



# CLIMATE & MOBILITY IN **COSTA RICA**

A Case Study for the Greater Caribbean Climate Mobility Initiative



Global Centre for  
Climate Mobility



Greater Caribbean  
**Climate Mobility Initiative**  
Enabling People Positive Adaptation Journeys



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# Costa Rica Snapshot

## Study Locations

**Santa Maria de Dota** - Situated in San Jose province of Costa Rica, approximately 30 kilometres south of the capital (also San Jose), Santa Maria is a rural district of the Dota canton. It is a pivotal area for coffee production, and houses a significant population of migrant labourers from Panama and Nicaragua in particular. Climate change impacts in the area have altered production cycles and labour dynamics, as mobility patterns – both internal and international – are predicted to shift. Other nearby districts include **San Marcos de Dota** and **San Rafael de Dota**, both framed by research participants as sites of destination of internal and regional mobility patterns.

**Tarrazú** - Another canton in the province of San Jose, the main city of which is San Marcos. This area witnesses similar impacts at the intersection of climate change, coffee production and labour mobility.



Map 1. Map of Costa Rica showing areas where research was conducted. Image credit: Samuel Hall 2024.

# Key Findings

1

Close to 52% of Santa Maria respondents and 58% of those in Tarrazú reported being from the areas where they currently live, while the majority of participants with lived experiences of migration and/or displacement had moved internally from other parts of the country.

2

Climate impacts were widely perceived and experienced across research locations, with 89% of respondents in Costa Rica having heard of climate change, while 85% of respondents reported seeing the impact of climate change in their daily lives.

3

The decision-making nexus observed in Costa Rica was strongly biased towards staying, with migration framed as a last resort.

4

While climate change was widely perceived as having a direct impact on the daily lives of residents – including in terms of their health and livelihoods – the majority of respondents in Tarrazú (78%) and Santa Maria de Dota (75%) indicated that they had no plans to move, nor did they wish to do so.



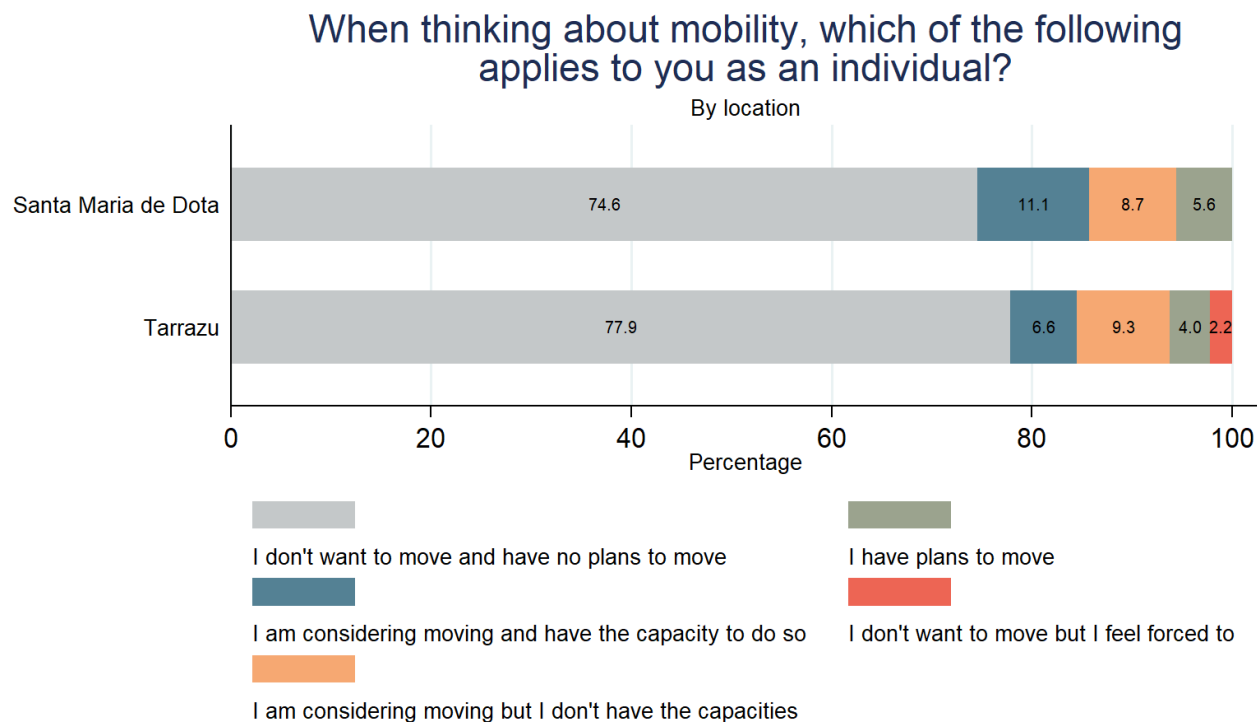


Figure 1. Mobility intentions and future decisions



Image 1: Talamanca mountains, Santa Maria de Dota, Costa Rica. Photo Credit: Ernesto Guevara Porras, 2024.

# Introduction

## Project Background

Samuel Hall, a research organisation specialised in migration and displacement, undertook research to address the critical issue of climate-induced human mobility in the Greater Caribbean region, assessing in particular how climate-related factors influence people's decisions to migrate or to stay and their resulting lived experiences.

This project is part of the Greater Caribbean Climate Mobility Initiative (GCCMI), a partnership of the Global Centre for Climate Mobility (GCCM), the Association of Caribbean States (ACS), the World Bank, the UN Development Programme (UNDP), UN Disaster Risk Reduction (UNDRR), UN Framework Convention on Climate Change (UNFCCC) and the International Organization for Migration (IOM). It aims to inform strategies for enabling people-positive adaptation journeys by strengthening adaptive capacities, supporting mobility and addressing climate-forced displacement in the region. The conceptual framework, based on Carling's ability/aspiration model developed for the African Climate Mobility Initiative (ACMI) was adapted for the GCCMI to focus on factors that shape people's vulnerability to climate change and their decision-making.

By collecting data in frontline communities affected by climate-related events, the findings from this field research complement the results of the Greater Caribbean Climate Mobility Model, which projects climate-induced movements up until 2050. SH engaged with the modelling efforts during the simultaneous research phases, and both teams shared their results to ensure synergy and alignment. The research findings were presented during the GCCMI stakeholder consultations in May 2024 and will inform the GCCMI's Greater Caribbean Climate Mobility Report.

## Methodology

Location	<p><b>Six Association of Caribbean States (ACS)</b> member countries in the Greater Caribbean region, chosen for their diverse climate events and mobility patterns.</p> <ul style="list-style-type: none"> <li>• Costa Rica</li> <li>• Suriname</li> <li>• Colombia</li> <li>• Jamaica</li> <li>• The Bahamas</li> <li>• Antigua &amp; Barbuda</li> </ul> <p>Two neighbouring districts in Costa Rica, selected to represent a diverse mix of (semi) urban and rural settings, both origin and destination areas for displaced populations, and regions experiencing a range of climate-related impacts.</p> <ul style="list-style-type: none"> <li>• Santa Maria de Dota</li> <li>• Tarrazú</li> </ul>
Selection Criteria	<p>Mainland country, key economic sectors affected by climate change (tourism, agriculture), extreme weather events (storm,) and slow onset events (sea level rise, droughts).</p>
Key Phases	<p>Desk review and research design, data collection and analysis, consultations and reporting (September 2023- September 2024).</p>
Research Tools	<p>370 household surveys, four focus group discussions, and four in-depth interviews with key informants were conducted to examine the relationship between migration and climate, focusing on mobility features, climate change adaptations, and the impact on decision-making.</p>

Further information on site selection, methodology, and regional findings can be found in the synthesis report.

## Note on data collection and localisation

A local Costa Rican search team led by Samuel Hall staff conducted fieldwork in Costa Rica in February 2024, in the province of San Jose, focusing on the areas of Santa Maria de Dota and Tarrazú. A total of 355 household surveys were conducted with community members and four focus group discussions and one semi structured interview were organised with 11 participants from the sample area, including women, youth, students, farmers, local business owners and activists. In depth interviews were conducted with three key informants representing relevant institutions and civil society groups.



The study aimed to understand the full range of mobility outcomes for populations in the Greater Caribbean region affected by climate change, examining the degree to which these outcomes are climate-related, how climate mobility interacts with other mobility dynamics, and the perceptions of those who have moved due to climate impacts. Throughout the data collection, Samuel Hall's team implemented a localisation approach, encouraging local researchers to lead the process and for communities to define the study's concepts themselves. A localised approach ensures that the research process and outcomes are adapted to the needs of the affected communities in the study.

## Note on contextualisation

This study offers an in depth exploration of two selected communities in each of the selected six countries. Given the limitations on timeframe and scope, the findings do not represent the perceptions of the entire communities, countries, or the region as a whole. Rather, they provide a snapshot into the experiences of individuals and households experiencing the impacts of climate-related factors on their life decisions. All findings should therefore be contextualised to each specific location's dynamic and features. Additional fieldwork within each country would offer a more comprehensive view, and additional country case studies would provide a deeper comparison within the region.



Image 2. Local enumerator team in Santa Maria de Dota, Costa Rica. Photo credit: Ernesto Guevara Porras, 2024.

