 5.1 Participant Profile
   - 5.2 Survey Application
   - 5.3 Focus Group Activity Results
   - 5.4 Stakeholder Mapping
   - 5.5 Perception of Risks and Vulnerability

6. Conclusions and Recommendations

1.-Introduction

Climate change represents one of the most severe threats currently facing the planet. Its effects are particularly acute in coastal regions, where rising sea levels, ocean acidification, and the intensification of extreme weather events are profoundly transforming ecosystems and human communities.

The coasts of California and Baja California are at the forefront of this environmental crisis. In California, climate indicators show a sustained increase in temperatures, prolonged droughts, and a higher frequency and intensity of wildfires. These changes negatively impact biodiversity and the health and stability of coastal ecosystems, directly affecting the quality of life, health, and safety of communities. In Baja California, the impacts are equally alarming: rising sea levels and ocean acidification threaten both marine flora and fauna and the integrity of infrastructure and the safety of coastal populations.

In response to these challenges, various civil society organizations have undertaken actions aimed at strengthening the resilience capacities of coastal communities on both sides of the border. In this context, on the Mexican side of the U.S./Mexico border between California and Baja California, **Proyecto Fronterizo de Educación Ambiental (PFEA)** has played a leading role for 33 years, focusing its efforts over the past 15 years on raising awareness about the risks of exposure to marine pollution for beach users in Tijuana. As part of this work, in 2006 PFEA initiated efforts to establish a citizen science laboratory, and in 2014 the organization set up the first coastal water quality monitoring citizen laboratory in Baja California. Additionally, in 2010 PFEA consolidated strategic alliances with other water advocates globally by obtaining the license as a **Tijuana Waterkeeper** program, integrating into the **Waterkeeper Alliance**. This program within PFEA focuses on the integrated management of water resources and the promotion of environmental health on the beaches of Tijuana.

On the U.S. side, **San Diego Coastkeeper** has carried out notable work over the past 30 years with the mission of protecting and restoring the waters of San Diego County to ensure they are safe for swimming, drinking, and fishing. This organization, also a member of **Waterkeeper Alliance**, aligns its vision with that of its Mexican counterpart. **San Diego Coastkeeper** conducts water quality monitoring in the

Tijuana River and also receives and shares coastal water quality information from the **San Diego County Department of Environmental Health**, contributing to the **Swim Guide**. The organization believes that a strategic combination of science, advocacy, education, and community engagement is the most effective way to address existing and emerging water quality issues.

Against the backdrop of mounting climate vulnerability, the **"One Coastal Community"** project was launched in 2023, sponsored by the **San Diego Foundation**. The project aimed to strengthen the coastal resilience of the population by providing information on the impact of climate change on marine water quality and coastal erosion processes in the San Diego–Tijuana and Playas de Rosarito coastal region. During the project's first phase in 2023, a comprehensive diagnostic study was developed addressing the geomorphological conditions of the coast, coastal water pollution and sediments, the characteristics of the resident population, and the existing infrastructure for wastewater management.

The second phase, which was launched in collaboration with **San Diego Coastkeeper** in 2024, has focused on disseminating the results of the diagnostic study and conducting two workshops. These workshops explored the perceptions of coastal users on both sides of the border regarding the threats and risks associated with human activities. The aim was to establish resilience strategies in the face of climate change.

This report presents the findings from twelve focus groups, 75% of which were held in Mexican territory, conducted on both sides of the border. Further details about the locations and composition of these groups can be found in the methodology section. These activities form part of the second phase of the **"OneCoastal Community"** project, which was developed by **Proyecto Fronterizo de Educación Ambiental, A.C**. in collaboration with San Diego Coastkeeper during the 2024–2025 period.

2.- Objectives

General Objective

To understand the collective perception of various population groups in the transboundary coastal area of the study region regarding the level of risk and vulnerability affecting them.

Specific Objectives

- Identify the level of knowledge and information that stakeholders from different sectors on both sides of the border possess regarding coastal resilience in the face of climate change.

- Analyze the types of power relations and interests that predominate among stakeholders with respect to coastal resilience.

- Disseminate the findings obtained during the focus group sessions

3.- Methodology for Planning and Designing Focus Groups

In order to gain a deeper understanding of the subject at hand, the project aimed to collect the perceptions of various population groups using the transboundary coastal area through a total of two workshops, one on each side of the border. However, once the project was launched it was decided to conduct a total of 12 focus groups: 3 on the U.S. side and 9 on the Mexican side of the study area. This expansion of the number of workshops and the extension of the work schedule from three to six months was due both to the complexity of the topic and to the need to gain greater knowledge on the Mexican side regarding perceptions of climate change impacts and associated risks, particularly about the coastal zone.

The extension of work deadlines was affected by changes in government and public administration officials in Baja California and Mexico, the Christmas holidays, and logistical conditions, all of which required the schedule to be extended. This extension of time significantly favoured the project's dissemination and strengthened the interest of certain sectors, as was the case with the Playas de Rosarito government group, which (included?) greater involvement of high-level stakeholders.

The focus group methodology was chosen for the workshops to gather information, opinions, perspectives and experiences, and to identify issues of greatest concern or interest to different groups of coastal zone stakeholders and users.

The focus group technique is used in qualitative research processes to collect data through group interaction, providing participant´s perspectives enriched by their opinions, experiences, and attitudes, to understand the meaning and subjective interpretation on behalf of various coastal zone users. The focus group results have been integrated through a process of data analysis to extract meaningful insights from the interactions and discussions.

Opinions were collected through conversations held during the focus groups on both sides of the border, which generated detailed descriptions and narratives that helped understand perceptions and other qualitative nuances related to the topic of interest.

These focus groups were organized through a planning process involving coordination meetings to discuss and agree on the general purpose of the work and the specific objectives associated with coastal resilience. Specific differentiated information needs were recognised for the identification of stakeholders on both sides of the border, associated with the different levels of information available. The following section describes the activities and planning stages applied to integrate the focus groups in sequence.

Planning of Focus Groups

The preliminary planning for the focus groups included the following activities:

- **Central objective**: To explore the collective perception of coastal risks and vulnerabilities.

- **Preparation of an activity guide and work schedule**, which included:

    - **Target audience segmentation**: The target audience focused on the coastal zone user population on both sides of the border.

    - **Participant identification and recruitment**: A recruitment plan was developed based on contact with key informants and participant directories for each focus group on both sides of the border were prepared.

    - **Design of a discussion guide**: A list of open-ended questions aimed at stimulating group dialogue was prepared. This material is included in

the annex.

- **Assignment of moderators**: Facilitators were appointed to lead the sessions.

- **Selection of meeting spaces**: Comfortable and accessible spaces were secured for the activities, ensuring proximity to the working groups.

- **Design of support instruments**: A risk matrix was prepared for completion during the sessions, as well as a bilingual questionnaire on the perception of coastal risks and vulnerabilities.

The questionnaire focused on exploring various dimensions, such as:

- Types of users and usage patterns of the coastal zone.
- Experiences with extreme weather events.
- Access barriers due to disability or health reasons.
- Sources of information used regarding risks and mitigation measures.
- Perceived needs to strengthen community resilience

Formation of Focus Groups

In order to select participants who were representative of the coastal user population, the first step was to identify the activities that take place in the coastal study area on both sides of the border. Priority was given to stakeholders who shared common situations or issues, whose experiences could represent a broader segment of the population. To facilitate invitations, key informants familiar with the local communities within the defined population groups were consulted.

In Mexico, the approach was to work with population groups categorized by social sector, according to categories used in official information to characterize economic activities and coastal population. Seven main interest groups were identified: residents; real estate developers; merchants; tourism service providers; academic institutions; government agencies; and emergency response entities. The

premise behind grouping these stakeholders into focus groups was that it would allow for greater freedom of expression and generate more specific information on each group's perceptions of the coastal zone. In the U.S. section of the study area, it was considered more relevant to emphasize resident and academic groups, thus efforts were made to work with three distinct stakeholder groups:

- The first group comprised San Ysidro residents who use the Imperial Beach beaches.
- The second group included students from the School of Public Affairs at San Diego State University (SDSU) who were interested in these interrelations.
- The third group was made up of residents of the City of Coronado.

Each focus group session included the following activities:

- **Online questionnaire application**: Before each session began, participants were provided with a QR link to complete a digital questionnaire, preferably before the session or on the same day prior to the start of activities.
- **Presentation of Phase 1 results from the project "One Coast, One Community"**: Findings from the diagnostic study were presented using maps in an appropriate format for review, and the most relevant findings were explained. This activity lasted approximately 25 minutes.
- **Guided dialogue**: Group discussions were encouraged through a list of trigger questions, focusing on deepening the conditions identified in the diagnostic study, as well as exploring perceptions of risks and vulnerabilities. This section was conducted over an estimated 35-minute period. (The full list of trigger questions and the activity schedule are included in the attachments.)
- **Stakeholder mapping**: Participants were asked to identify relevant stakeholders in relation to the topic addressed, using a quadrant diagram to analyze their level of power, interest and collaborative relationships related to the coastal zone. The time allotted for this activity was between 15 and 20 minutes.
- **Preparation of the risk matrix**: Participants identified activities and conditions that generate coastal risks. They were supported in this task by a guide that

helped them recognize environmental threats and health risks associated with the coastal zone. This activity took approximately 25 minutes.

4. Methodology for Analyzing Results

In order to integrate the information from all focus groups, the same questionnaires and materials were used in both English and Spanish, as well as identical work formats for the focus group activities on both sides of the border.

The evaluation and analysis of the focus groups results on both sides of the border was divided into five phases.

Phase 1: Transcription and Organization of Results

The responses obtained from the focus groups were transcribed and digitized. This included the answers to the questions posed, as well as the notes and recordings made during the working sessions on both sides of the border

The information obtained from the various focus groups and its analysis were divided into two stages:

- In the first stage, keywords were identified and highlighted by creating a word cloud, emphasising those most frequently used in relation to coastal activities.

- The second stage built on the first, by analysing the responses obtained from the questionnaires, thereby initiating both quantitative and qualitative data analysis.

Phase 2: Interpretation of Results

Based on an interpretative analysis of the concepts identified, which linked the perceptions expressed by the participants with the objectives set for the activity, it was possible to detect trends, concerns and areas of opportunity perceived by the user communities of the coastal zone.

Phase 3: Identification of Perspectives

Based on the observed patterns, conclusions and recommendations were developed that synthesized the main collective perspectives on coastal risks and resilience. Those findings that reflected greater consensus or were particularly relevant for strengthening community resilience were prioritized.

Phase 4: Validation and Triangulation of Results

To ensure consistency and robustness, the findings were validated and triangulated. This was achieved by comparing the results with other available data sources and through feedback exercises with focus group participants, which allowed for confirmation or refinement of the interpretations derived from the analysis.

5.- Results

5.1 Participant Profile[1]

When selecting participants for the focus groups on both sides of the border, one of the criteria considered was ensuring that individuals either engaged in activities, resided in, or maintained a significant connection with the coastal study area. The aim was to include participants who were willing to share their opinions and experiences of the area, and to engage in open dialogue about the impact of climate change on the coastline.

The analysis of results mentions some of the emphases found in the different groups, as well as why the academic group predominated over the others in terms of participation.

A review of the most representative activities present in the coastal study area was necessary in order to identify the types of activities involved. These activities were identified based on an analysis of official information relating to economic activities and the profile of the resident population. This resulted in the classification of seven main groups.

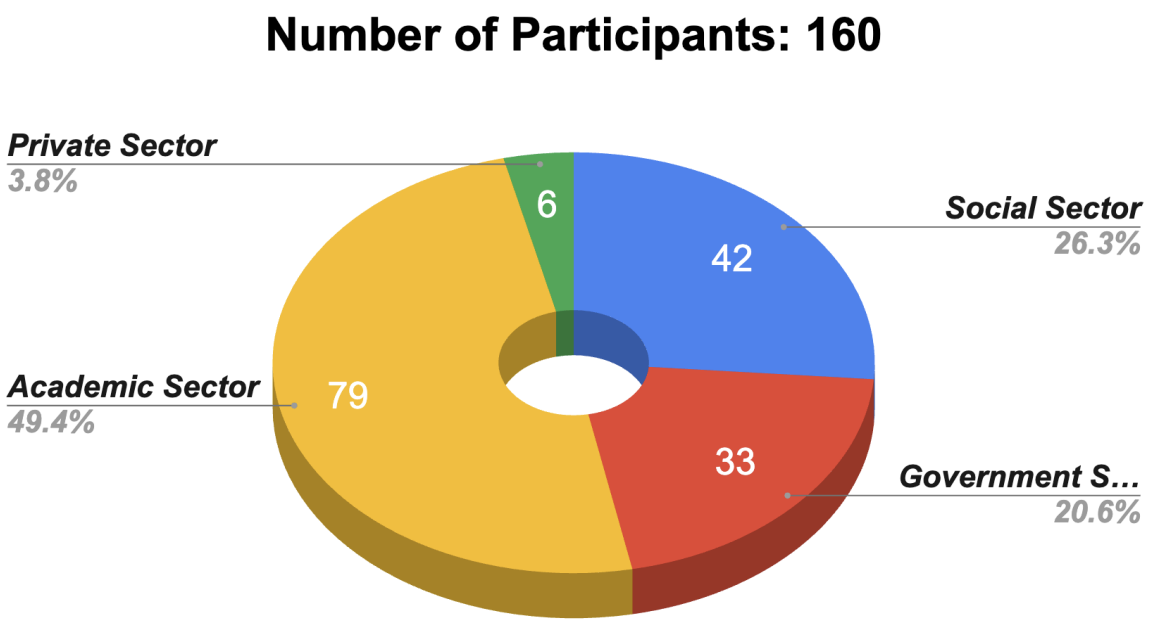
- Residents

[1] Determining participants' profiles helps to identify the characteristics of focus groups that foster consensus or dissent around an issue affecting a group of people. This allows currents of thought to be identified and aspects influencing certain collective behaviours to be recognised, while simultaneously improving understanding of the different approaches, interests and particular needs expressed by each group.

