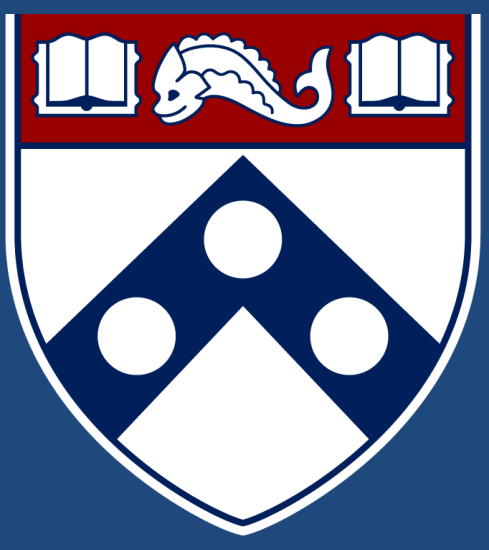


# Perceptions of climate change risk in community members of Puerto Baquerizo Moreno, San Cristobal, Galapagos



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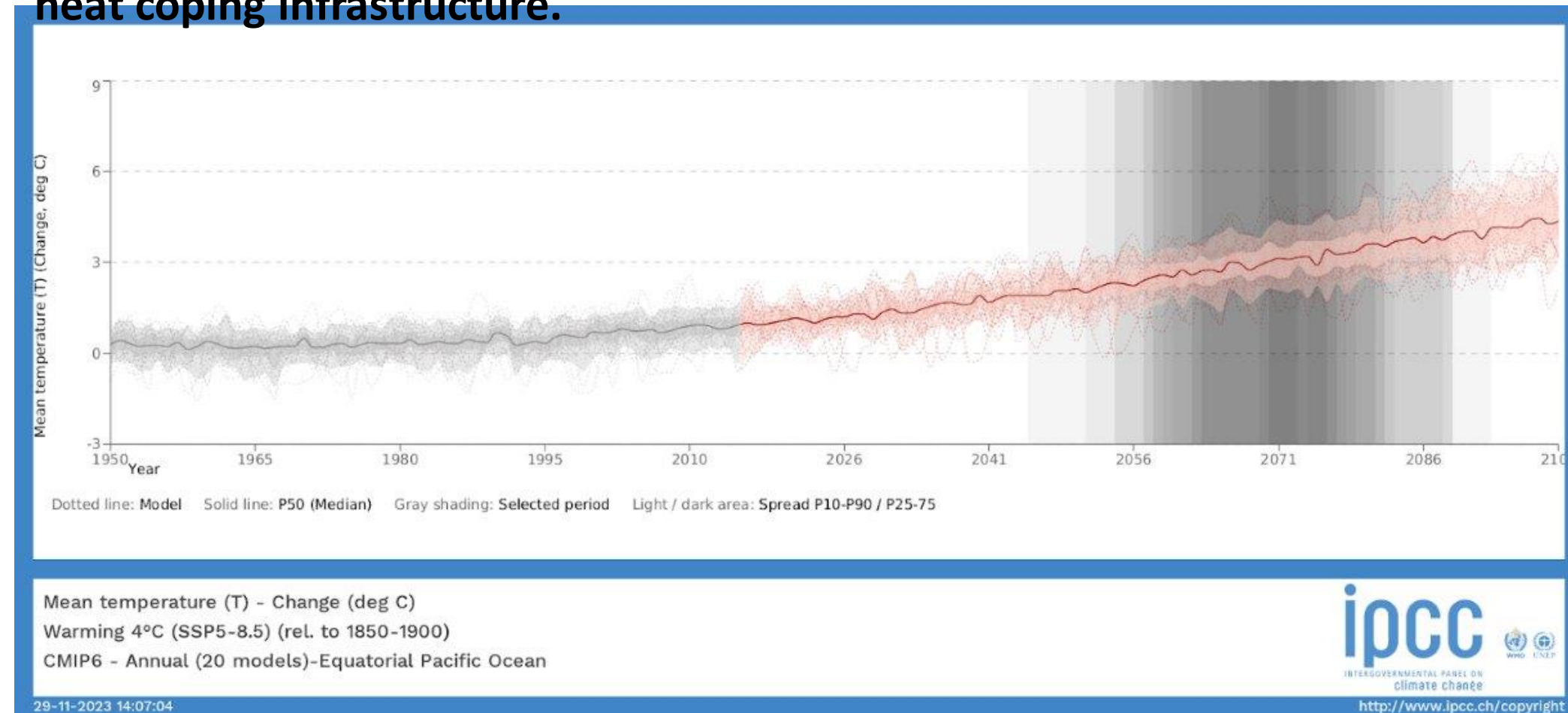
## Abstract