## Key terminology and concepts

Climate Change	"Long-term changes in the Earth's climate that are warming the atmosphere, ocean and land. Climate change is affecting the balance of ecosystems that support life and biodiversity, and impacting health. It also causes more extreme weather events, such as more intense and/or frequent hurricanes, floods, heat waves, and droughts, and leads to sea level rise and coastal erosion as a result of ocean warming, melting of glaciers, and loss of ice sheets." <sup>1</sup>
Climate Adaptation	"Actions that help reduce vulnerability to the current or expected impacts of climate change like weather extremes and natural disasters, sea-level rise, biodiversity loss, or food and water insecurity." <sup>2</sup>
Climate Resilience	"Resilience is the capacity of a community or environment to anticipate and manage dangerous climatic events and recover and transform after the ensuing shock, with minimal damage to societal wellbeing, economic activity, and the environment." <sup>3</sup>
Vulnerability	"The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to be affected by the impact of hazards." <sup>4</sup>

1 United Nations Development Programme (UNDP). "Climate Dictionary: An Everyday Guide to Climate Change." <https://www.undp.org/iran/news/climate-dictionary-everyday-guide-climate-change>

2 UNDP. "Climate Dictionary: An Everyday Guide to Climate Change."

3 UNDP. "Climate Dictionary: An Everyday Guide to Climate Change."

4 United Nations Office for Disaster Risk Reduction (UNDRR). "Vulnerability." <https://www.undrr.org/terminology/vulnerability>



# Context & Profiles

Climate change amplifies and exacerbates certain pre-existing climate risks and related short-term, disaster-driven mobility dynamics; while further re-shaping key economic sectors and associated labour migration patterns in Costa Rica.

Situated in the Caribbean region of Central America, Costa Rica stretches over 51,100 km<sup>2</sup>. The country's varied topography is characterised by coastal plains, separated by mountainous areas, and bordered by the North Pacific Ocean and Caribbean sea. The population was estimated at 5,180,829 in 2022, 80% of which is found in urban areas, a proportion expected to increase to 90% by 2050.<sup>5</sup> The following subsections provide an overview of climate change impacts and related mobility dynamics in Costa Rica, before moving on to the profiles of study respondents.

## Locations Profile: Climate Risks and Mobility Dynamics

**Climate impacts drive internal displacement.** From the outset, Costa Rica's vulnerability to climate impacts stems from its location at the intersection of two highly active tectonic plates, which increases the incidence of earthquakes, which combine with heavy rains and flooding to raise the risk of landslides.<sup>6</sup> Overall, the IDMC attributes 59,000 internal displacements in Costa Rica to 46 disaster events between 2008 and 2022, the vast majority of which are the result of storms (30,000) and floods (26,000).<sup>7</sup>

<sup>5</sup> World Bank Climate Knowledge Portal. "Country Costa Rica." <https://climateknowledgeportal.worldbank.org/country/costa-rica/vulnerability>

<sup>6</sup> IOM (2021), Human mobility caused by disasters and climate change in Central America.

<sup>7</sup> Internal Displacement Monitoring Centre (IDMC). "Country Profile Costa Rica." <https://www.internal-displacement.org/countries/costa-rica>

Past research has confirmed that these geographic factors interact with certain characteristics of the Costa Rica economy, whereby the country is **classified by the World Bank as “highly vulnerable to extreme climate events and natural hazards”**.<sup>8</sup> This vulnerability notably stems from the presence of communities in high risk areas (e.g. for landslides and earthquake damage), as well as the high risk of SLR to the country’s coastal regions. Key at-risk coastal areas underlined by the World Bank include Jaco, Puntarenas, and Puerto Limón.<sup>9</sup>

**Segments of the population are particularly vulnerable to certain types of climate events (notably in terms of mobility outcomes), as identified by IOM.** Overall, high vulnerability groups include Indigenous children and women, small scale farmers, individuals living in poverty, coastal and fishing communities, as well as other individuals residing in at-risk areas. However, additional groups specifically vulnerable to hurricanes include: (1) rural and urban communities; (2) for flooding: urban communities in informal settlements, as well as afro-indigenous and indigenous communities; and (3) for SLR: indigenous women and migrants.<sup>10</sup>

Accordingly, with the exception of SLR, this brief overview of past research **reveals a focus on rapid-onset climate events – and resulting disaster impacts.** This notably highlights the relevance of conducting research, as was done in the context of this study, focusing on rural, inland communities impacted by slower-onset events, in order to fill key information gaps in the Costa Rican climate mobility context. Mobility actors such as UN agencies also acknowledged this area is understudied in Costa Rica.



Image 3. Santa Maria de Dota town square, Costa Rica. Photo credit: Ernesto Guevara Porras, 2024.

8 World Bank (2023), Climate Change Portal: Costa Rica.

9 World Bank (2023), Climate Change Portal: Costa Rica.

10 IOM (2021), Human mobility caused by disasters and climate change in Central America.

## Respondent profile: socioeconomic and migration characteristics

Respondents	355 Survey Respondents
Age	49 Years
Gender	43% Women, 57% Men
Household Composition	An average household size was 3.4 household members, 42% of the respondents were married, 26% single, 12% divorced, and 11% in a civil union.
Education Level	47% completed primary schooling; secondary schooling more common in Tarrazu (25%) than in Dota (18%); more respondents in Dota (23%) had higher education degrees than in Tarrazu (14%)
Housing	59% live in concrete housing 23% in mobile or prefabricated houses 10% wooden housing
Employment	41% worked in permanent jobs , 38% did not work, 13% engaged in seasonal jobs in Santa Maria vs Tarrazu (7.5%)  Women less likely to have a permanent job (34%) when compared to men (51%),
Occupation	12% and 13% in Santa Maria and Tarrazu working in agriculture, fishing, and herding activities
Remittances	Half of those with family working away receive money back home.
Government Pensions	37.5% in Santa Maria; 29% Tarrazu as source of income





Image 4. Survey respondents at their home, Santa Maria de Data, Costa Rica. Photo credit: Ernesto Guevara Porras, 2024.



Image 5. Focus group discussion in Santa Maria de Data, Costa Rica. Photo credit: Ernesto Guevara Porras, 2024.

## Migration profile

**Most residents are long-term locals.** Close to 52% of Santa Maria respondents and 58% in Tarrazú reported originally being from the locations in which they currently reside, and were thus considered non-migrant community members. Among those having migrated to the current location of residence, the majority had already been present for significant amounts of, with almost 30% in Santa Maria and slightly more than 30% of respondents in Tarrazú having moved to the area between 10 and 20 years ago. In Santa Maria, a considerable share of respondents have a more recent migration history with 11% having migrated in the past 1 to 5 years and 6% in the past year. Conversely, in Tarrazú, less than 10% report having moved in the past 9 years.

**Family drives migration decision making significantly.** Overall, 27% of respondents with lived experiences of mobility had moved alone, while 59% relocated to the area with their entire household, and 14% with part of their household only. There are no statistically significant differences between the two study locations in this regard. When it comes to the main reasons for past migration, 1 in 2 respondents reported family-related causes, followed by 41% of interviewees who reported economic and work-related factors to be the key drivers.

Finally, of the **respondents that grew up in a different area before moving to the research locations**, most had been raised in rural areas, including 58% of those in Santa Maria and 64% of those in Tarrazú. 26% of those in Santa Maria and 28% in Tarrazú migrated from urban settings.

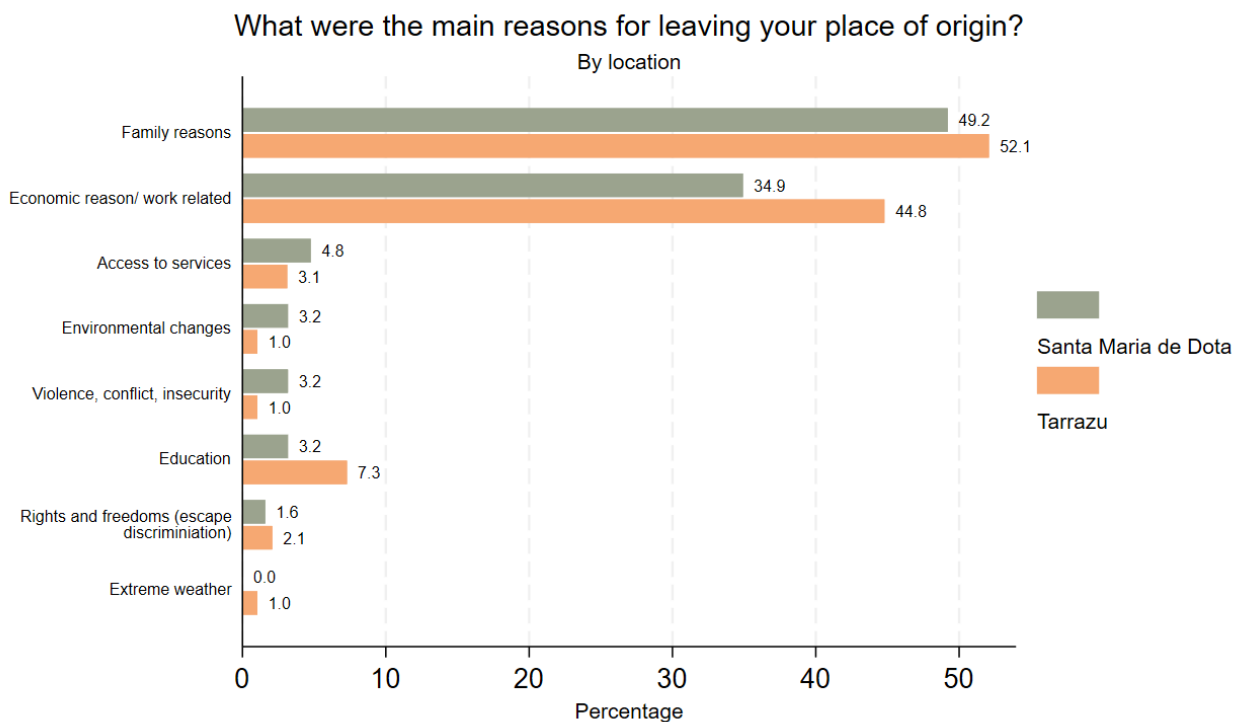


Figure 2. Reasons for leaving community of origin



**Mobility dynamics have significantly shifted over time.** General mobility dynamics - not necessarily tied to climate change – in both research locations had undergone significant historical shifts over the past several decades. These tended to be described in phases. The first of these occurred between 50 to 60 years, whereby individuals would migrate to the United States, before eventually returning to invest in local coffee businesses.<sup>11</sup> This was reportedly followed by a second phase, during which prior forms of migration ceased being economically viable, and the coffee industry became increasingly dependent upon remittances, alongside returns to Costa Rica.<sup>12</sup>