- Real estate developers
- Merchants
- Tourism activities
- Academic institutions
- Government agencies
- Emergency response entities

Based on this classification, five focus groups were formed, through which twelve working sessions were conducted. Two groups—corresponding to the commercial and tourism sectors—were not formed, mainly due to the inability to establish leadership for convening and organizing these groups.

An initial survey on risk perception and coastal vulnerability was administered to each group of stakeholders to establish their profile and context of reference. The first relevant data obtained was the total number of people who participated in the focus groups, which amounted to a total of 160 people located on both sides of the border. The following graphs show the distribution of participation in terms of the four main sectors: governmental, private, social and academic.



Source: Developed by Proyecto Fronterizo de Educación Ambiental based on focus group attendance data

The graphic shows that the majority of attendees (49.4%) were from the academic sector. This can be attributed to a legal mandate in Mexico that requires academic institutions to engage with the community, in line with a transformative vision of education. This obligation has been reinforced in recent years as part of public policy aimed at ensuring that higher education and scientific research directly impact social well-being, particularly in historically marginalized communities.

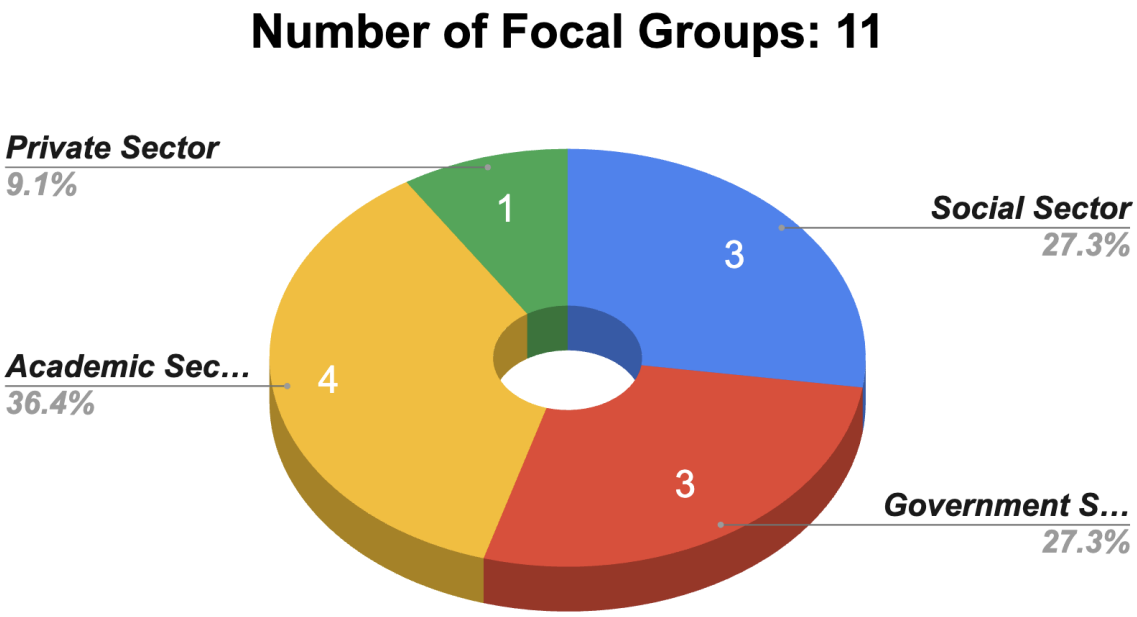
The second most prominent group in terms of attendance was the social sector (26.3%), represented by community members and coastal residents—mainly from Tijuana and Imperial Beach—who responded positively to the call for participation due to growing concerns about health issues and coastal pollution.

As for the governmental sector (20.6%), participation was particularly notable from the municipal agencies of Playas de Rosarito, compared to those of Tijuana, Imperial Beach, and Coronado. This can be explained by the greater relevance of coastal issues in Rosarito, where tourism is the main source of income.

Finally, the private sector (3.8%) accounted for the lowest participation rate. This is likely due to the sector's more direct links with government institutions, which resulted

in a limited response to the call. However, the participation of the real estate sector is considered valuable due to the significance of its input on coastal issues.

The following graphic shows the percentage distribution of participation by different groups in relation to the total number of focus groups conducted. Once again, the academic group demonstrated the highest level of participation, while social and governmental entities were more evenly represented. Private sector participation was limited to a single entity.

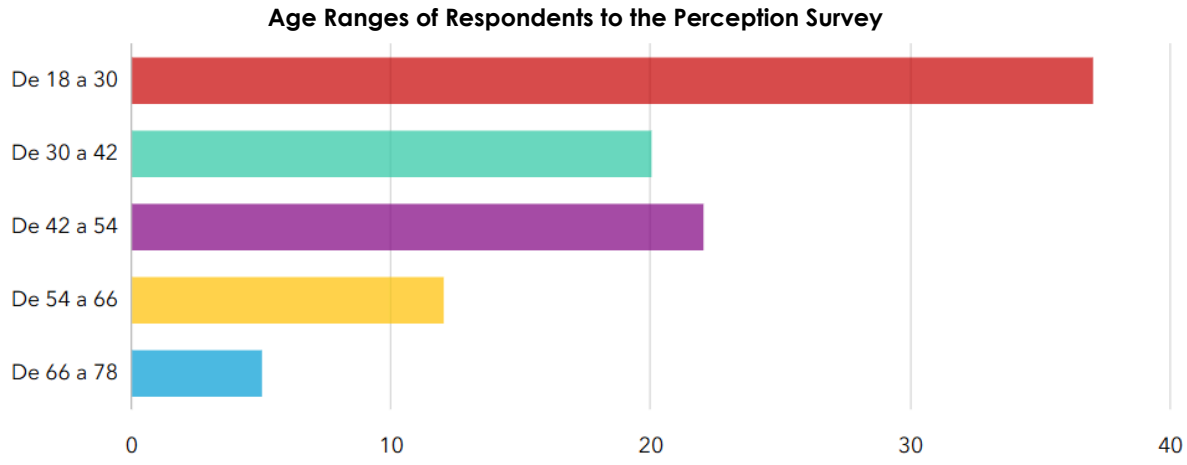


Source: Developed by Proyecto Fronterizo de Educación Ambiental based on focus group attendance data

5.2 Survey Results

According to the survey results from 96 individuals, the age profile of the participants was concentrated within three main age ranges: 18–30 years (38.54%); 42–54 years (22.91%); and 30–42 years (20.83%). This distribution reflects a higher proportion of young people, particularly from the academic sector, who were among those with the highest attendance at the focus group sessions. The second most represented

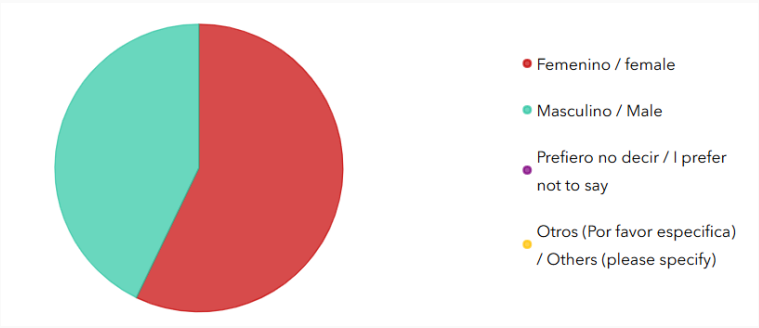
age group, 42–54 years, indicates significant interest in the topic addressed among this population segment.



Source: Developed by Proyecto Fronterizo de Educación Ambiental with data from the perception survey

In terms of gender distribution, the results show higher participation among females (55.21%) than males (39.58%), with the remaining percentage corresponding to individuals who preferred not to specify. This higher female representation could be attributed to several factors, such as greater sensitivity or concern regarding the impacts of climate change, increased availability or interest in community topics, or a heightened perception of the effects of climate change on health and well-being, among others. Further clarity on this observation could be provided by additional information derived from the health-related survey.

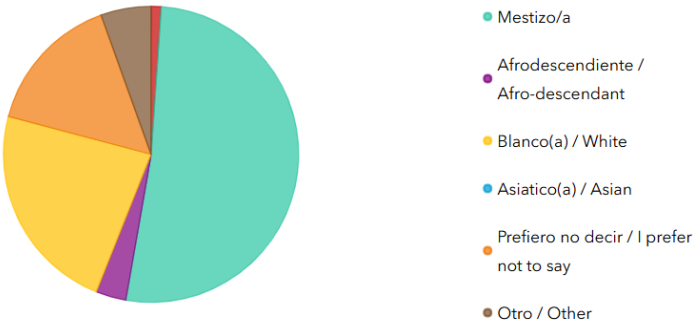
Gender Proportion of Participation in the Perception Survey



Source: Developed by Proyecto Fronterizo de Educación Ambiental with data from the perception survey

In terms of nationality, 69.79% of respondents identified as Mexican, 18.75% as U.S. nationals and 6.25% as another unspecified nationality. In terms of ethnic origin, 48.96% of respondents identified as mestizo, 21.88% as white, 3.13% as of African descent and 1.04% as indigenous. Around 14.58% of respondents chose not to disclose their ethnic origin and 5.21% placed themselves in the 'other' category without specifying. These results indicate a predominance of mestizo populations, but also significant ethnic diversity within the sample. The decision not to disclose ethnic origin may reflect discomfort, the perception that the data is irrelevant, or confusion regarding the provided options.

Nationality and Ethnic Origin of Survey Respondents



Source: Developed by Proyecto Fronterizo de Educación Ambiental with data from the perception survey

In terms of language, 80.21% of participants reported Spanish as their primary language, 20.83% reported English and 1.04% fell into the 'other' category, which was not specified. This corresponds with the results observed in the sections on nationality and ethnic origin.

Finally, in terms of connection to the coastal zone, 37.5% of respondents identified as residents, 33.33% as students, 26.04% as recreational users and 10.42% as government officials.

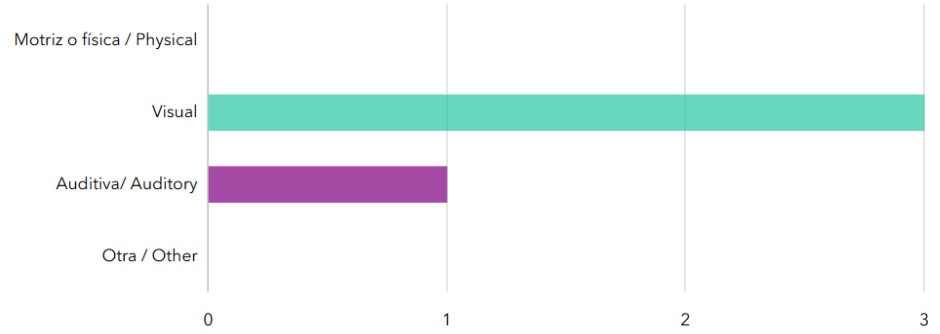
In summary, the surveyed population is characterized as predominantly female, mestizo and Mexican in origin, Spanish-speaking, aged between 30 and 54 years, and with a high degree of direct or indirect connection to the coastal zone.

Regarding the population's vulnerability to risk situations or climate emergencies, associated with disability factors, the survey results indicated that 89.58% of participants did not identify as having a disability, while 3.13% reported having one, and 2.08% preferred not to specify. Among the group that reported having a disability, 4.17% reported a visual disability, 3.13% did not specify the type of disability, and both hearing and mobility disabilities were reported in 1.04% of cases, respectively.