As global temperatures rise, the frequency and intensity of precipitation, heat, and drought are projected to increase in the South American Pacific region. However proper adaptation planning can only be done by bridging the gap between broader scientific models and local perceptions of climate change impacts. Through the collection of oral histories on the island of San Cristobal, Galapagos, the goal of this project was to understand what kinds of challenges they have faced regarding severe rainfall and heat to identify key vulnerabilities, attitudes towards risk, and coping strategies.

Most respondents were aware of the possible risk of extreme rainfall, particularly after experiences with high precipitation during El Niño (ENSO) years. They were primarily concerned about damages to private property and infrastructure. Some responses suggested an earlier arrival of the hot season, lack of air conditioning or ventilation in houses and worry for others, particularly vulnerable groups. There is some discrepancy between the local perception of risks and vulnerabilities and institutional responses to rainfall and extreme heat. The reliance on community help over institutional responses suggests the need to increase resources for institutional adaptation measures.

## Background

- The Galapagos is an archipelago located 972 km west off the coast of Ecuador, that due to its geographic location in the Equatorial Pacific, is expected to experience rising temperatures and shifting seasonality as the climate changes.
- Only four islands allow permanent settlements, of which, San Cristobal hosts the provincial capital, Puerto Baquerizo Moreno. 97% of land is protected under National Park, limiting urban expansion and agricultural production.
- Climate vulnerability is exacerbated by the topography of the island, with **ravines or encañadas** that cross town and tend to overflow, lack of stormwater and heat coping infrastructure.



- Mean land surface temperatures in the Islands have increased by about 0.6°C since the early 1980s (Paltán et al., 2012), with projections showing that they will increase by an additional 2.5°C by the 2070s (IPCC, 2018).
- Economic reliance on tourism, dependence on mainland for imports and planning conflicts between National Park, national and local authorities hinder climate change adaptation planning.
- Participatory climate change adaptation is necessary to address current gaps and downscale the predicted effects of different emissions scenarios.

## Methods

- In the summers of 2022 and 2023, I conducted field visits to *encañadas* across town, the town landfill and infrastructure projects for climate adaptation.
- A semi-structured interview protocol was drafted with three thematic axes that emerged from the literature: extreme rainfall, heat, and El Niño (ENSO) oral histories.

Number of Interviews (2022-2023)	24
Age Range	31-72
Age Median	56
Time in San Cristobal Range	8-72
Time in San Cristobal Median	28
N Men - N Women	14 - 10
%Men - %Women	58% - 42%
# of Occupations Sampled	17
Number of Neighborhoods Sampled	11

Figure 2. Demographic information and metadata for all 24 interviews.

## Data Analysis

- Interviews were transcribed and coded using MAXQDA. The first round of line-by-line coding yielded 181 In Vivo, process and descriptive codes. The frequency of most common codes can be visualized in the following word cloud.