**International migration serves as an adaptation strategy.** International migration – and remittance support – were therefore used as adaptation strategies implemented on a poly territorial basis, whereby relatives worked together across borders in order to ensure their subsistence, ultimately mitigating the need to move among family members remaining in Costa Rica. Finally, a third phase characterised by circular (temporary) labour migration, often to the United States and back.<sup>13</sup> Participants also reported that migration trends used to be distinctly gendered with outbound migrants being male, although this is reportedly no longer the case due to increasingly restrictive processes involved in obtaining a visa for the U.S.<sup>14</sup>

**The coffee industry drives regional mobility.** Labour – driven by the coffee industry, is now the dominant driver of mobility in the area, with Dota now entirely reliant upon international migrant workers from Panama and (to a lesser extent) Nicaragua to sustain production;<sup>15</sup> as well as internally mobile workers from the south of the country. A significant proportion of these workers are from Indigenous communities in neighbouring countries<sup>16</sup>; and from the Ngäbe and Buglé indigenous groups in Costa Rica. Finally, higher education, combined with limited job opportunities and a reticence to work in the coffee industry are key out-drivers of migration, particularly among the youth of Santa Maria de Dota and Tarrazú, with key destinations in this regard being San Jose and the United States.<sup>17</sup>

## Household profile

**Assessing perceived migration capacities is a key objective of this study.**

Most **Costa Rican respondents reported feeling financially secure** insofar as they could keep their current job so long as they wished to do so (76%). When asked if they had an alternative source of regular income throughout other periods of the year, 30% of all respondents reported being engaged in additional seasonal work in agricultural production, an income source prone to being affected by changes in weather patterns.

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11 FGD1

12 FGD1, FGD3

13 FGD3

14 FGD3

15 FGD1, FGD2

16 FGD3

17 FGD1, FGD2, FGD3

**Most respondents feel financially secure.** Many were positive about their financial situations, although around 1 in 5 reported difficulties, indicating different levels of financial capacities to respond or prepare for climate change impacts. When asked about the current financial situation of their households, the vast majority of respondents across locations reported living comfortably or very comfortably (65%), with no major differences between Santa Maria and Tarrazú. 21% of sample respondents answered that it was either difficult or very difficult to get by (Figure 3).

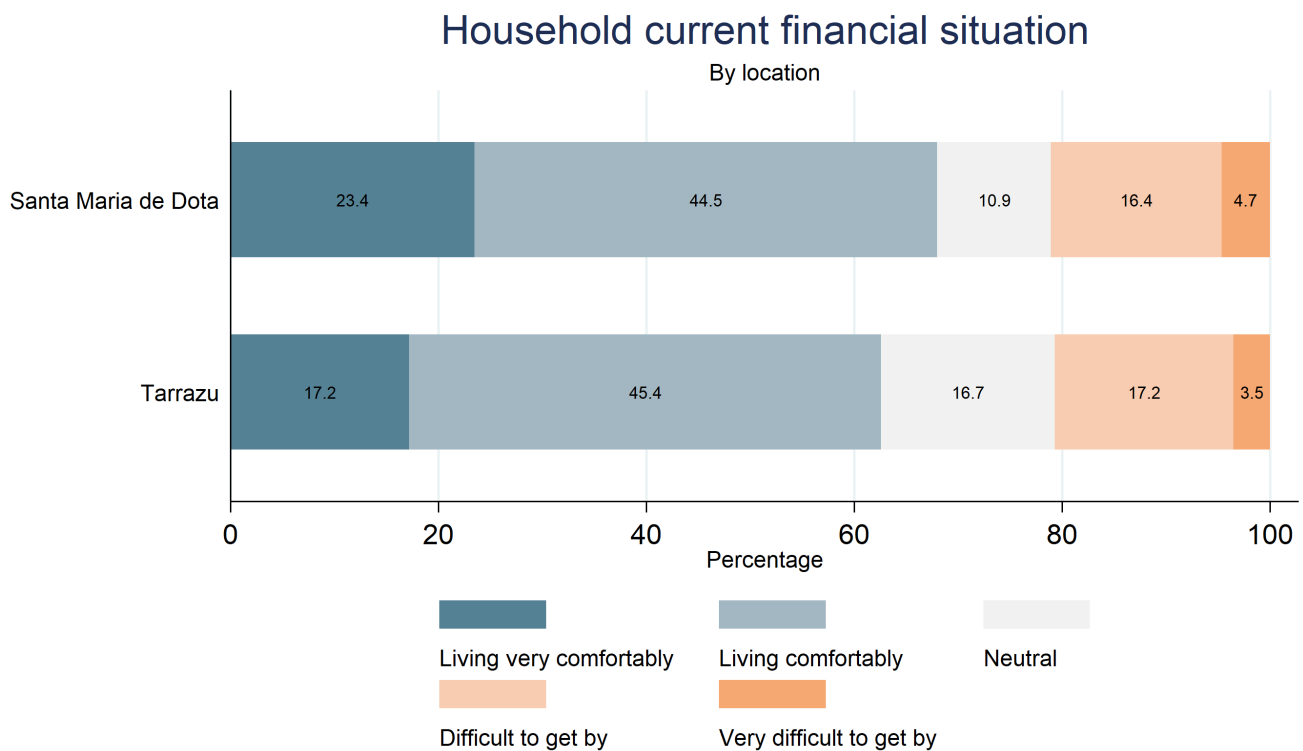


Figure 3. Financial situations of households

**Respondents' income is relatively stable.** Unsurprisingly in light responses to their current financial situations, the majority of respondents in Santa Maria and Tarrazú reported having a stable and predictable income from month to month. In Santa Maria however, respondents were more likely to report their income to be consistently stable and predictable (64%), whereas in Tarrazú respondents were more likely to report incomes as mostly or always unstable (24%). Non-migrant respondents were more likely (82%) to report having always or mostly stable incomes than migrant respondents (74%).

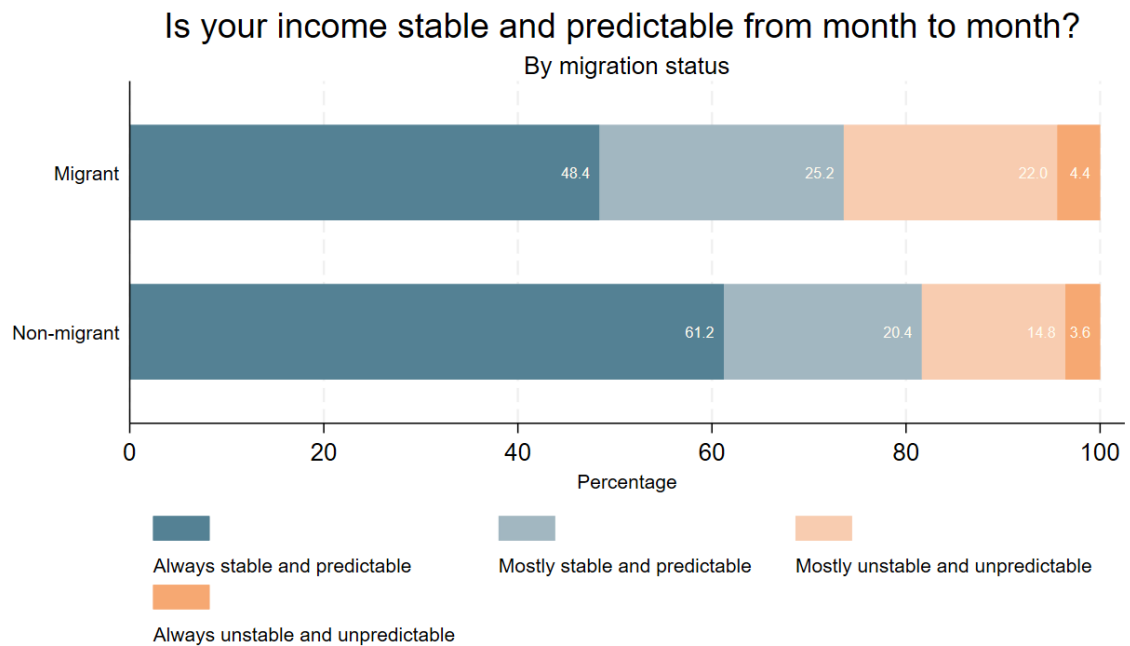


Figure 4: Household income stability and predictability (migrant v non-migrant)

**Most respondents own their homes and feel secure to stay.** The survey found that most respondents (80%) live in owned dwellings, with 16% renting. Non-migrants were more likely to be living in homes that they own (Figure 5). Housing types showed little variation across locations, and very few lived in huts, shacks, apartments, mud houses, townhouses, or duplexes. A small portion of respondents reported living in small spaces resulting in overcrowding in their homes and a few reported their homes were inaccessible for persons with mobility difficulties or disabilities. Overall however, 97% of respondents reported having the freedom to remain in their homes indefinitely.