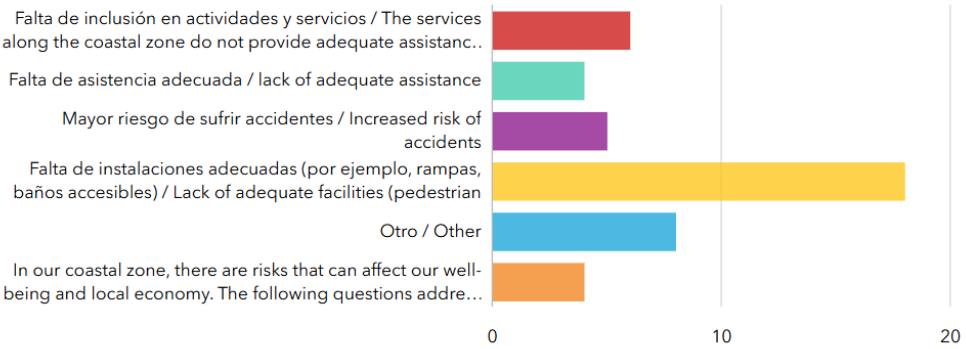
Regarding the impact that disabilities represent in the use and enjoyment of the coastal zone, respondents identified the main limitations as: lack of adequate facilities and accommodations[2] (18.75%), followed by lack of inclusion[3] in activities and services (6.25%), increased risk of accidents (5.21%), lack of appropriate assistance (4.17%), and, to a lesser extent, other unspecified factors (8.33%). These results reflect significant accessibility and safety barriers for people with disabilities in the coastal environment.

Highest Values of Disabilities Identified

[2]This refers to the arrangement of physical, design or access elements that make using coastal spaces easier.
[3]This refers to the lack of access to equal opportunities, resources and services, and participation of certain individuals or groups due to characteristics such as disability, gender, race, ethnicity, sexual orientation, religion or any other difference..



Source: Developed by Proyecto Fronterizo de Educación Ambiental with data from the perception survey

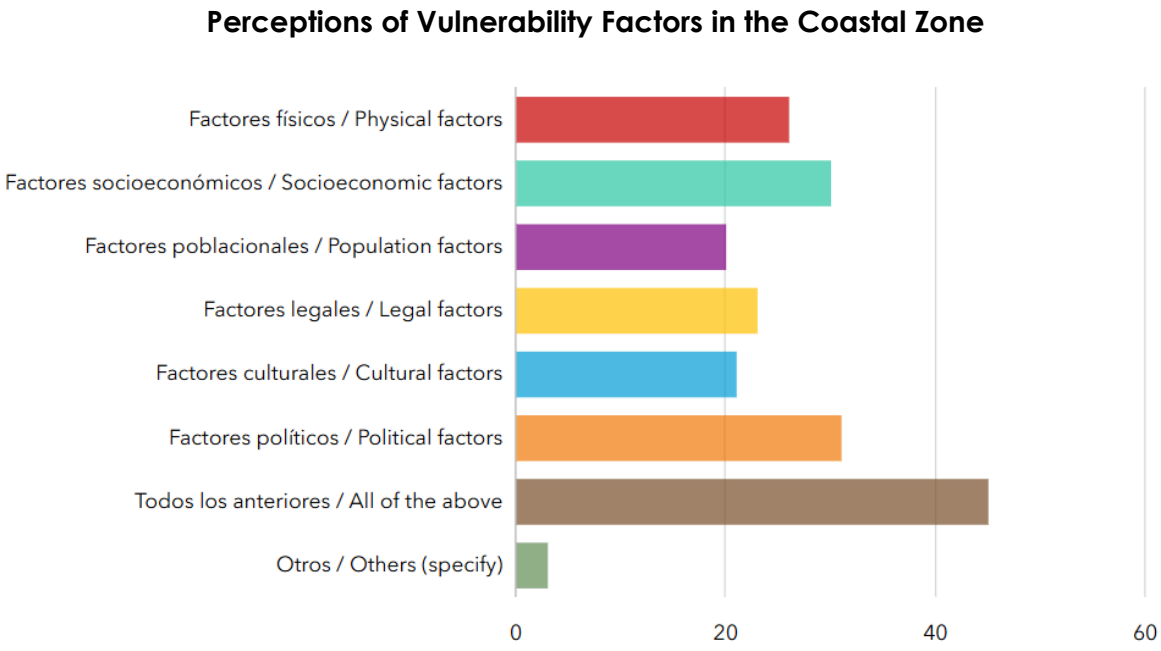


Source: Developed by Proyecto Fronterizo de Educación Ambiental with data from the perception survey

Regarding the factors associated with the general vulnerability of the coastal zone, participants' perceptions were distributed as follows:

- **Physical factors**: 26.04%
- **Socioeconomic factors**: 31.25%
- **Population factors**: 19.79%
- **Legal factors**: 22.92%
- **Cultural factors**: 21.88%

- **Political factors**: 31.25%
- **All of the above**: 46.88%
- **Other unspecified factors**: 3.13%



Source: Developed by Proyecto Fronterizo de Educación Ambiental with data from the perception survey

Interpretations and Considerations

The first significant finding of the survey results is that 46.88% of respondents considered all the mentioned factors to be relevant in explaining the vulnerability of the coastal zone. This suggests that the issue is perceived as complex and multifactorial, which is positive as it encourages consideration of multiple solutions or

risk mitigation alternatives. Therefore, public policies and mitigation measures should be approached comprehensively, addressing multiple dimensions simultaneously.

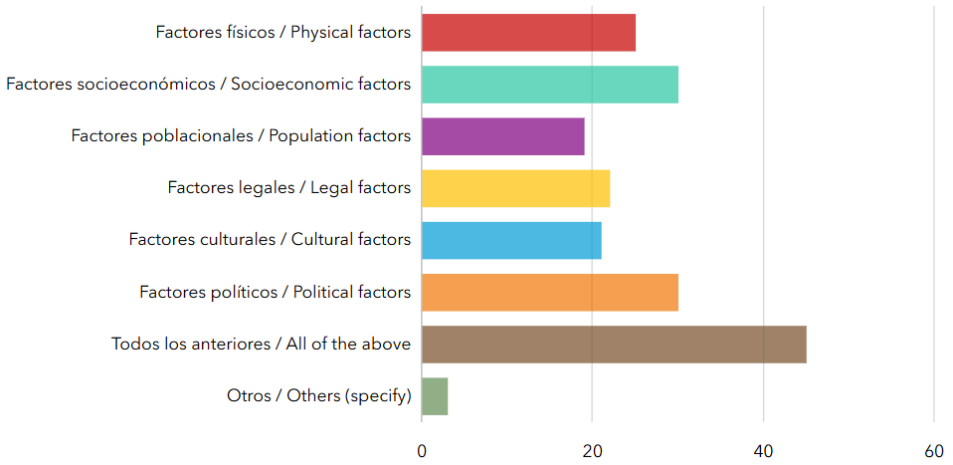
The participants identified economic inequality, lack of resources and the absence of appropriate political decisions as critical elements contributing to coastal vulnerability. Socioeconomic and political factors were identified as equally important (31.25%), with no difference between the two.

Additionally, physical (26.04%) and legal (22.92%) factors were considered relevant, indicating that the natural conditions of the coast and the existing legal framework significantly influence perceived vulnerability. This further supports the percieved need for coastal infrastructue improvement and for strengthening legislation on coastal and urban environmental management.

It was also acknowledged that cultural practices (21.88%) and population factors (19.79%) play a role in coastal resilience. This suggests that coastal areas are affected by cultural practices related to how housing is constructed along the coastline or how waste is managed and disposed of. It also suggests that population density and distribution play a role. These results highlight the importance of promoting environmental education programs, coordination mechanisms among different stakeholders, and urban planning strategies that consider cultural and demographic sustainability.

Finally, 3.13% of respondents indicated "other" factors, pointing to the existence of additional variables not covered by the survey. This suggests the need for further research to identify other relevant elements that may influence the vulnerability of the coastal zone.

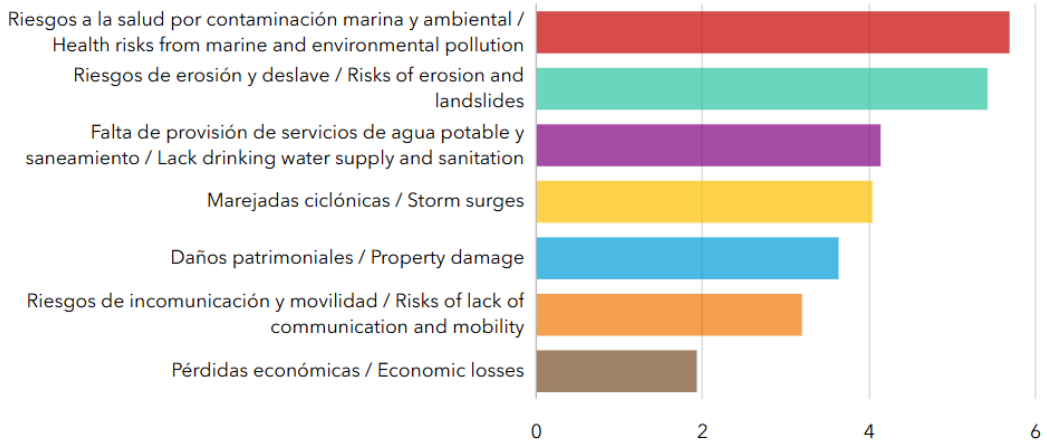
In conclusion, the results underscore the need to adopt an integrated and multidimensional approach to address the risks and vulnerabilities of coastal areas, integrating physical, socioeconomic, legal, cultural, population, and political aspects.



Source: Developed by Proyecto Fronterizo de Educación Ambiental based on focus group attendance data

Regarding the perceived risks that could affect health—and, consequently, increase the population's vulnerability—the survey results present average scores for each type of risk. Each option received a score based on five possible levels of assessment. The scores presented represent all survey responses, classified by their average rating. The option with the highest average score is ranked as the most relevant.

- Health risks due to marine and environmental pollution: 5.68
- Risks of erosion and landslides: 5.42
- Lack of provision of drinking water and sanitation services: 4.13
- Storm surges: 4.03
- Property damage: 3.63
- Risks of isolation and mobility issues: 3.19
- Economic losses: 1.92



Source: Developed by Proyecto Fronterizo de Educación Ambiental with data from the perception survey

Interpretations

The interpretations presented below are based on the data and responses provided by the survey participants. It is important to note that most respondents were not aware of the results of the coastal diagnostic study before taking part in the focus groups, so these perceptions are based on their direct experience.

The highest average score (5.68) corresponds to health risks due to marine and environmental pollution, highlighting significant concern about the effects of pollution on public health. This suggests that respondents perceive pollution as a major threat.

The risk of erosion and landslides (5.42) also received a high score, reflecting concerns about the direct physical impact on coastal areas. In terms of basic services, the lack of drinking water and sanitation provision (4.13) was considered a significant risk, as were storm surges (4.03), which are extreme weather events that directly impact communities.

Property damage (3.63) and the risk of isolation and restricted mobility (3.19) were considered important concerns, albeit less urgent than health risks and natural disasters. This may be interpreted as a prioritization of personal safety and survival over the protection of material assets.

Finally, the lowest score (1.92) corresponds to economic losses, suggesting that the financial impact is considered to be more manageable or less urgent than threats to safety and health. This may also indicate lower awareness of the long-term economic consequences.

Perception of Vulnerability to Natural Phenomena:

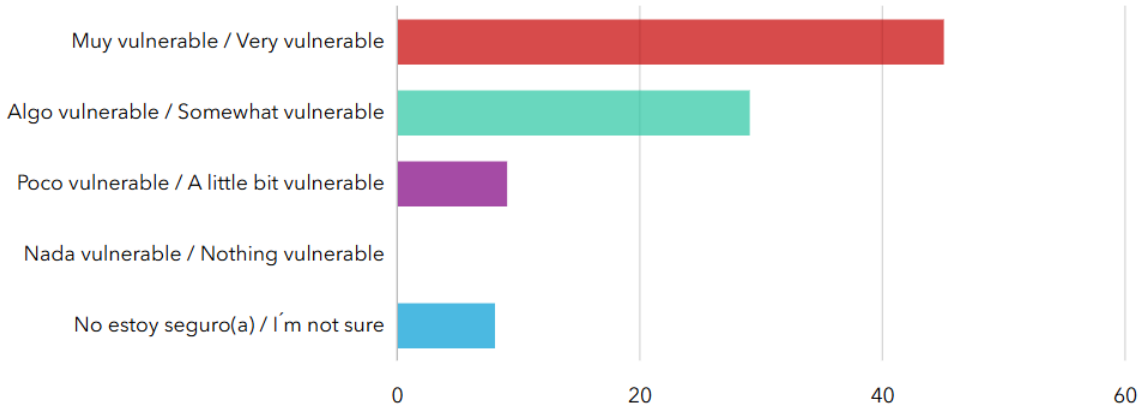
- **46.88%** considered the coastal zone to be highly vulnerable.
- **30.21%** rated it as somewhat vulnerable.
- **9.38%** perceived it as slightly vulnerable.
- **8.33%** were unsure.
- **0%** indicated that the zone was not vulnerable.