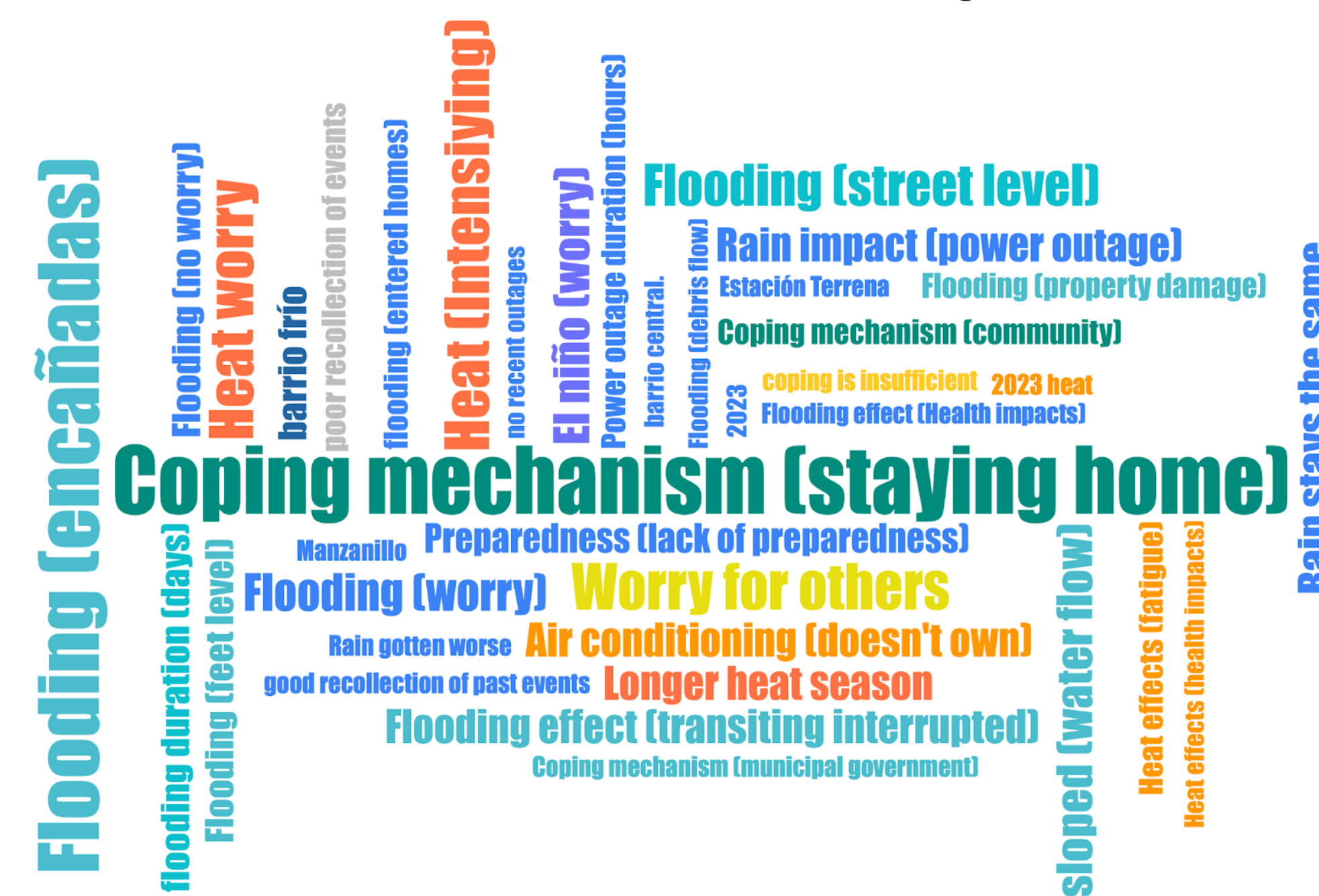


Figure 3. Word cloud of most commonly used themes after first-line coding. The graph was generated by the author using MAXQDA's Code Cloud tool.

- With these preliminary codes in mind, a codebook, was developed to identify broader themes in longer segments centering around rainfall, heat, seasonality and coping strategies.
- The frequency of themes and sub-themes was quantified, and correlation with different demographic variables such as age, years living on the island, economic activity, and neighborhood was calculated.
- Frequency tables for each of the three sections were created using Excell

## Results

### Rainfall

- Memories of intense rainfall events include instances of physical harm, economic losses, and property damage, particularly in 1983 and 1997-98 El Niño years.
- Infrastructure has been improved since, but concerns persist, particularly in neighborhoods closer to water bodies or in the peripheries of town.
- Recent rainfall events in 2015 and 2016, while not as especially damaging, have exposed houses and unpaved roads.



Figure 4. Pictures of dirt paths crossing encañadas, houses built within risk zones and flooded areas. Taken in 2023.

### Heat:

- Respondents perceive a more intense hot season in recent years.
- They worry about health impacts, particularly for vulnerable populations like children, senior citizens, and people with disabilities.
- A lack of infrastructure like air conditioning poses challenges, leading to makeshift coping strategies.

### Seasonality and coping strategies:

- Less predictable seasonality, with worries about changing growing patterns.
- Coping mechanisms include staying at home and community help to mitigate flooding.
- Lack of cooling systems and green public spaces exacerbates heat-related challenges, highlighting the need for participatory adaptation planning.

## Conclusions and limitations

- The vulnerabilities identified by community members can complement the institutional adaptation process, which requires the improvement of communication channels between stakeholders.
- The data collected, while not generalizable due to its small size, shows indications of discrepancies between risk mitigation and adaptation goals and the lived reality of the population.
- Further research must incorporate participatory processes into climate change adaptation planning to ensure equitable and efficient adaptation measures, as called by the IPCC (2022)

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