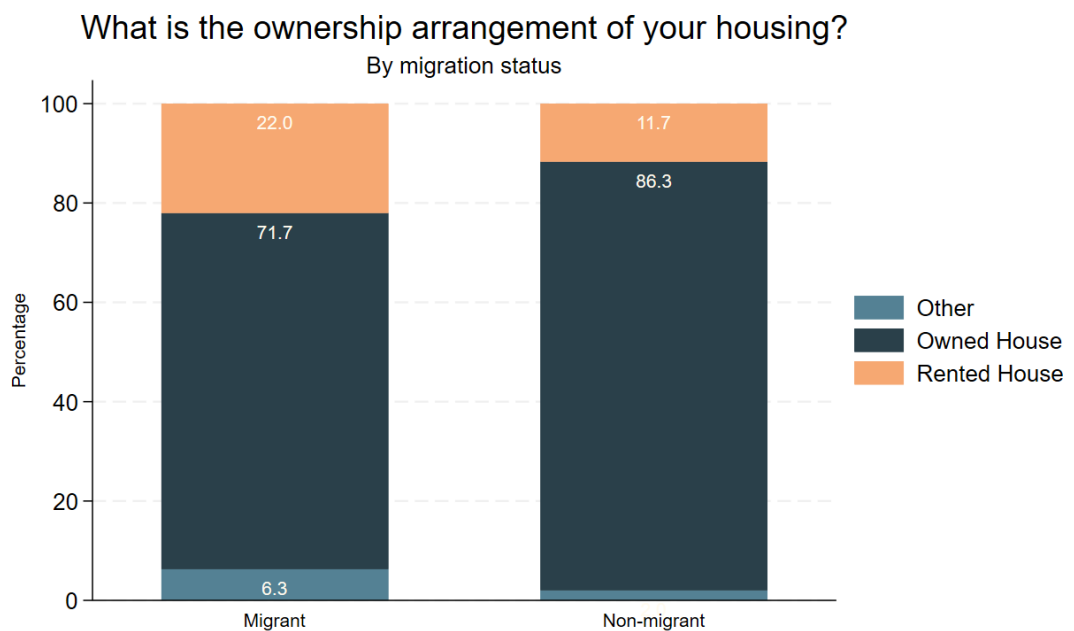


Figure 5: Housing ownership arrangement (migrant v non-migrant)

**Respondents and participants were keenly aware of the risks and impacts of climate change.** Climate impacts were widely perceived and experienced across research locations, 89% of respondents in Costa Rica having heard of climate change, while 85% of respondents reported seeing the impact of climate change in their daily lives.

Along these lines, and in light of the socio-economic dimensions communicated via survey responses presented above, **these findings point to a high adaptation capacity among residents of these areas.** This said, the sample of participants and survey respondents may not be representative of local communities, particularly when it comes to (indigenous) migrant labourers, who may be much more vulnerable to climate change impacts – and much less capable to adapt – than local, host community members.

**Religious and cultural perspectives significantly shape community responses and understandings to climate change.** Reticence to participate among members of these communities stems from a range of factors including long work hours (and therefore less availability to participate), as well as cultural and linguistic barriers. This said, the fact that a number of participants expressed their understanding of climate change – and by extension reality – through religious terms also may mitigate willingness to understand climate change as a harmful, anthropogenic phenomenon (but rather as a predetermined occurrence beyond human control).



Image 6. Household survey data collection in Tarrazú, Costa Rica. Photo credit: Nicole Stoumen, Samuel Hall, 2024.

# Climate-related Challenges & Impacts

## Climate Challenges and Vulnerabilities

Disasters frequently impact coffee-dependent communities. Within the areas of study which were predominantly inland and rural economies dependent on coffee production, around 1 in 3 respondents (32%) reported that their households had been affected by disasters frequently, and nearly 30% reported being affected by such events occasionally.

There were no significant differences in the reported frequency of climate events between the two study locations, namely Santa Maria and Tarrazú, due to their being situated in relatively close proximity to one another.

Climate events predominantly damage agricultural produce. Tarrazú also reported significant impacts from land degradation and tropical cyclones, whereas Santa Maria faced challenges primarily from drought and land degradation. A more detailed breakdown of these – and other – weather events is presented in the accompanying graph (Figure 6).



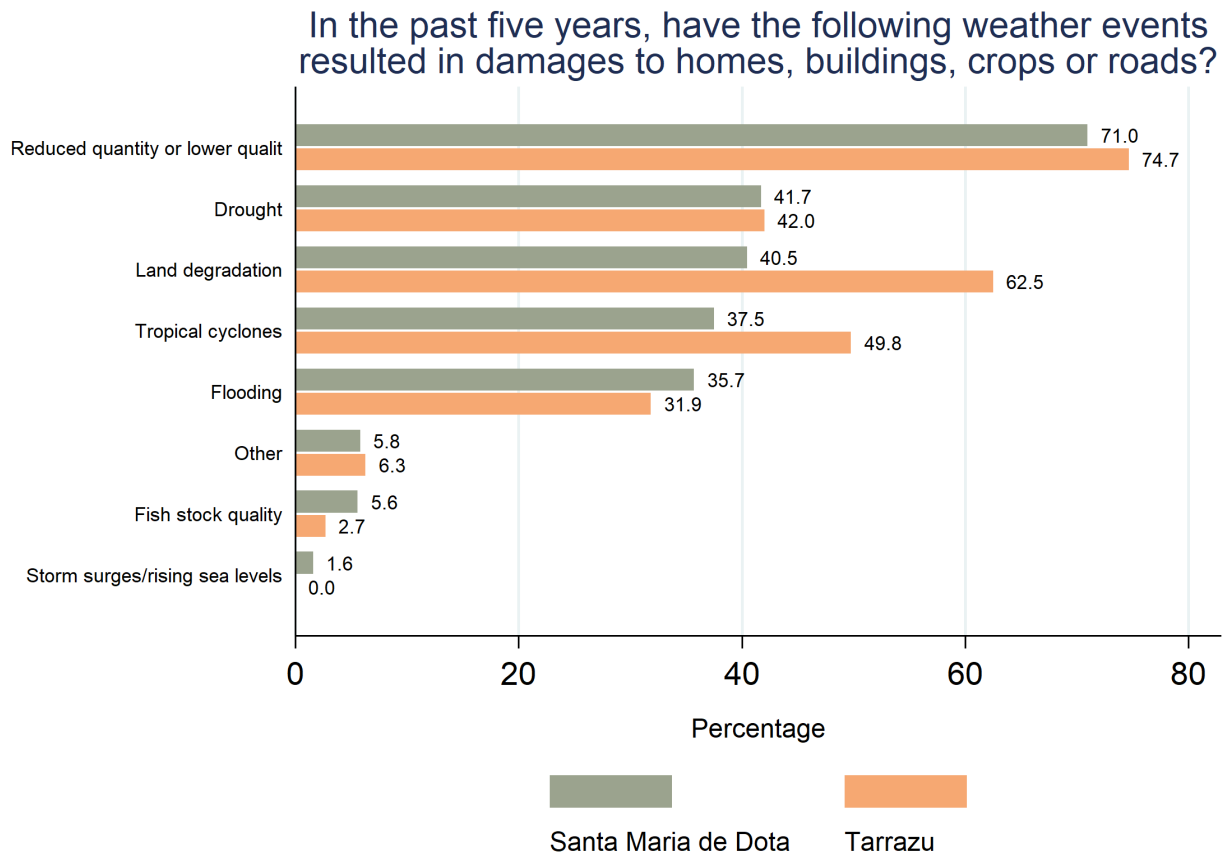


Figure 6. Weather events or phenomena resulting in damages, as reported by respondents.

**Climate predominantly impacts quality of fish stocks, biodiversity, and local ecosystems (Figure 6).**<sup>18</sup> It is important to note for contextualisation that these weather events do not reflect the overall perception of climate change and related threats in Costa Rica. Rather, these figures specifically illustrate quite clearly the presence and respective prevalence of climate risks in rural, inland, agricultural economies largely dependent upon a single crop, namely coffee. This single-product economy, moreover, is highly reliant upon various forms and aspects of migration, an overview of which are presented below – along with broader characteristics of human mobility in and around the localities of Santa Maria de Dota and Tarrazú.

## Climate-related impacts

**Climate change foreshadows long-term disruptions to communities.** Data collected in Costa Rica reveals a range of climate-related challenges and impacts shaping various aspects of daily life, ranging from social interactions to income generation, cultural practice, access to basic services and even language. Accordingly, while climate change – at least in the short term – is not entirely disrupting the lives of residents in research locations, impacts observed and reported foreshadow significant medium to long term changes to the economies, social makeup, financial and political ecosystems of Santa Maria, Tarrazú and surrounding areas.