Regarding the relationship between climate change and coastal zone vulnerability, **89.58%** of respondents believed that vulnerability is indeed increasing. The following examples are cited among the reasons mentioned:

- *"Climate change is intensifying environmental threats, such as sea level rise, coastal erosion, land loss, and increased flooding, affecting infrastructure, homes, and livelihoods."*
- *"Storms are now more frequent and intense, ocean warming is altering marine biodiversity, affecting both fisheries and local ecosystems."*

Conclusion: The results point to a primary concern for immediate health, environmental, and natural disaster risks, while economic impacts are seen as

secondary. This perception suggests that interventions should prioritize public health, environmental management, and disaster preparedness.



Source: Developed by Proyecto Fronterizo de Educación Ambiental with data from the perception survey

Including these considerations in the public policy formulation and evaluation cycle can influence policymakers in prioritizing public health, environmental management, and disaster preparedness issues. This would help validate or complement technical data, identify discrepancies between institutional practices and the experiences of citizens, and prioritize issues from the perspective of those directly affected by the problem.

According to the survey results the percentage of use and frequency of visits to the beaches was determined as follows:

- **32.29%** visit the beaches only during summer.
- **21.88%** visit once a month
- **19.79%** go once or twice a year.

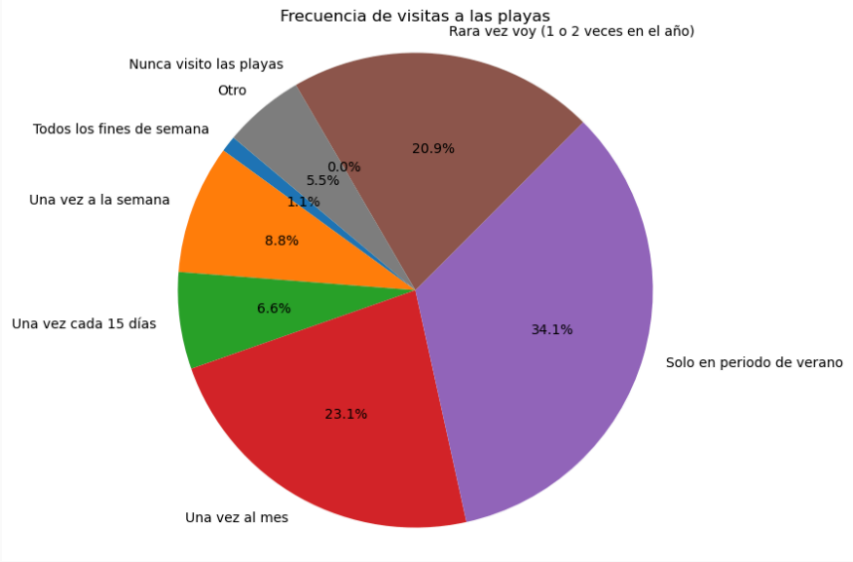
Factors Influencing Visit Frequency

- **Weather and Season**: Summer, with higher temperatures, increases the influx of visitors.

- **Geographic Proximity**: Individuals living near the coast visit beaches more frequently than those residing in more distant areas, due to transportation costs.
- **Economic Income**: Higher income allows for closer coastal residence and more regular visits.
- **Beach Conditions**: Positive or negative experiences related to environmental quality[4], available services, and safety influence the decision to visit beaches.

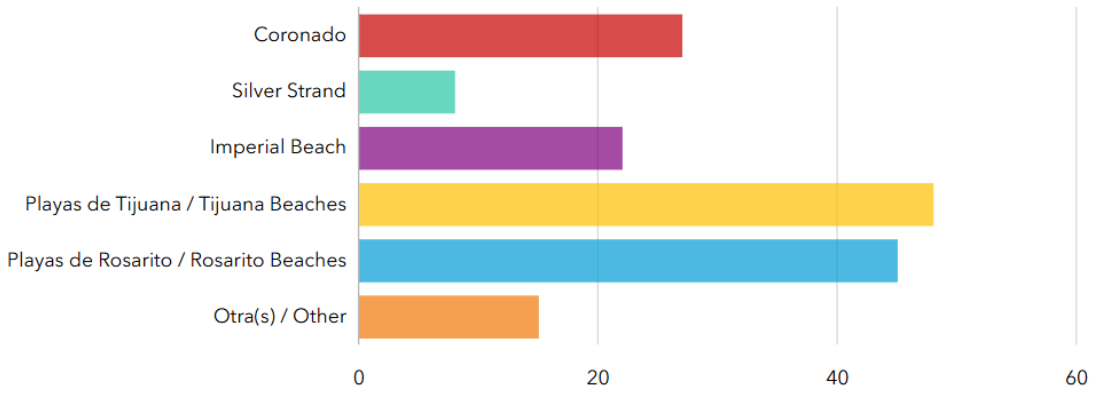
Most Visited Beaches

- Tijuana Beaches
- Playas de Rosarito
- Coronado
- Imperial Beach



Source: Developed by Proyecto Fronterizo de Educación Ambiental with data from the perception survey

[4] The survey did not reference precision in concepts associated with landscape, aesthetic, or other issues, referring generically to environmental quality associated with aspects of water quality, presence of litter, or vegetation decline, which were settled more in the comments and dialogues about problems and risks, rather than in specific terms.



Source: Developed by Proyecto Fronterizo de Educación Ambiental with data from the perception survey

Topics of Greatest Interest to Users

- Free use of the beach and ocean without worries: **61.46%**
- Legal certainty[5] and coastal zone planning: **44.79%**
- Property and health safety: **42.71%**
- Compliance with coastal zone regulations: **32.29%**
- Studies and research on marine biodiversity: **26.04%**
- Tourist attractions for visitors: **16.67%**

Interpretations:

The priority issue is the free and safe use of beaches, reflecting a desire for clean, safe, and accessible spaces. Legal certainty and planning are also prominent concerns, indicating a demand for clear and effective coastal zone management.

[5] Legal certainty refers to the clear and secure understanding of the laws, regulations, and policies that govern the use and development of this coastal area. It implies that individuals, communities, and businesses can understand and anticipate the limits and consequences of their actions in the coastal zone, which promotes planning, investment, and sustainable management of coastal territory. Legal certainty is also considered an important competitiveness factor for economic investment.

Interest in marine biodiversity (26.04%) reveals an emerging awareness of environmental conservation. Finally, the attraction of tourists is important but generally occupies a secondary place, possibly because users prioritize local well-being and sustainability over tourism promotion. However, there are particular areas, such as Playas de Rosarito and the city of Coronado in the U.S., where interest in tourism was higher. It is also possible that this aspect is ranked lower because Tijuana locals may not view their beach use as "tourism."

It should be noted that the opinions of commercial actors were not clearly represented in the focus groups due to their limited participation, which may have influenced the weighting of this topic.

Conclusion: Users of the coastal zone mainly value safety, freedom of use, and sustainable beach management, while tourism promotion is seen as a complementary but not a priority aspect.

Perceptions of Protection and/or Mitigation Measures

Regarding the protection and/or mitigation measures perceived by the population as safeguards against coastal risks, respondents mentioned a variety of options that could be understood as either existing or necessary; their mention highlights their importance. These included sediment traps, mangrove and wetland protection, ecosystem restoration, infrastructure, buffer zones, dune restoration, dikes, barriers, shelters, emergency plans and evacuation routes, coatings and waterproofing, sandbag protection, updated regulations and public policies, risk atlases, storm drain and ravine cleaning, roof reinforcement, reforestation and promoting the blue economy.

This diversity of responses reveals that perceptions of the effectiveness of protection and adaptation measures vary depending on different conceptions of risk. For instance, nature-based solutions, such as wetland protection, tend to be considered sustainable, multifunctional alternatives. In contrast, grey infrastructure solutions, such as dikes and physical barriers, are perceived as more reliable in the short term but often more disruptive to local ecosystems.

Additionally, the mention of emergency plans, evacuation routes, and shelters highlights the importance placed on the direct protection of people, underscoring

the need to strengthen community education and preparedness, as well as the existence and timely and effective implementation of alert and emergency response protocols by the government on the Mexican side. These are essential components of disaster resilience, whether for pollution issues or natural phenomena.

The references to public policies, regulations, and tools such as alert and emergency response protocols and follow-up on Municipal Risk Atlases reveal a perception of institutional commitment and governmental planning as fundamental elements for coastal safety. However, confidence in the effectiveness of public policy can be significantly influenced by the population's previous experience with enforcement of such policies, highlighting the importance of promoting greater citizen participation in issues of law enforcement and compliance.

Conversely, the infrequent mention of the blue economy in participants' responses suggests that a sector of the population is beginning to develop knowledge of this topic. This knowledge may originate from academic or innovation spheres that are open to new technologies and sustainable approaches to managing marine and coastal resources.

Summary, The population's perception of protection measures against coastal risks refers both to those that currently exist and are recognized as protective—albeit sometimes ineffective—and to the need for those that do not exist and need to be created. This viewpoint is influenced by factors such as the perceived ineffectiveness of government actions, the environmental impact resulting from the lack of such measures, the level of knowledge about applicable public policies for the coastal zone, and openness to innovation strategies. Considering these perceptions will be crucial for designing risk management strategies that garner acceptance and support from coastal zone users.

5.3 Focus Group Activity Results

As detailed in the methodology section, the analysis of the dialogues and exercises conducted in the focus groups on both sides of the border involved capturing, classifying and systematizing responses, as well as identifying relevant concepts and meanings. The aim of this process was to capture the perceptions of the 160 participants regarding coastal risks and vulnerability in the context of climate change, and to link these findings to the objectives of the the project.

Word clouds were used to facilitate the analysis of qualitative responses and simplify the processing of concepts expressed by the different participating actors. This tool provides a visual representation of the most frequently mentioned terms and concepts, with variations in word size highlighting their frequency. The word clouds generated by participants in the focus groups are shown below. The words represent a sample of what the stakeholders expressed regarding the main activities and uses of the coastal zone identified during the exercises.

Main Activities Identified in Focus Groups in the U.S.

Main Activities Identified in Focus Groups in Mexico

Source: Developed by Proyecto Fronterizo de Educación Ambiental with data collected during the focus group activities.

In the word cloud corresponding to the focus groups conducted in Mexico, the most prominent word is "TOURISM," indicating that this topic was the most emphasized among the sample of participating stakeholders. Surrounding this central word, other relevant terms such as "infrastructure" and "residential" were identified, suggesting that both infrastructure development and residential areas are closely linked to tourism or are general areas of interest for participants.

Words such as "government," "beach," "recreational activities," and "industry" also stand out, pointing to the perception that both governmental authorities and the industrial sector considered to be key actors in tourism development. Likewise, beaches and recreational activities emerge as fundamental attractions, particularly in the municipality of Playas de Rosarito. Taken together, the word cloud reflects an interconnection between tourism, infrastructure, residential settlements, and institutional support, highlighting the relevance of these elements in promoting and consolidating tourist destinations in the studied coastal area.

On the other hand, the word cloud derived from the focus groups conducted in the United States shows a more urban planning and territorial development-oriented focus. Among the most prominent words and phrases are: "Transportation," "Residential areas," "Coastal hotels," "Residential development," "Urban encroachment," and "Community-owned land." These terms highlight a concern for managing urban growth, where transportation, housing, and infrastructure play a central role.

Additionally, topics such as resident health, water use, and institutional continuity in government agencies are mentioned, indicating a strong interest in community well-being and long-term sustainability. This configuration suggests a more structured vision of coastal land management, where planning, resource management, and governance are prioritized.

5.4 Stakeholder Mapping

The focus groups revealed stakeholders level of interests, influence, levels of participation, capacity for involvement, support, and permanence in the coastal study area. These stakeholders can play a key role in implementing programs and specific public policy actions aimed at reducing the risks and vulnerabilities of people and activities in the coastal zone. This exercise aimed to identify the different types of stakeholders perceived by the population, and their potential role in mitigating the effects of climate change and strengthening coastal resilience.

In this regard, the stakeholder mapping allowed for:

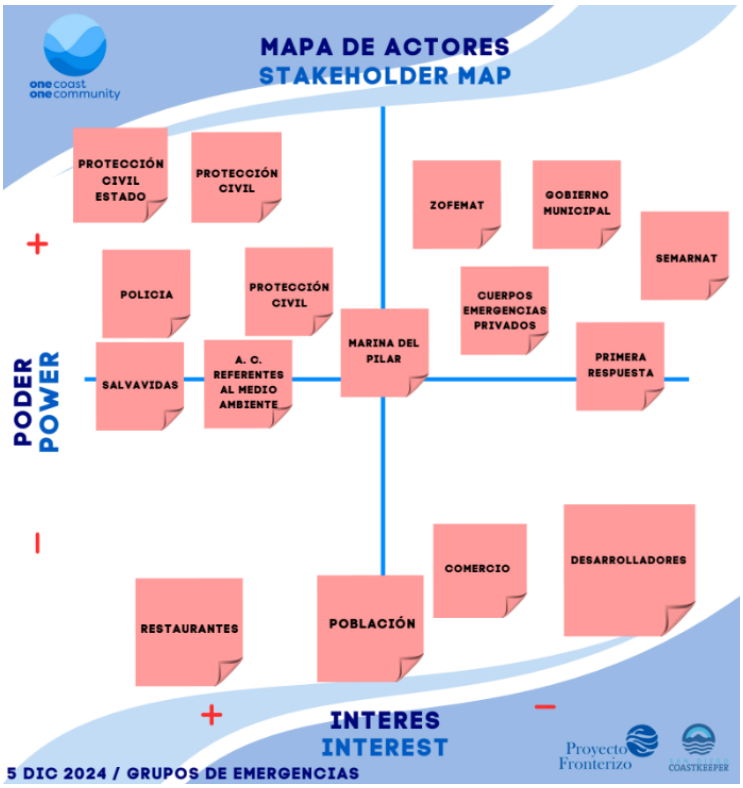
- Identifying actors involved in the issue at hand.
- Classifying actors based on their level of power and interest.
- Identifying links and relationships between the different actors in relation to the project.
- Relating functions, interests, objectives, and approaches of the actors to coastal resilience in the face of climate change.
- Detecting conflicts or potential advantages and alliances among actors to help manage capacities for coastal resilience.

Stakeholder or actor identification was based on a participatory perception exercise involving all members of the each of the focus groups. Four categories of actors were established for this purpose:

a) Actors with higher levels of power
b) Actors with lower levels of power
c) Actors with higher levels of interest
d) Actors with lower levels of interest

The assignment of these levels to the different actors was carried out through a group decision-making exercise, where participants, based on their experience, knowledge, and perception, placed each actor in one of the quadrants of a Cartesian plane. The image below illustrates the exercise performed.

Actor Mapping Matrix



Source: Developed by Proyecto Fronterizo de Educación Ambiental with results from the focus group exercise

Through inclusive dialogue and deliberation, a classification of actors was established, whereby actors were classified according to participants' perception of their level of power and interest. This exercise also helped to identify the varying capacities of these actors in relation to coastal risk management and climate change resilience.

Using the Cartesian quadrant as a visual tool for stakeholder mapping was useful for identifying and analyzing the influence and interests of various stakeholders regarding coastal risk management and resilience. This graphic representation enables each stakeholder to be positioned according to the collective perception of the participants, thereby facilitating an understanding of their respective levels of influence and commitment. The method involves dividing the plane into four quadrants based on two variables: power (P) and interest (I). This allows key or strategic actors (I+P+) to be identified, as well as those requiring less attention (I–P–). The distribution is as follows:

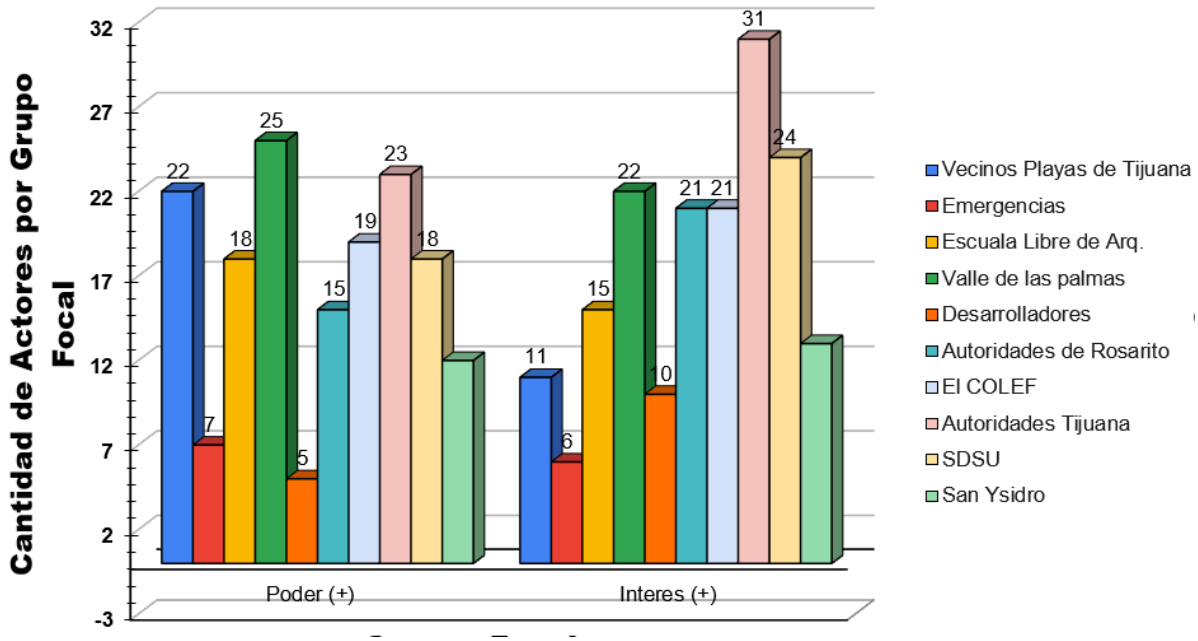
- **Quadrant I+P+**: Actors with high interest and high power.
- **Quadrant I+P–**: Actors with high interest but low power.
- **Quadrant I–P+**: Actors with low interest but high power.
- **Quadrant I–P–**: Actors with low interest and low power.

This classification provides participants with a shared view of the positioning of certain actors, helping to identify those perceived as key or a priority. This method makes it easier to interpret the weight assigned by participants to different actors. Based on this stakeholder mapping, differentiated future strategies for management, communication or collaboration can be defined according to the preferences of each group of actors.

The results obtained from the 160 focus group participants provide a preliminary categorisation of stakeholder groups in the coastal area. The findings enabled the identification of a total of 79 stakeholders, highlighting the existence of a significant pool of capacities and resources for managing the coastal area.

Regarding the first quadrant I+P+, a significant group of key actors was identified with high decision-making capacity and greater interest in the objectives of mitigating climate change and strengthening coastal resilience. This suggests favorable conditions for building work agreements, partnerships, and strategies to enhance coastal resilience capacity.

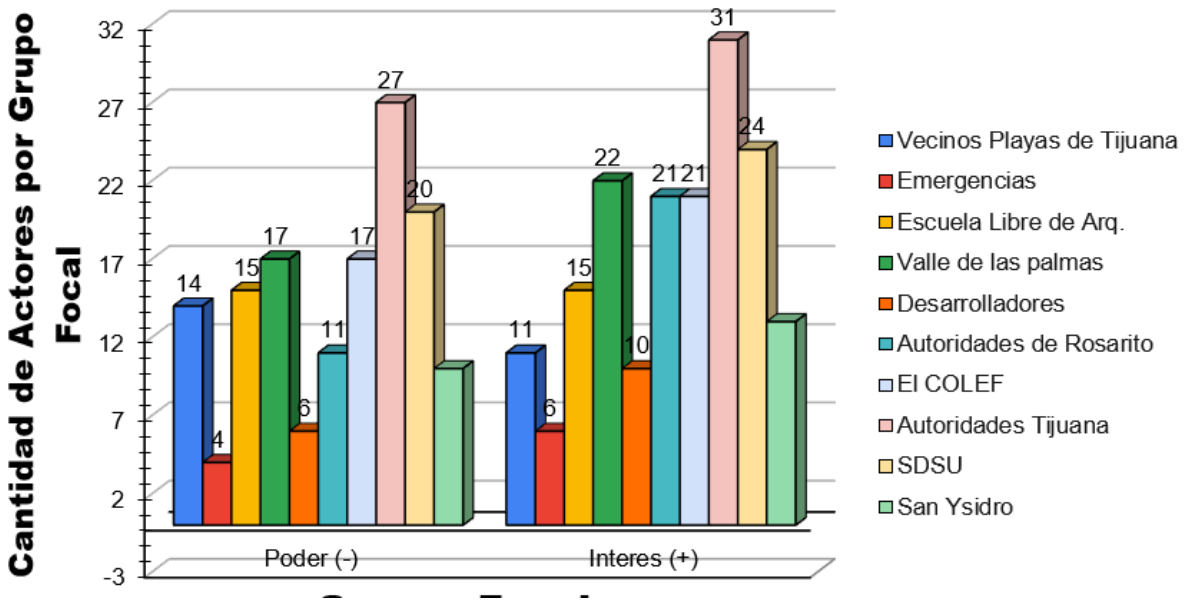
Number of Actors with Higher Power and Interest Identified



Source: Developed by Proyecto Fronterizo de Educación Ambiental with results from the stakeholder matrix exercise

For the I+P- combination, which groups actors with high interest but low power, an increase in the number of actors in this category was observed. This suggests a general perception among participants of limited management capacity or lower power in some of the identified actors. This perceived decrease in power indicates a more moderate level of engagement; however, while there is interest in participating in actions related to coastal resilience and risk mitigation, the lack of power reduces their capacity for effective advocacy. This perception was more pronounced among members of the Tijuana authorities group, who emphasised that there are interested actors, but they are constrained by structural or institutional factors.

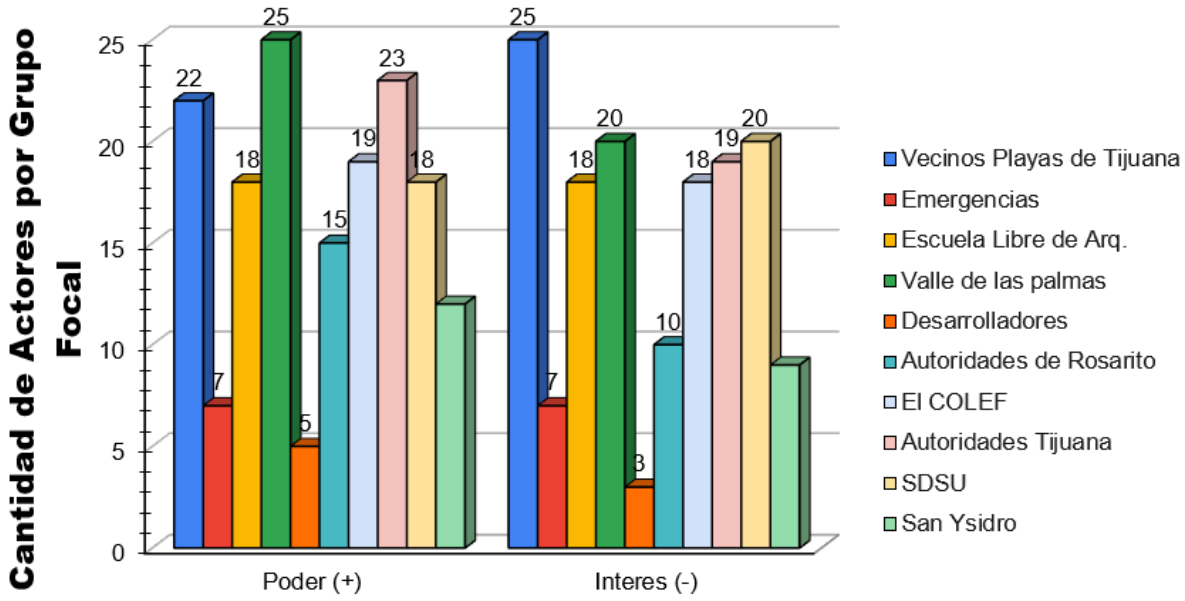
Number of Actors with Lower Power and Higher Interest



Source: Developed by Proyecto Fronterizo de Educación Ambiental with results from the stakeholder matrix exercise

In Quadrant I–P+, which groups together actors with low interest and high power, the number of identified actors appeared to be more homogeneous in terms of perceptions of power and interest levels. This suggests that a significant proportion of actors were placed in this quadrant, indicating that, although these actors have the capacity to influence, they are currently only minimally involved. This situation highlights the need for strategies that will increase their level of interest and encourage greater participation in efforts to mitigate risks and strengthen coastal resilience.