<sup>18</sup> FGD2

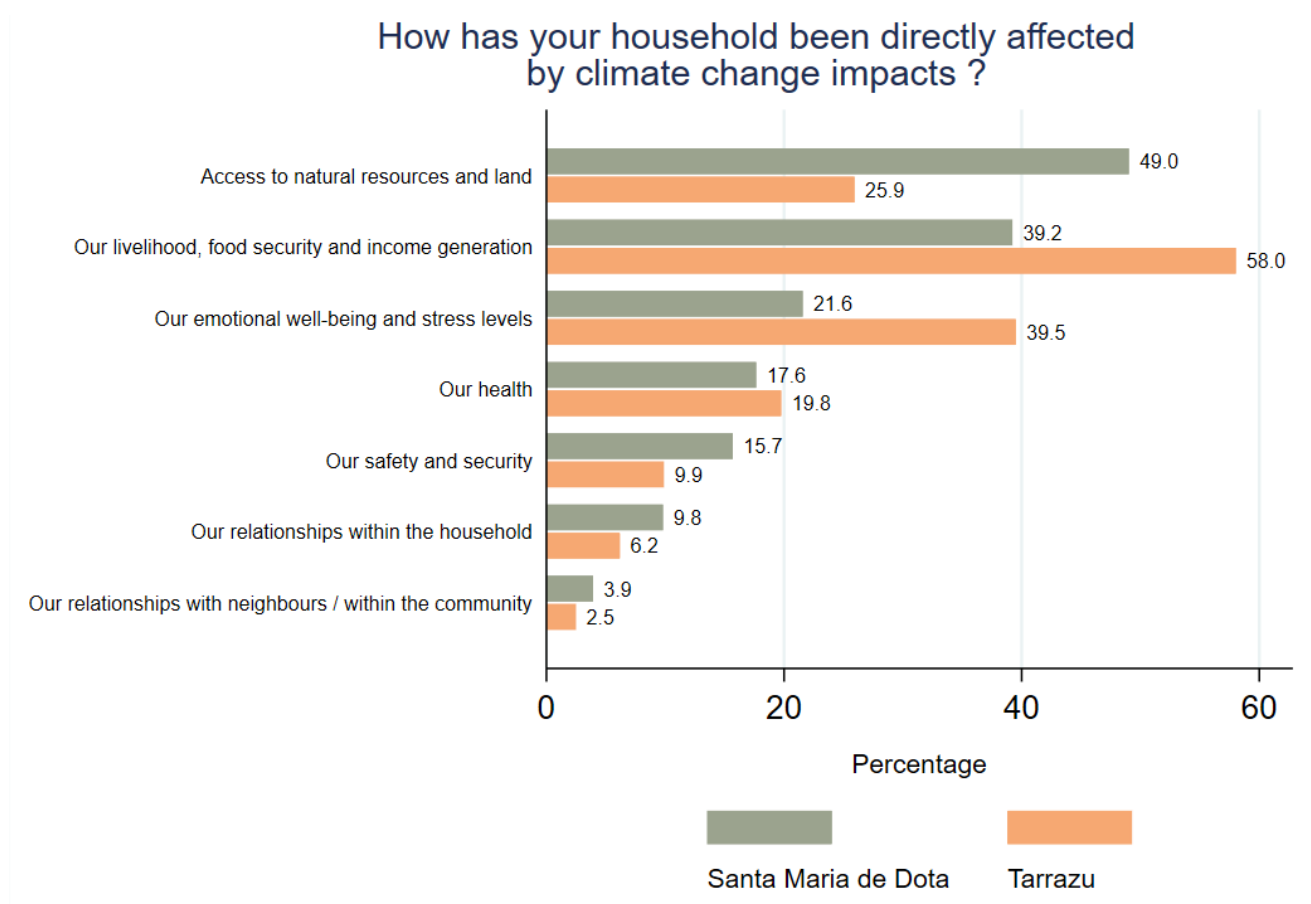


Figure 7. Effects of Climate Change on Households

**Climate change disrupts livelihoods and resources.** In terms of specific consequences of climate change, households in Tarrazú were most affected in terms of livelihoods and food security (58%), whereas in Santa Maria respondents mainly highlighted impacts on their access to natural resources (49%). Other impact areas include emotional well-being, in particular in Tarrazú (40%), and to a lesser extent in Santa Maria (22%), health (mentioned by 20% of respondents in Tarrazú, 18% in Santa Maria), as well as safety and security, particularly in Santa Maria (16%).

## Agricultural impacts

**Unpredictable weather jeopardises harvests and livelihoods.** These figures, notably when it comes to specific climate events and the impacts thereof, resonate with findings from the focus groups discussions (FGDs) conducted in Costa Rica. Various FGD participants underlined increasingly unpredictable weather patterns, whereas excessive rain raises soil humidity, amplifying the risk of certain diseases affecting crops, therefore threatening coffee harvests and local livelihoods.<sup>19</sup> These erratic weather patterns also resulted in flooding and drought, the latter being somewhat more common than the former.

<sup>19</sup> FGD1, FGD2, FGD3

A distinction, however, should be made between instances of flooding, and increased, **unpredictable rainfall which, while not necessarily leading to floods, may still threaten local economies**. More broadly, these climate trends were associated with more intense El Nino / La Nina weather phenomena, fuelling extreme heat and torrential rains, sometimes in close, rapid succession.<sup>20</sup> This also increased the risk of landslides tied to soil erosion in research locations.<sup>21</sup>

## Social impacts

**For some, climate change can strain social cohesion.** From a social standpoint, most respondents stated that community relations had not been affected by climate change (65%), another 19% reported purely negative impacts, while 6.5% of survey participants reported that the effects were both negative and positive. Along these lines, while questions surrounding the social impact of climate change did not generate consensus among participants, perceived consequences nonetheless tilted towards the negative in discussions.

**Resource scarcity can drive social tensions.** Among those who reported negative impacts on community dynamics, 52% also underlined shifting access to natural resources and land, likely contributing to social tensions. In this same vein, 37% of respondents in Santa Maria and 37.5% in Tarrazú reported increased competition and disputes over water resources; while 33% in Santa Maria and 23% in Tarrazú reported conflicts surrounding access to community resources.

Strained relationships within the community were also mentioned by 31% of respondents in Tarrazú and 19% of those in Santa Maria. These figures are concerning in light of the fact that, in line with most available predictions, **climate impacts are likely to worsen over the coming years, potentially exacerbating social tensions in rural areas of Costa Rica (and throughout the greater Caribbean region).**

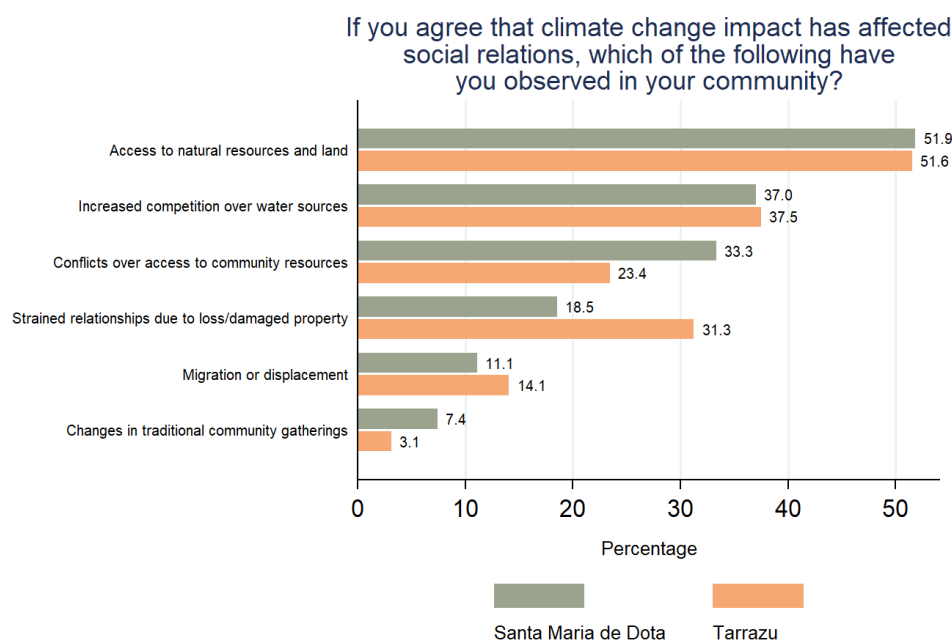


Figure 8. Effects of Climate Change on Households

<sup>20</sup> FGD1, FGD2

<sup>21</sup> FGD2

## Economic impacts

**Santa Maria de Dota and Tarrazú are highly dependent on coffee production.**

Accordingly, the fact that these are essentially single crop economies significantly increases local vulnerability to climate change impacts. All the more so as coffee is a “single harvest crop”, meaning that farmers rely entirely on the production of a single yield, the quality of which is contingent upon receiving the right amount of rain over the right amount of time.

**Coffee production drives seasonal labour migration from Panama and Nicaragua to Costa Rica.**

Labour migration practices, however, are built on the assumption that weather patterns – and by extension agricultural production cycles – will remain constant from one year to the next. However, when climate impacts increase the unpredictability of weather patterns, harvesting timelines become misaligned with seasonal migration cycles.

Accordingly, if climate impacts directly affect the health of crops, they also **threaten farmers’ ability to ultimately reap the fruits of their labour**. This points to the extreme financial vulnerability of coffee-based ecosystems in the face of climate change, which renders current production practices – and associated mobility patterns – unsustainable. This challenging economic reality is succinctly summarised by an FGD participant in Santa Maria: *“It was [...] very interesting because here the coffee pickers, as they are migrants, always come at the end of October, and in September the coffee was ripe to be harvested. And there was no manpower. Then it reached that maturity, and the labour force was not yet there.”*<sup>22</sup>

## Cultural impacts

However, as explained by an FGD participant in Dota, the consequences of climate change on agriculture are not strictly limited to socioeconomic dimensions of everyday life: *“Well, in general, everything related to agriculture: vegetables, coffee, all of that, there are changes in productivity, mainly. And in the cultural practices that are normally carried out, you have to adapt to the new patterns, to what’s new in the climate.”*<sup>23</sup>

**This statement illustrates the all-encompassing nature of climate, whereby one sphere of adaptation cannot be entirely disconnected from the next.** Accordingly, the above-quoted statement communicates a sense of uncertainty, extending well beyond agricultural production: changes in climate require changes in productivity, which in turn foreground broader changes to the cultural landscape of a given area. These, in turn, may fundamentally alter the manner in which local residents read, interact with, read and relate to their environments. Language potentially provides the most concrete example of the manner in which shifting weather patterns can ultimately re-structure cultural repertoires, values and meaning in a given area affected by climate change. A clear example of this appears in the following exchange surrounding unpredictable weather patterns, which took place during the third FGD conducted in Santa Maria de Dota.

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22 FGD2

23 FGD3

[Facilitator]: *"What do the pintas say this year? [Costa Rican tradition: it is said that the weather of the first 12 days of January reflects what the months of the year will be like]."*

[Participant 2]: *"Ah, the pintas are crazy."*

[Participant 1]: *"That no longer exists, it is a thing of history."*

[Participant 2]: *"But yes see, it did rain. I think it was in January and February in March it got dark, dark, but no, no, I didn't see like it was going to rain."*

[Participant 1]: *"That it would rain, definitely not in any month"*

[Participant 4]: *"Pintas are in San José now [laughs - "pintas" also refers to people who commit petty crime]."*

**The impacts of climate change have thus literally changed the meaning of a specific word** – or rather rendered obsolete one of two complementary meanings this word used to have. Along these lines, this exchange provides an insightful look into the actual process through which points of reference – cultural and otherwise – are shifted, fragmented or entirely erased through the knock-on effects of climate change in certain areas.