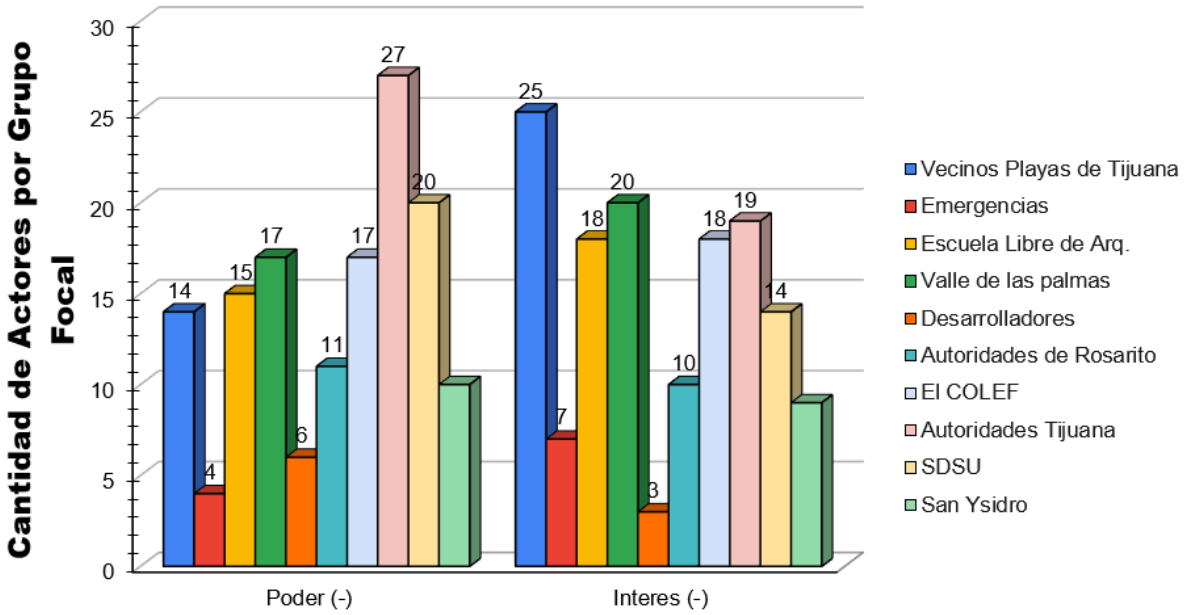
Number of Actors with Higher Power and Lower Interest



Source: Developed by Proyecto Fronterizo de Educación Ambiental with results from the stakeholder matrix exercise

Finally, in Quadrant I–P, which includes actors with low interest and low power, more heterogeneous behaviour was observed in the results. Although the number of actors in this category is relatively low compared to the other quadrants, this suggests a generally more favourable perception of the interest and power of the identified actors in terms of coastal risk management capacity. However, some figures exceeded the average on both the low-power and low-interest axes. This was particularly emphasised by the authorities in Tijuana and the residents of Playas, who highlighted the need to strengthen the connections and participation of certain actors who currently demonstrate a low level of interest.

Number of Actors with Lower Power and Lower Interest



Source: Developed by Proyecto Fronterizo de Educación Ambiental with results from the stakeholder matrix exercise

Some of the emphasis obtained from the stakeholder mapping activities with the 160 focus group participants refers to the perceived interest in stakeholders identified by the participants that are associated with insufficient power. This result suggests the presence of stakeholders with limited influence, commitment and power with regard to risk management and coastal resilience in the face of climate change. This pattern was particularly evident among stakeholders in the emergency response and civil protection sector.

On the other hand, some actors such as real estate developers, who were attributed a certain level of power, were perceived as having a low level of interest in the issue at hand, indicating potential influence but limited commitment to climate change actions.

In contrast, actors from the academic sector stood out for showing positive interest, accompanied by moderate negative aspects, suggesting a significant and sustained commitment from this sector to climate change-related issues and the need for greater climate action.

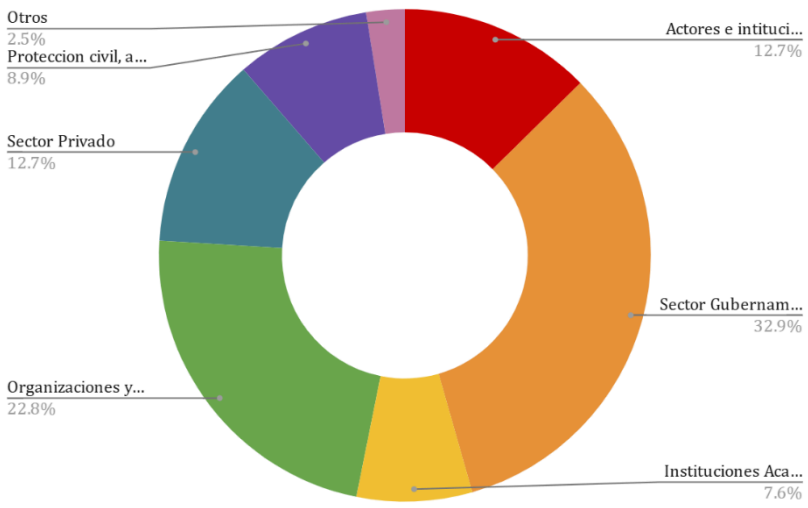
It can be concluded from this that governmental actors were the most easily identified by the focus groups out of the 79 identified actors, totalling 26 actors and

representing 32.91%. This reflects the importance assigned to the government's participation in dialogue and interaction processes with different sectors, as well as its crucial role in formulating and implementing public policies related to climate change. This predominance is associated with greater capacity for action and influence over resource management and the regulation of policies and activities that directly impact the reduction of risks and vulnerabilities faced by the population in the context of climate change.

In the second phase of the analysis, the stakeholder system was characterised in more detail by classifying the stakeholders according to their sector, hierarchy and specific functions related to the issue. This enabled influence relationships among actors to be identified and a more detailed relational map to be constructed.

As previously mentioned, the information obtained from the focus groups revealed a total of 79 stakeholders, which can be categorised into seven main groups: U.S. actors and institutions; the Mexican government; academic and research institutions; civil society organisations; the private sector; civil protection, emergency response and security; and others.

Percentage Distribution of Stakeholder Groups



Source: Developed by Proyecto Fronterizo de Educación Ambiental with data collected in the focus groups

In the **U.S. Actors and Institutions** category, 10 actors were identified at various levels of involvement and hierarchy, representing 12.65% of the focus group's relevance. Including these actors emphasises the presence of relevant international stakeholders in both the binational and global contexts associated with current policies and perspectives on climate change. This emphasises the need for greater cross-border collaboration to address these impacts more comprehensively.

The second largest group was **non for profit and civil society organizations**, with 18 representatives — equivalent to 22.78% of the total. This indicates a reasonable level of participation and awareness in this sector regarding the importance of community action and collaboration in the face of climate change. These organizations are notable for their contributions to raising awareness, education and community mobilization, as well as for advocating in favor of the need to strengthen capacities for climate resilience. Notably, of the 18 identified actors, only Proyecto Fronterizo de Educación Ambiental was recognized as a civil organization dedicated specifically to these issues, highlighting the significant need to expand environmental education

Of the **academic and research institutions**, the highest percentage participated in the focus groups (36.4%). However, the number of influential figures identified within this sector by the total participants was lower compared to the previous two groups. Six institutions were identified, accounting for 7.59% of the total. However, this sector is so relevant because it provides essential scientific data and analysis for formulating climate change policies and strategies. Furthermore, the sector holds significant influence in terms of resource mobilization, knowledge and has substantial potential for public policy advocacy, educational training and leadership in climate resilience initiatives.

The **private sector** had a low level of participation in the focus groups, with 9.1%, and a representation rate of 10 actors (12.7%). Nonetheless, its role is key in implementing sustainable practices, technological innovation for clean energy use, and financing projects. Its participation reflected the need to establish closer collaboration with civil society and non for profit groups, government, and other coastal zone actors to promote more effective strategies to address the threats posed by climate change.

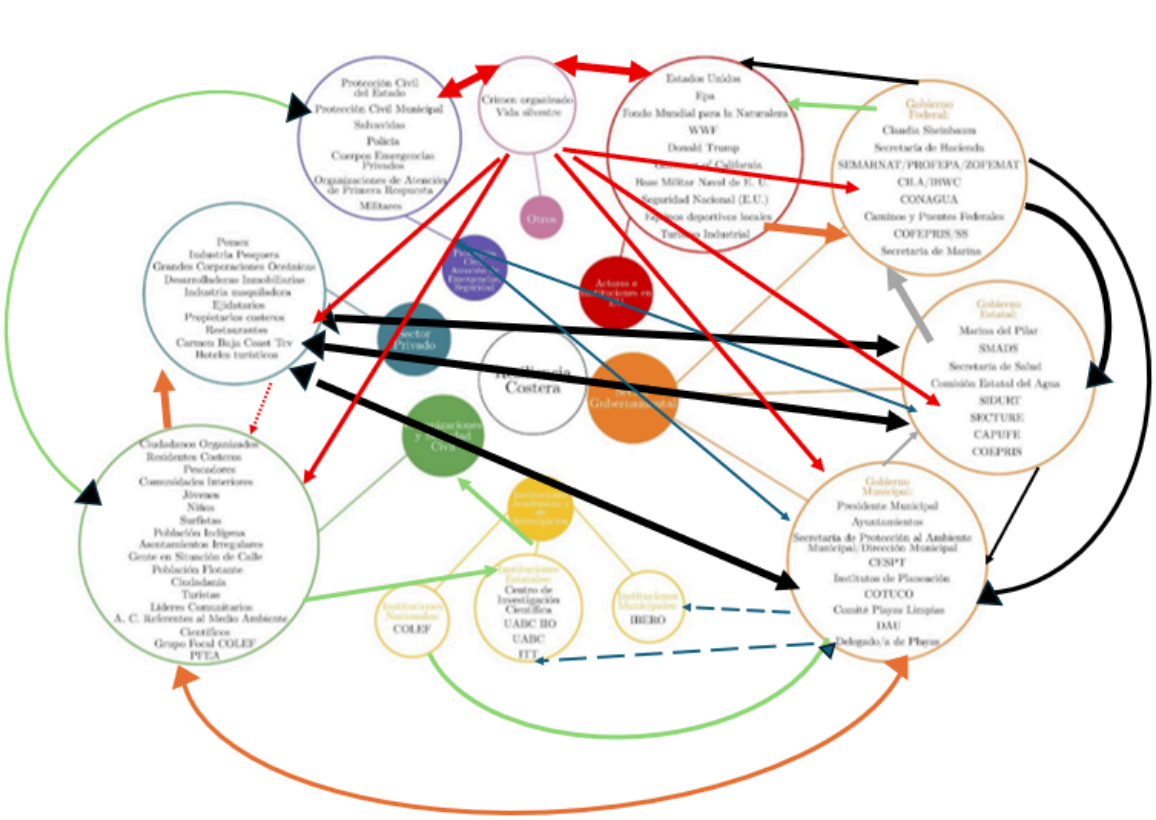
Participation was low in the emergency response sector, whose role in preventing, adapting to and mitigating climate change-related risks is fundamental. Only five representatives attended the focus groups, partly due to an earthquake which ocurred on the same day as the session and also to other urban contingencies that interfered with travel and attendance of emergency responders. Nevertheless, a

total of seven individuals in this category were identified (8.9% of the total). This group is crucial not only in disaster preparedness and response actions, but also because of its influence on how safe the population perceives the coastal zone to be, thereby strengthening risk management and resilience capacities.

Additionally, two categories grouped as **"other actors"** were mentioned, which, although not clearly fitting into the previous categories, were identified as relevant by focus group participants. One of these actors is **organized crime (drug trafficking)**, perceived as a negative influence due to its cross-cutting impact on various areas, including socio-environmental aspects. The other was **wildlife**, considered a positive agent for its role in mitigating climate change through ecosystem functions, though also vulnerable, as its disruption can exacerbate climate change vectors.