**Agricultural climate impacts also shift demographic makeups in both locations.**

Indeed, limited productivity and profitability incurred lower wages which, alongside the general absence of higher education and certain socio-administrative challenges tied to the distribution of land among local households, drove the departure of youth in search of better, more sustainable livelihood opportunities further afield.<sup>24</sup>

This undermines the transfer of cultural practices from one generation to the next. The consequences of this mobility pattern, exacerbated by the medium-term economic impacts of climate change, contrasts sharply with the rationale driving historical mobility from Santa Maria de Dota, as outlined by an FGD participant whose family had been present in Dota over generations:

*"Historically it is what I was saying, that many people left to maintain and not lose their coffee plantations, to continue with the coffee, that their family lives here, that the culture is not lost. So, this dependence on these remittances for agriculture is not attractive, but it is necessary, is it not? Unfortunately, it is necessary."*<sup>25</sup>

While migration was in the past undertaken specifically in order to sustain local economies and preserve local culture, **climate change impacts and associated migration dynamics now threaten local economies and transform cultural practices in rural settings.**

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24 FGD2

25 FGD1



In line with figure 7 (above), health challenges created or exacerbated by climate change included, among others: (1) harm directly caused by exposure to extreme heat and sunlight / UV rays,<sup>26</sup> and (2) an increase in health conditions tied to the use of pesticides and other chemicals. This last consequence further illustrates **the systemic impacts of climate change at a local level**, bringing to mind the links between climate, weather, agriculture and cultural practices outlined above. Indeed, FGD participants described a chain of events whereby torrential rain raises solid humidity, which increases the risk of diseases in coffee plants – e.g. “crow’s eye”, “rust” or “anthracnose”, which lead farmers to use more chemicals in order to preserve plants and boost production.

**However, these chemicals reportedly seep into drinking water sources, which negatively impacts people’s health.** These causal links go to show the intrinsic ties binding the health of plants to that of human beings; while further underscoring the need for integrated, comprehensive and multi sectoral adaptation strategies to climate impacts in rural, single-crop economies.



Image 7. Coffee beans from Santa Maria de Dota, Costa Rica. Photo credit: Ernesto Guevara Porras, 2024

# Responses & Adaptations

## Adaptations and Strategies

Various adaptation strategies and support mechanisms had been developed at community level in order to adapt and respond to climate change impacts.

Some adopted various adaptation strategies at the local level, including crop diversification and the establishment of financial community-based support mechanisms (cooperatives), mitigating some of the most severe economic impacts of climate change on local economic production. At the household level, several respondents report taking measures including recycling and water rationing or installing extra water storage as a response to climate change effects.

**Respondents rely on family.** At a more personal level, if respondents faced a climate-related challenge or emergency (such as flooding or drought.), they most frequently reported that they would turn to immediate family for support. This was the case for 51% of respondents in Santa Maria, and 45% in Tarrazu. Local government was also considered as a potential source of support by 41% of respondents in Santa Maria, for 39% in Tarrazu. Less than 2% of respondents reported not having anyone to turn to in the case of climate-related emergencies.

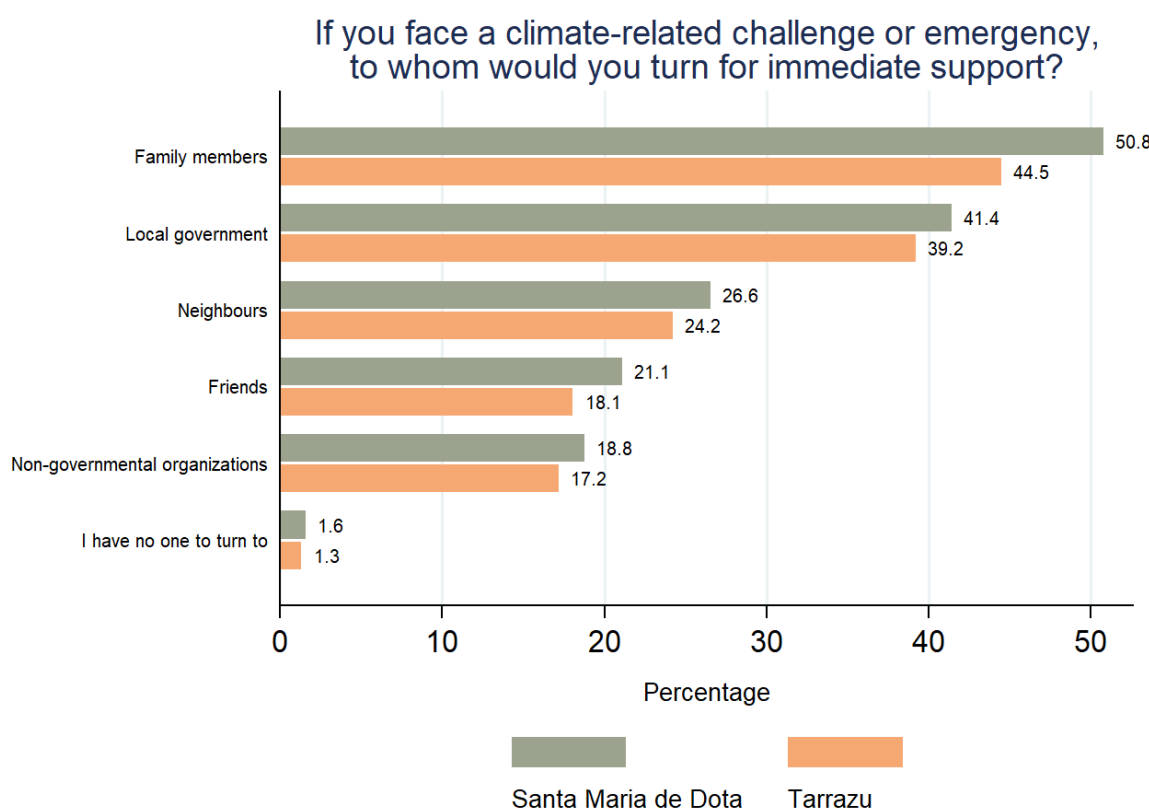


Figure 9. Support mechanisms

### Box 1. Representativity and the adaptation of invisible populations

This last statistic in particular should be read with caution. Indeed, as indicated above, both localities in which data collection took place are home to significant populations of migrant labourers, many of whom are reportedly choosing to remain in Costa Rica for longer periods of time in order to compose with the unprecedented unpredictability of weather patterns; or to settle permanently in the country.

These individuals are likely to suffer from depleted social capital and limited access to community-based support mechanisms as compared to other residents, making it difficult to determine how, exactly, they would adapt to a rapid-onset climate event. It is however ironic to note that the longer term presence of these individuals could itself be read as a broader economic adaptation mechanism, the necessity of which stems from climate impacts on local coffee production in Dota.

Accordingly, further research should investigate the links between (1) macro-adaptation mechanisms to climate impacts on agriculture, and (2) increased vulnerabilities among migrant workers in rural areas of LMICs, including a specific focus on children, women and young mothers in these communities.

**Almost half participants feel their communities aren't preparing for climate changes.** Moreover, around half of all respondents (47%) disagreed (somewhat or strongly) that their community collectively takes steps to adapt or prepare for the impacts of climate change, compared to 31% reporting that their communities do take such action. The rest of the survey sample either felt neutral about the question or refused to answer. There were no major differences between different locations in this regard. It is, however, difficult to determine the precise implications of this statistic, namely whether this points to a lack of collective steps towards adaptation; or a general lack of awareness surrounding the same. This may also reflect the limited availability or accessibility of trusted collective decision making mechanisms, although collectives of coffee producers play this role to a certain extent, although with a very specific focus built around a unique (if fundamental) economic sector.

**Most respondents feel uninformed about local climate change impacts, and few have taken steps to prepare.** Only around half of survey respondents (54%) felt informed (somewhat or very much) about the impacts of climate change in the region, and approximately one in three respondents felt either somewhat or very uninformed, with no significant differences between the two study-locations. Moreover, less than 1 in 3 (29%) respondents reported that their households took specific measures to prepare for or adapt to the impacts of climate change. When asked about their capacity to cope with a climatic shock, close to half of the sample felt as prepared as other people in their communities. Men were slightly more likely to feel prepared than women, although the results are not statistically significant. This gender discrepancy may however reflect gender roles – and associated responsibilities – in the areas where data were collected.

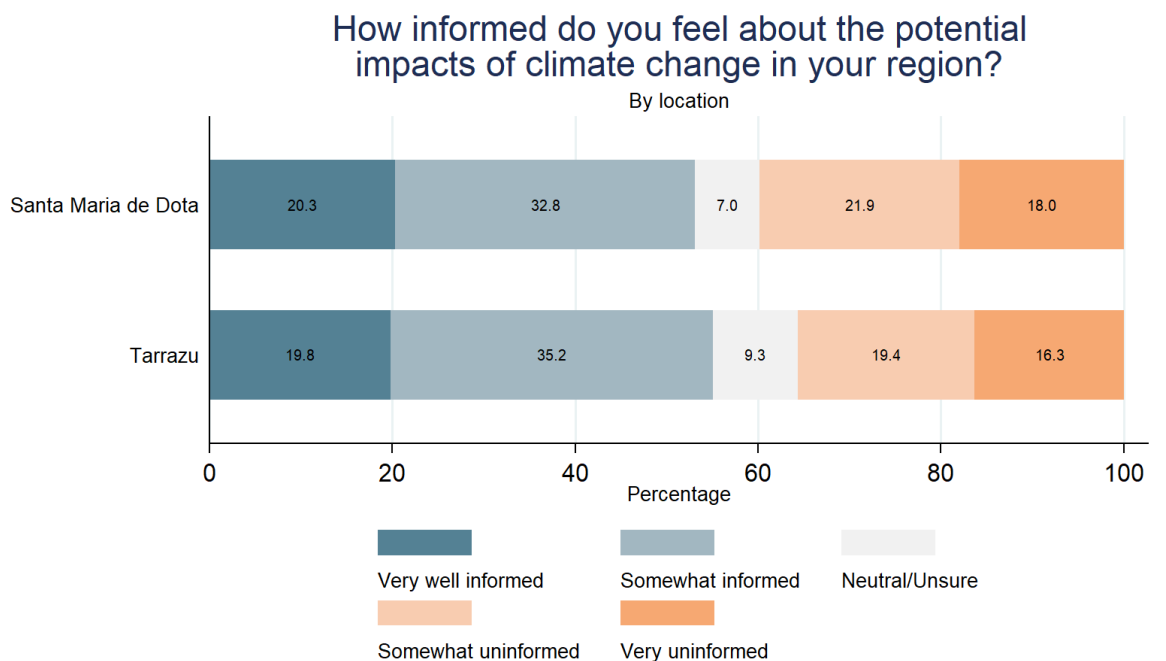


Figure 10. Levels of informedness, as reported by respondents



FGD respondents had more climate adaptation awareness, highlighting agriculture's role in the community. Information on preparedness and familiarity provided by FGD respondents further contrasted with the survey answers summarised above – likely due to participation being voluntary, whereby individuals willing to discuss climate mobility are indeed likely to be more familiar with adaptation strategies than the “average” community member. Community-based support mechanism seeking to overcome – or at least mitigate – certain consequences of climate change in the agricultural sector. Agriculture generally comes across as the basic scale of adaptation to climate change, which is unsurprising given the fact that, as indicated by the FGD participant quoted above, *“everything relates to agriculture.”*<sup>27</sup>

Local coffee producer cooperatives play a vital role in supporting farmers affected by climate change and economic challenges. “Cooperativas” serve as a means of supporting farmers affected by climate change, declining prices, and unequal competition from large production companies. The largest of these collectives is Coopedota, the *raison d’être* of which is explained by a participant as follows: *“Coopedota is a large cooperative, they do have a budget to work on programs according to what the sector is requiring at the moment, as on issues, to be able to generate a relief in the producer’s pocket.”*<sup>28</sup>

Cooperativas also support the generation of data surrounding best practices in agricultural adaptation, thus building the capacities of local farmers to respond to climate change, and notably to the increasing unpredictability of rain patterns: *“My husband worked there for a long time in Coopetarrazú [another collective], and they gave them a lot of training, so he learned a lot, and that helped him to maintain his fences [gardens], his coffee plantations.”*<sup>29</sup>

Key among the approaches to achieving climate sensitive agriculture was crop diversification,<sup>30</sup> clearly a promising strategy in light of the massive risks and far-reaching climate vulnerabilities characteristic of single crop economies, as outlined above.

Alternatively, certain participants suggested shifting to a tourism-based economy – or other modes of subsistence perceived by residents to be less exposed to climate impacts. This, however, was complicated by the fact that land ownership in Santa Maria and Tarrazú is reportedly concentrated among a few wealthy individuals, unlikely to be open to the idea<sup>31</sup>; while such a shift would indubitably bear cultural repercussions unacceptable to local residents, as expressed in focus group discussions.

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27 FGD3

28 FGD1

29 FGD3

30 FGD1, FGD2, FGD3

31 FGD3

## Mobility as an adaptation?

Migration, however, was rarely considered as an immediate option by survey respondents or FGD participants in Santa Maria de Dota or Tarrazú. A 2015 study focused on internal migration stemming from floods and landslides (i.e. hydrometeorological events) in Costa Rica between 1990 and 2000 found that “these events did increase migration on average, but also that very severe events (for example, those resulting in deaths) actually decreased migration. Regarding destinations, less severe events increased migration to metropolitan areas (rural-urban and urban-urban flows).<sup>32</sup>” Stated differently, there appears to be an inverse relationship between the severity of certain events and the volume of internal displacement in Costa Rica. UNHCR also mentions a link between urban-bound migration – particularly among young women – and frequent or prolonged bouts of extreme heat causing drought in rural areas dependent on agriculture in Costa Rica.<sup>33</sup>

Finally, SLR and coastal erosion have been tied to climate-mobility in Puerto Viejo, Puerto Limón, Cahuita, Manzanillo and Gandoca localities.<sup>34</sup> However, an IOM overview of the state of climate mobility research in Central America underlines the general paucity of knowledge surrounding this phenomenon in Costa Rica (as well as the region more broadly). Nonetheless, a few key trends can be identified. These include emigration as a strategy meant to mitigate the need for further climate mobility, whereby part of the household migrates in order to increase the financial ability to remain of those left behind via remittances.<sup>35</sup>

Alternatively, studies conducted on displacement caused by landslides in Costa Rica have underlined negative impacts of mobility on the mental health of displaced individuals. These impacts are tied to the forced nature of such displacement, as well as the “violence and chaos” experienced by individuals and households during and after displacement events. Such developments were specifically observed in the locality of Calle Lajas, in the San Antonio district of Costa Rica.<sup>36</sup> Finally, a study conducted in the locality of Pueblo Nueva Parrita underscores the links between post-mobility increases in vulnerability and the “impossibility of accessing safe spaces, which in turn facilitate the relocation of affected populations to areas highly exposed to further climate events, creating a pernicious cycle of exposure and permanent displacement.”<sup>37</sup>

Migration patterns in Santa Maria de Dota and Tarrazú shed light on climate mobility in Costa Rica, emphasising its role as a destination for migrants to support economic adaptation.

As outlined above, the coffee industry (1) is highly vulnerable to climate change, in particular shifting weather (rain) patterns, and (2) is entirely dependent on seasonal labour migration from neighbouring countries; however (3) labour migration patterns are now often misaligned with increasingly unpredictable harvesting timelines.

32 Centre for International Earth Science Information Network (2023), GCCMI Desk Review; information drawn from Robalino, J., Jimenez, J., & Chacón, A. (2015), The Effect of Hydro-Meteorological Emergencies on Internal Migration. *World Development*, 67, 438-448.

33 UNHCR (2018), Cross-border Displacement, Climate Change and Disasters: Latin America and the Caribbean

34 IOM (2021), Human mobility caused by disasters and climate change in Central America

35 IOM (2021), Human mobility caused by disasters and climate change in Central America

36 IOM (2021), Human mobility caused by disasters and climate change in Central America

37 IOM (2021), Human mobility caused by disasters and climate change in Central America

**Climate is driving more permanent forms of regional labour migration to Costa Rica.**

In light declining profits tied to climate change combined with local youth's growing reticence to work in the agricultural sector people are migrating mostly from Panama and Nicaragua.<sup>38</sup> Indeed what used to be cyclical and temporary migration is becoming increasingly perennial in coffee-producing regions such as Dota, allowing the latter to adapt to an increasingly uncertain environment. One FGD participant notably used the growing number of Panamanian students in their child's school as a proxy for this adaptive mobility shift. Incidentally, these workers may also contribute to the conservation of certain local cultural practices tied to coffee production.

**This mobility pattern – including in terms of adaptive objectives – was reminiscent of dynamics observable in the Ngobes indigenous community.** Indeed, a key informant interviewed in Costa Rica revealed that this group, residing in the highlands of southern Costa Rica, was particularly vulnerable to forest fires fuelled by drought (and climate change), causing either temporary relocation; or, in line with labour migration trends outlined above, mobility further afield by community members seeking employment in the agricultural sector.<sup>39</sup>

Beyond the very specific mobility dynamic outlined above (and which clearly constitutes a form of adaptation), **climate change tended to be viewed as an impactful – if secondary – cause of migration.** As explained by an FGD participant in Santa Maria,

*“The phenomena that are taking place affect what has to do with the production processes, and then there is less income, and from there it can be a starting point to go searching [for opportunities in other places]. But not because we say, “It’s very cold here and I’m going to look for a warmer place”, no... “It’s hotter here, I’m going to look for a colder place” I don’t think that’s a reason to cause a person to move from here to other places, either here in Costa Rica or in the world.”<sup>40</sup>*

**Here, mobility is seen as an adaptation to economic challenges linked to climate change, rather than a direct response to climate impacts.** In practice, there is virtually no way of separating economic and climatic spheres and stressors in Santa Maria de Dota or Tarrazu. Hence while climate may not feature as a direct driver in local narratives, discourses and understandings, these are still clearly linked to climate impacts experienced by a majority of community members having participated in the study.

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38 FGD1

39 KII1

40 FGD2

## Involuntary and voluntary immobility

Climate-driven migration and mobility experienced in Costa Rica is broadly voluntary in character – with the exception of certain landslide events leading to the destruction of housing and/or entire urban areas in particular. As outlined throughout the report, while the impacts of climate change were clearly pervasive to the economies, socio-cultural landscapes and mobility dynamics experienced by inland rural communities, most manifestations of such change related to long-term shifts in weather, particularly including increasingly extreme and unpredictable patterns at local level. Along these lines, both residents – and incoming migrants – were essentially choosing to migrate (or, alternatively, to remain in place). This said, longer-term labour migration in particular was driven by necessity, both among farmers / local economies; and likely among migrants, seeking to support their household’s basic needs through access to more sustainable livelihood opportunities.<sup>41</sup>

Regarding immobility, decisions were generally viewed as voluntary, shaped by the specific needs and capacities of community members. For instance, access to information about negative experiences of irregular migration was framed as justifying the decision to stay by an FGD participant in Santa Maria.<sup>42</sup> Finally, among those who did not move with the whole household, elderly family members were most frequently left behind (25%), followed by women (22%) and children (19%).



Image 8. Migrant workers coming in and out of Santa Maria for coffee production- Costa Rica. Photo credit: Raquel Lejtregger, 2024.

<sup>41</sup> It is however important here to keep in mind that labour migrants from neighbouring countries did not participate in the FGDs, hence this statement is based on a general understanding of the drivers of “economic” migration and seasonal labour mobility.

<sup>42</sup> FGD3

# Looking Ahead: Decision- making

## Factors Influencing Decision-making

A range of interconnected factors were found to be influential when contemplating future decisions about climate adaptation including when considering mobility.

As outlined throughout, key among these were (1) shifting weather conditions and patterns, and in particular the unpredictability thereof; as well as (2) the impacts of climate change on economies and livelihoods at local level; and (3) by extension on the conservation or “loss” of culture.