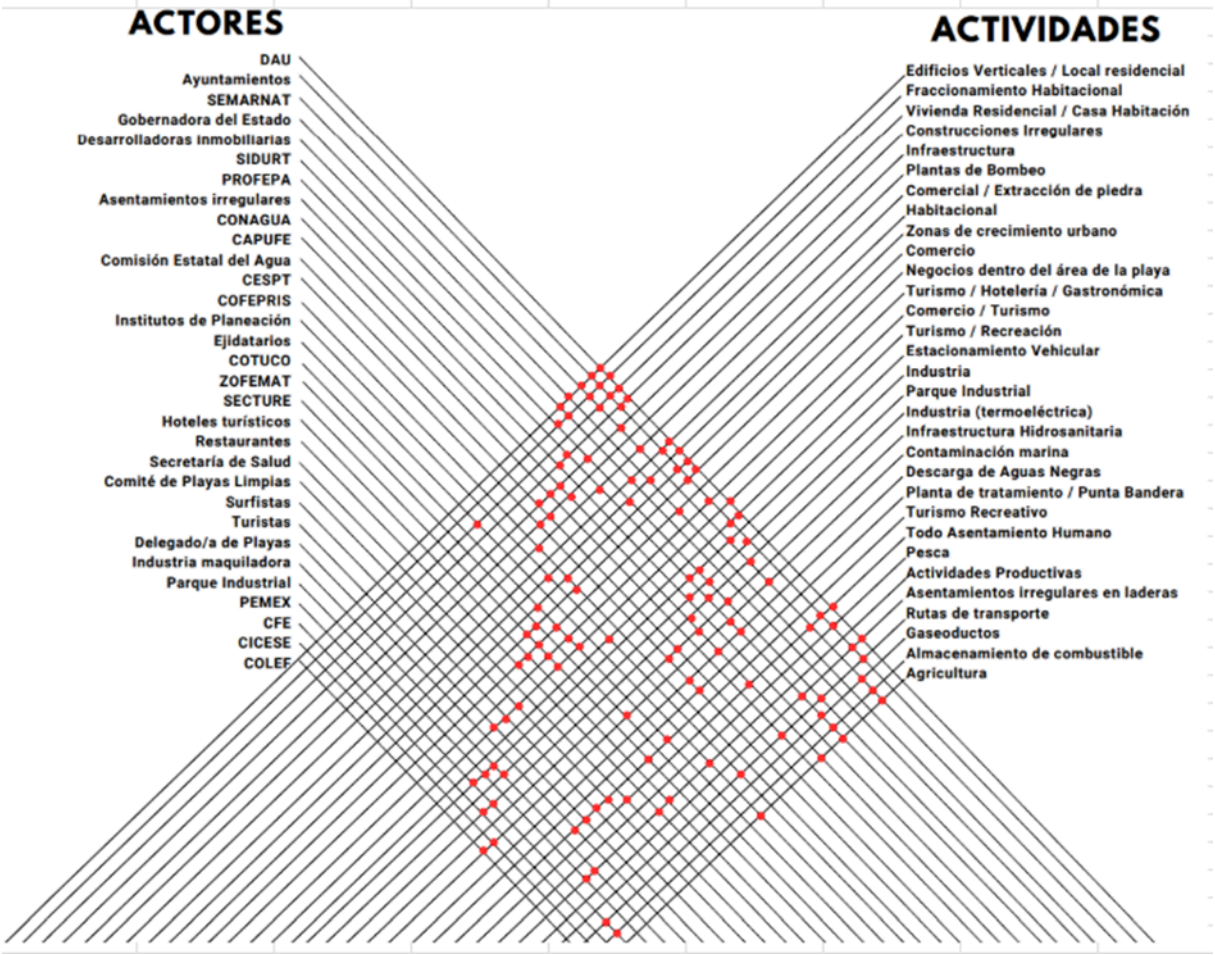
A noteworthy aspect is the absence of references to international organizations such as the **United Nations Development Programme (UNDP)**, the **World Bank**, or regional initiatives like **US EPA´s Border 2025 Program**. This suggests that the perception of climate change in the region is still fragmented, and that it is not yet being addressed as the systemic problem it is, requiring funding and technical support to enable sustained adaptation and transformation processes.

To visualize the 'influence' relationships among the stakeholders identified in the coastal zone, the levels of governmental hierarchy with the greatest decision-making power, as perceived by the participants, were considered. Additionally, the collaborative and coordination relationships between these actors, and their level of participation in formulating and executing public policies related to climate change, were taken into account. This hierarchy is represented visually through a graphic using circles of varying sizes to indicate their level in the hierarchy, the power relationships between actors and their capacity to act on climate change issues.



Source: Developed by Proyecto Fronterizo de Educación Ambiental with data collected in the focus groups

To highlight these influence relationships among actors with greater decision-making power and interest in the issue, connection lines are used to emphasize the collaboration and work coordination relationships between actors, referencing their involvement in formulating and executing public policies related to climate change. E The following graphic is a matrix of relationships between actors and activities, showing which actors are involved in which types of actions or processes within the context of risk management and coastal resilience capacity.



In the graphic, each red dot represents a relationship between an actor, (such as SEMARNAT, real estate developers or tourists), and an activity, such as residential subdivisions, marine pollution or tourism. These correlations reveal a complex network of relationships and interactions between governmental institutions and social, economic and environmental actors.

The number of red dots indicates the number of activities in which an actor is involved, revealing which actors play a central or more influential role in the system. SEMARNAT and real estate developers, for example, have numerous connections, identifying them as key actors in managing risks and impacts in the coastal territory.

On the other hand, activities that involve many actors can be seen as areas of potential conflict or in need of coordination, such as wastewater discharges,

informal settlements, or tourism. This helps identify where better planning or inter-institutional governance is required. Another aspect visible in the graphic is how the decisions of one actor can affect multiple areas, and how one activity can be influenced by various actors, which is useful for impact and vulnerability analysis of the population, and the need to establish institutional collaboration mechanisms to manage the complexity of the impacts caused by multiple actors and/or sectors.

Actors with the most relationships across different activities can be considered the most influential. Those highlighted in the graphic include: the **Secretariat of Environment and Natural Resources (SEMARNAT)**, the **State Governor**, **real estate developers**, the **Secretariat of Infrastructure, Urban Development, and Territorial Reorganization (SIDURT)**, and the **Federal Attorney for Environmental Protection (PROFEPA)**. These actors play a central role in multiple territorial activities, indicating they possess a high capacity for decision-making or influence over territorial, urban, environmental, and economic development. They bear greater responsibility for critical issues such as pollution, urban growth, and infrastructure development, and therefore, there is a greater need for inter-institutional coordination to achieve comprehensive coastal zone management and to develop resilience capacities.

An important outcome of the focus group exercise was engaging with various stakeholders, some of whom had not previously been in contact with Proyecto Fronterizo de Educación Ambiental or the subject of the study. This creates opportunities for closer groups to expand their dialogue and collaboration.

5.5 Perception of Risks and Vulnerability

In order to analyse perceived risks and vulnerability in the coastal zone, an exercise was carried out to identify activities and land uses that the participants perceived as generating hazardous or vulnerable conditions. To this end, a risk matrix was employed, prompting participants to identify all activities present in the coastal study area.

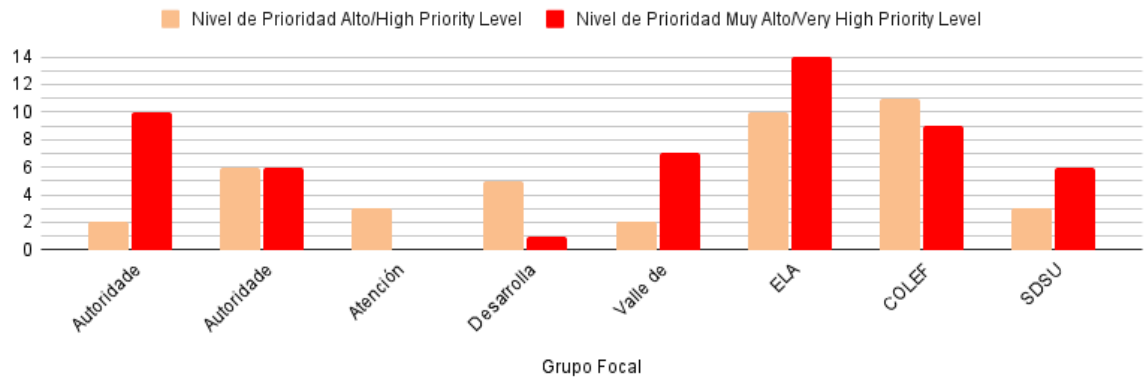
To facilitate this process, participants were provided with a list of activities that had been cross-checked against official documents, such as land use maps and census data from the study area, to confirm their presence in the coastal zone. These activities included residential, tourism and fishing uses, among others. Based on this information, participants identified activities precieved as posing some type of risk or vulnerability. They were also asked to specify the associated risk type and perceived impact level.

A reference guide was provided to help identify the risks associated with the activities previously identified. Participants were asked to identify the types of risk linked to these activities. The objective was to establish which risks were perceived as being associated with these activities.

Participants were then asked to assign a priority level of attention to each activity, taking into account its relationship with the type of risk and impact. Four levels were established: Very High, High, Medium and Low. These levels were represented by the colours red, orange, yellow and green, respectively.

The result of the exercise revealed a higher concentration in the categories assigned the "Very High" and "High" priority levels. Therefore, for the purposes of the characterization analysis, only these two levels were considered, given that these represent the set of perceived needs that participants deemed to be the most urgent and important.

Number of Activities by Priority Level and Focus Group



Source: Developed by Proyecto Fronterizo de Educación Ambiental with data collected in the focus groups

The graph results show that the academic focus groups identified the largest number of activities in the "Very High" and "High" risk priority categories, followed by the group of governmental entities.

The risk and frequency graph shows the types of risks identified most frequently by participants, indicating a greater degree of importance or relevance for them. From left to right, the graph highlights the following risks:

- Flooding: 7 mentions
- Coastal erosion: 12 mentions
- Sea level rise: 6 mentions
- Hillside instability: 11 mentions
- Soil subsidence and cracking: 14 mentions
- Landslides and rockfalls: 13 mentions

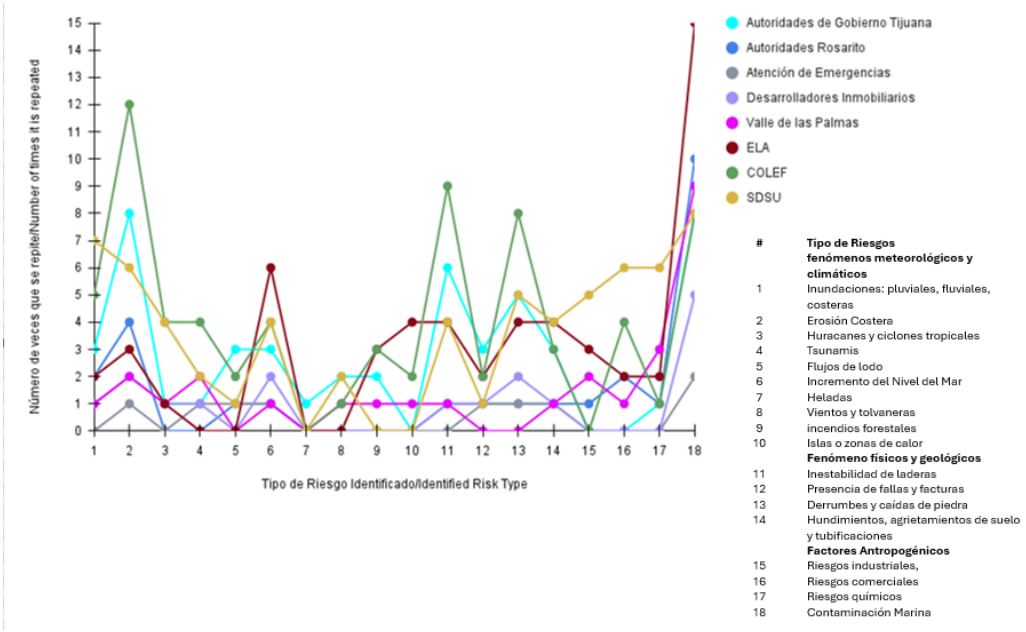
Among anthropogenic risks, coastal erosion associated with commercial uses stood out with 16 mentions, followed by marine pollution risks with 15 mentions. Among the activities identified as associated with greater risks were residential zones and vertical residential developments, commercial uses, tourism, and water and wastewater infrastructure, as well as activities by the gas company, PEMEX.

Residential housing was the activity with the most actors involved, reflecting its transversal impact on urban, social, and environmental development. Water and wastewater infrastructure was identified as a critical issue due to its relationship with marine pollution issues, requiring greater coordination between entities. In the case of PEMEX's activities in the area, it was mentioned as a conflictive activity, likely due to its association with industrial and energy activities with high environmental impact and potential risk.

The activity with most actors involved was residential housing, reflecting its impact on urban, social and environmental development. Due to its relationship with marine pollution issues, water and wastewater infrastructure was identified as a critical issue necessitating greater coordination between entities. PEMEX´s activities in the area were mentioned as source of conflict, most likely due to their association with high environmental impact of industrial and energy activities.

The importance assigned to activities and different types of risk was evident from the analysis of how frequently these risks were mentioned. Pollution risk was mentioned the most, followed by landslides, rockfall, hillside instability, coastal erosion and sea level rise.

Perception of Relevance by Risk Type and Response Frequency



Source: Developed by Proyecto Fronterizo de Educación Ambiental with data collected in the focus groups

Other threats, such as cyclones, hurricanes, tsunamis, mudflows, frosts, winds, dust storms and forest fires, were perceived as posing a lower level of risk. Within the same low range of values, heat islands received the highest valuation, along with faults and fractures.

It is worth noting that the presentation of data and results from the first stage of the project (the diagnostic study) sparked participants' interest and highlighted the need to create more opportunities for interaction among different stakeholders, in order to address these issues from a more inclusive perspective.

Reviewing coastal risks helped to identify relevant issues to be considered by the users of the coastal zone, in order to achieve better management of perceived problems and priorities regarding coastal risks. The discussions held in the focus groups demonstrated participants' ability to develop ideas on a complex issue such as climate change. This was reflected in the priority level assigned by participants to

activities with high risk and vulnerability implications, such as vertical construction, wastewater discharges and pollution.

Conclusion.The results of the stakeholder analysis reveal a complex, multidimensional and diverse composition, highlighting the specific roles and capacities of different groups in mitigating and reducing the impacts of climate change. This diversity emphasises the importance of collaboration between different sectors in developing more comprehensive and effective solutions. Interacting with actors who have different perspectives, capacities and levels of interest will be crucial for jointly addressing coastal resilience and climate change challenges..

6. Conclusions

The conclusions and recommendations for this phase of the 'One Coastal Community' project are based on the concepts reviewed and the observations made during the work with the focus groups. These conclusions are based on the results generated and the relevant elements that emerged throughout the process.

Despite the diversity of participant profiles, perspectives and nationalities across the different groups interviewed, the results from the focus groups reflect a general consensus on the relevance and importance of coastal risk management, and the need to increase resilience in the coastal study area against the impacts of climate change.

The risk analysis helped identify key aspects and relevant data, which facilitated recognition of the issues and priorities that participants perceived regarding coastal risks. The dialogues held in the focus groups demonstrated the participants' ability to discuss a complex topic such as climate change. This was reflected in the priority level participants assigned to activities with high risk and vulnerability implications, such as vertical building construction, wastewater discharges, and pollution.

Regarding the concepts of risk and vulnerability explored through the focus group discussions, it was found that interpretations of risk and vulnerability were heterogeneous. This means that, on one hand, risk is associated with physical conditions such as erosion and flooding, while on the other hand, it is linked to the lack of prevention, planning, and intervention, which are also perceived as risks when the likelihood of adverse events is increased.

The concepts of risk and vulnerability explores in the focus group discussions revealed that interpretations of risk and vulnerability were heterogenous. On the one hand, risk is associated with physical conditions such as erosion and flooding. On the other hand, risk is linked to a lack of prevention, planning, and intervention. These factors are also perceived as risks when the likelihood of adverse events increases.

Furthermore, the lack of information or awareness about coastal risks caused participants to indistinctly identify these risks as vulnerability factors, given their ability to hinder informed decision-making and expose the population to threats. A similar case was observed regarding pollution, which was considered a significant risk due to its impact on human health, the environment, and the economy.

References to the concept of risk included biodiversity loss, community fragmentation, economic deterioration, and unplanned development, such as the growth of certain fisheries.

Regarding the distinction between risk and vulnerability, it was found that participants did not clearly understand the difference between the two concepts. For example, some groups had social networks to discuss community issues but were unable to recognize their vulnerability to potential threats. This may indicate a lack of understanding of these concepts, which makes it difficult to recognize how other factors affect their organizational capacity and preparedness for certain situations. This limits their ability to define intervention priorities.

This perception highlights the need to improve the understanding of the risks posed by coastal processes and the impacts generated by activities so that the stakeholders involved could see beyond gray infrastructure as the primary viable solution.

Generally, the concept of risk carries negative connotations. However, this does not imply that people perceive themselves as vulnerable, and therefore it does not motivate them adopt safety measures or establish prevention mechanisms.

Another relevant finding was that people had difficulty categorizing risks. They referred indistinctly to risks and vulnerabilities that were not specifically associated with the coastal context. For example, they referred to pollution, extractivism, a lack of infrastructure, invasions, disinterested politicians, and a lack of environmental culture indistinctly as risk or vulnerability factors. This lack of clarity in the use of these concepts can directly influence how people address these threats.

Additionally, some participants were able to recognize a risk situation present within their community or with a neighbor, but at the same time, they were unable to recognize that this condition also affects them, assuming that implementing individual protective measures is sufficient to resolve the risks. This reflects that the concept of risk is more directly associated with issues that affect them immediately and not with other forms that help reduce individual or collective vulnerability to a threat.

Although aspects related to material security were a concern, this was not considered a priority topic in the opinion survey. Participants showed greater interest when the risks were related to health issues. In most cases, they associated solutions with public sector intervention.

A high perception of health risk was evident, particularly in focus groups held in San Ysidro and the cities of Coronado and Imperial Beach in the United States. Differences in prioritized approaches were observed on both sides of the border. In the United States, emphasis was placed on territorial planning, transportation, residential areas, and infrastructure. In Mexico, greater emphasis was given to basic needs and the immediate use of coastal territory.

This exercise helped distinguish the different conditions on both sides of the border and provided an understanding of the unique local characteristics. It helped identify professionals, researchers, and groups interested in the issue and the project, which might lead to opportunities for future collaboration between sectors and across borders. Nevertheless, the stakeholder mapping revealed the absence of formal coordination and collaborative endeavors among the disparate sectors and participating groups. For instance, real estate developers were perceived as having limited interest in risk issues, indicating a lack of commitment to risk mitigation and climate change actions. In contrast, academic sector actors stood out for showing greater positive interest than negative interest, suggesting stronger interest in climate change-related topics and the need for greater climate action from this sector.

This highlights the need to develop formal frameworks that strengthen cross sector and transborder collaboration and dialogue in various areas related to climate change issues.

Another point to highlight is that, of the total 79 identified actors, those belonging to the governmental sector were the most clearly identified by participants, reflecting

the relevance attributed to this sector in terms of its greater capacity for influencing climate resilience management.

7. Final Recommendations

The recommendations in this chapter are based on an approach combining the analysis of official and academic documents with qualitative information from the focus groups. This approach enables the identification of relevant legal and technical frameworks related to resilience and climate change. They emphasize recommendations based on the needs and proposals expressed by participating social actors. The criteria used to formulate the recommendations included alignment with the main issues of concern and risks identified by the participants, institutional capacities recognized in sectoral programs referring to compliance with the OSDs, and, of course, to contributions for reducing risks and social vulnerabilities, with an emphasis on environmental management of the coastal zone.

One important finding from the focus group work on the Mexican side of the study area is the need to align local efforts with the National Climate Change Strategy (ENCC) guidelines. This requires implementing cross-cutting adaptation measures for developing, implementing, and monitoring national climate policy. This framework is a useful guide for prioritizing local actions in all sectors and highlights the importance of formulating long-term climate strategies that strengthen the resilience of coastal zones. Therefore, one recommendation is to use the results of the coastal zone diagnosis study and the focus group exercise to create a plan for managing coastal resilience capacities in the face of climate change for the institutions and groups involved in the study area.

Similarly, it makes sense to address the Inter-American Development Bank's recommendations from 2018, which suggested promoting strategies to address climate change by increasing support from various stakeholders through participatory processes. This implies carrying out activities similar to those in this project, which aim to foster citizen participation, improve intersectoral communication, ensure access to relevant information, and promote the formation

of an informed opinion on climate change. These activities facilitate more solid and consensual decision-making.

In relation to the above, it is very important to consider that in order to reduce the gaps in participation and facilitate public access to information to improve understanding of environmental problems and coastal risks in the region, it is necessary to promote comprehensive strategies for action supported by the use of open access platforms for different interest groups. The proposal of the "One Coast Community" project aims to promote the development of open access data and information platforms that allow the inclusion of existing data in real time on water quality, coastal erosion and biodiversity, among other topics. These platforms should trigger the development of, and provide public access to, environmental studies, interactive maps and geospatial data on pollution, shoreline changes and environmental impacts. To this end, it is recommended that an academic institution or civil society organization assume responsibility for coordinating access to and dissemination of scientific data that will generate repositories of information on research work carried out by universities, civil society organizations, government and other interested groups that serve vulnerable communities.

In relation to the recommendations that emerged from the participants during the focus group exercise, there was a clear interest in organizing an informative public meeting to broaden the dialogue on this issue. To achieve a broader and more comprehensive understanding of coastal issues, greater coordination is necessary between different levels of government, social groups, and actors on both sides of the border. To this end, it is recommended that existing collaboration mechanisms be strengthened to include the participation of other social groups, such as civil associations and community organizations, to increase commitment, shared leadership, and capacity to respond to climate challenges.

In this regard, as part of the project, **San Diego Coastkeeper (SDCK) and the Border Project for Environmental Education (PFEA)** are planning an informational event, which will be either face-to-face or virtual. The results of the health survey and the perspectives derived from the focus groups conducted during this phase will be shared with different sectors at this event. This is an important step toward designing

future agendas and strategic partnerships for climate management in the coastal border region.

Regarding urban and coastal land use planning, participants emphasized the need to strengthen urban growth regulations through responsible agencies, paying special attention to urban planning, transportation route improvement, and environmental impact considerations and compensation measures. They proposed that the feasibility of new developments depend on fulfilling requirements such as providing urban services, drinking water, and adequate roads. Participants also recommended respecting land-use planning programs, zoning urban growth zones, and incorporating risk analysis as a key input for planning.

It was also suggested that residential construction and vertical buildings in the coastal strip be regulated, especially in areas with slopes, by requiring construction plans that are consistent with the level of risk. The housing deficit and the effects of migration in irregular settlements within the coastal zone should be addressed. Additionally, land regularization should be facilitated, and vigilance in granting construction permits should be reinforced.

In terms of environmental management and ecosystem protection, it was recommended that agreements be established with commercial services to improve the sanitation of wastewater discharges, implement environmental compensation measures, and enhance inspection and surveillance. The priority was to increase the load capacity of wastewater pumping plants and redirect flows to prevent direct discharges into the ocean. As part of these proposals, it was suggested that more investment be made in green infrastructure to safely convey, control, and treat wastewater. It was also suggested that environmental monitoring of municipal watersheds be strengthened and that damage to hillsides be avoided.

Regarding coastal zone protection, it was suggested to prohibit the extraction, dredging, and removal of stone materials and sand in streams and coastal zones designated for recreational tourism. Alternative spaces or relocation of extractive

activities were proposed, along with developing green infrastructure that promotes recreational and conservation spaces. It was also recommended to disseminate water quality monitoring results for consultation before engaging in recreational activities, stabilize hillside soils with live structures and environmentally friendly materials, and establish specific regulations for concrete construction.

Strict application of waste management and emissions standards was proposed, along with generating specific legislation for beach zone protection and issuing local regulations for the operation of activities in the federal maritime-terrestrial zone. This includes regulating or removing commercial activities, regulating parking, delimiting businesses in beach areas, and establishing waste collection zones.

In terms of risk management and coastal protection, the following recommendations were made: develop construction guidelines for areas with coastal erosion; prohibit buildings near the coastline; and guarantee free access to beaches. It was also suggested that the soil on slopes facing the coast be stabilized using living structures and environmentally friendly materials. Additionally, specific regulations for concrete construction were recommended.

Regarding industrial risk, the following suggestions were made: avoid installing gas pipelines in vulnerable areas; move fuel storage away from inhabited and coastal areas; carry out periodic inspections; establish firebreaks; and apply stricter standards to power plants.

In the areas of governance, regulations, and institutional control, the most common recommendation was to strengthen the enforcement of policies, laws, and regulations by implementing more effective monitoring mechanisms. Developers who fail to comply with regulations should be sanctioned, and they should be required to pay compensation or fines for environmental damage resulting from noncompliance in construction, wastewater treatment, or sanitation. Control of land use densification was also suggested.

Regarding education, participation, and environmental culture, it was stressed that urban developers must be made aware of the environmental impact of tourism and

encouraged to consume responsibly. This involves providing them with more information on the risks in the coastal zone affecting both marine life and urban development and inviting them to participate in and support the educational work of environmental associations. Expanding public policies to promote marine fauna care was also recommended.

Finally, it was suggested that campaigns be carried out to improve solid waste management in residential areas, that informative signage be placed, that emphasis be placed on controlling wastewater discharges in urban subdivisions, and that various sectors work more as a team.

The results of the stakeholder mapping highlight the need to strengthen the capacity of stakeholders who were perceived as having low levels of interest and power. In this regard, it is highly recommended that we deepen our understanding of why these stakeholders are perceived as having low interest and power, the barriers they face, and the opportunities to increase their involvement.

Some recommended actions to strengthen government institutions include providing specialized climate change training to civil servants. This would build capacity and develop leadership in local governments regarding local climate change, helping to establish clear mandates and budgets for government activities with other sectors, such as academia, the private sector, and social organizations.

Regarding the academic sector, it is advisable to establish stronger and broader links between the government and higher education institutions and researchers so that academic knowledge can inform policy and action measures for social wellbeing.

In the case of other actors such as private real estate developers, it is advisable to generate training programs for developers on urban risk prevention, resilient design, as well as the development of emerging regulations. It would also be important to make the environmental impact of urban developments visible in order to promote a positive change in the perception of little interest of developers and other actors and users of the coastal zone, based on the establishment of alliances between them.

The role of civil society organizations and groups was highlighted for their role in raising awareness among social groups through outreach and environmental education processes. Improving links with non for profit or other civil society organizations is part of the recommendations recognized at the international level. These organizations are known to have the expertise and capacity to facilitate dialogue and orchestrate effective collaboration mechanisms with other actors to generate education processes on climate resilience, create mixed (public-private) funds, disseminate information and open source environmental data, and other initiatives that favor the actions of those who contribute to coastal resilience.