Moreover, these factors shaped several forms of mobility, including internal mobility towards urban areas undertaken by youth, as well as short and longer term displacements of indigenous communities in certain regions of Costa Rica – although this group’s mobility, as influenced by climate change, warrants further investigation. Internationally, factors included financial needs of migrant workers’ households; as well as access to education and work opportunities for local youth heading to other countries including the United States.



**Survey results highlight key differences in migration factors between Santa Maria and Tarrazú.** In Santa Maria, half of the respondents cited extreme weather events as a reason for moving, compared to 34% in Tarrazú. Conversely, in Tarrazú, changes in temperature and resource scarcity were significant factors influencing potential moves, more so than in Santa Maria. Meanwhile, economic reasons like job or income loss were more commonly cited in Tarrazú compared to Santa Maria. Overall, these survey responses are aligned with the qualitative and secondary data (from a review of literature) collected in the context of this study.

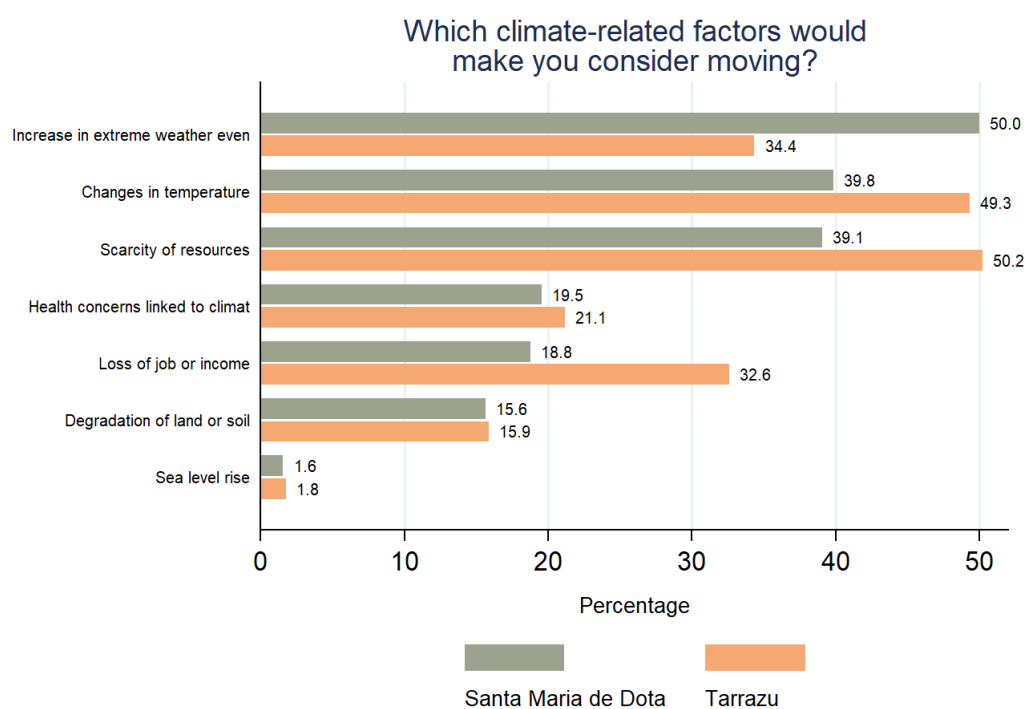


Figure 11. Climate-related decision making factors in mobility considerations

## Climate and mobility decision-making nexus

**Decision-making in Costa Rica was closely shaped by strong connections to place among community members, whereby a sense of belonging, home and identity was rooted in the local area.** This comes through in the various statements highlighting the intersection of climate, culture, agriculture and mobility in the FGDs. This notably informs the differentiation of migration / mobility on the one hand and, on the other, adaptation to climate. As explained by a key informant, adaptation and migration are perceived as mutually exclusive, since engaging in the latter implies a failure to successfully adapt in place: *“if you have to migrate it means you didn’t adapt, to me adaptation is local, you adapt to new conditions to stay in that place.”*<sup>43</sup>

This is very much aligned with the adaptation strategies outlined by FGD participants – and which generally sought to tailor local economies to climate impacts (rather than simply forgo coffee production in favour of re-establishing community livelihoods elsewhere). Along these lines, the decision-making nexus observed in Costa Rica was strongly biased towards staying, with migration framed as a last resort.

**Most respondents prefer to stay in place and express strong attachment to communities, though climate change influences some migration plans.** Accordingly, when it came to future migration plans and aspirations, most respondents (76%) had no desire or plans to move, with no major differences between both research locations. This indicates a high level of attachment to the inhabited lands and communities, as migration is only considered by a minority (24%), among which 9% considered migration but did not have the capacity to move (Figure 1). On the other hand, 4 in 10 respondents reported that they factor in climate change when considering future migration and more than 1 in 5 (22%) consider it as one of the main reasons behind their decision. This suggests that despite prevalent preferences to stay, climate change is closely linked to mobility considerations (Figure 12).

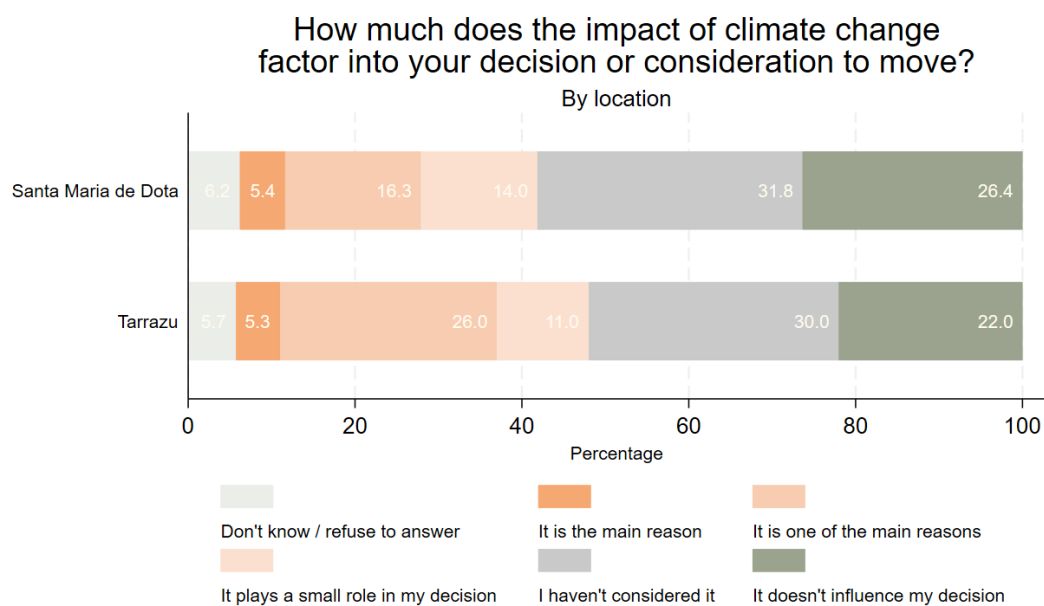


Figure 12. Climate mobility decision making


**Migration preferences vary by destination and location.** When asked about where they would migrate if they were to move, 28% of respondents said they would move to a different area of the same country, 25% to a different village in their current area of residence, 20% did not know, and 14% would move to a different country entirely. When asked about the preferred duration of stay in preferred destinations, 35% reported that they would stay there for a season or less, 32% permanently, while 24% said they did not know the duration of the potential stay.

However, participants in two of the FGDs indicated that climate conditions and impacts lowered the likelihood of return following climate mobility. Specifically, they described a migration pattern whereby individuals leave for other regions or countries (the U.S. in particular) in search of job opportunities, before returning to CR and investing in agricultural IGAs. However, they further described the impacts and threat of climate change on coffee harvests as lowering the likelihood of (sustainable) return and reintegration of “economic migrants.”<sup>44</sup>





Image 9. Coffee farm in Santa Maria de Dota, Costa Rica. Photo credit: Nicole Stoumen, Samuel Hall, 2024.



# Conclusions: Findings on Climate Mobility

Climate change impacts were widely experienced by inhabitants of inland, rural, agricultural based economies studied in Costa Rica. These were exacerbated in certain areas by the fact that local economies were entirely reliant on a single crop, namely coffee.

Data collection highlighted the prevalence of slow onset consequences of climate change in the country, including the increasing commonality of extreme temperatures – heat in particular – as well as steadily more unpredictable weather patterns. The latter notably concerned rain, creating a range of risks for coffee production, including shifts in harvesting timelines and related labour shortages, whereby seasonal migration trends became misaligned with local labour needs dictated by agricultural production cycles. Moreover, the health of plants, and by extension of residents, was also directly threatened by changing weather patterns. Keeping this in mind, key findings include:



- **The knock-on effects of climate change in rural communities included an exacerbation of pre-existing mobility dynamics**, whereby youth in particular, faced by limited livelihood opportunities and increasingly difficult weather conditions, were often driven to move to either large urban centres such as the capital San Jose; or to other countries within the region and beyond, notably the United States. Along these lines, data collection revealed a clear generational character to climate mobility trends in Costa Rica;
- **Previously temporary – i.e. seasonal – labour migration (in particular that of migrant workers from Nicaragua) is becoming increasingly permanent, notably due to the unpredictability of weather patterns and harvesting timelines**, allowing farmers and local economies to adapt to the consequences of climate change, without necessarily seeking to change specific production processes at a technical level. This migration trend, moreover, highlights the manner in which climate change may in fact be drawing migrants to certain regions, rather than simply driving out-migration as would be expected. Such trends have the potential to fundamentally alter the demographic makeup of communities such as Santa Maria de Dota and Tarrazu.
- **Agriculture served as the basic element for measuring climate impacts and associated changes, including in terms of migration**. Beyond mobility itself, the harmful effects of certain adaptation strategies – including increased use of pesticides to fight crop disease, leading to health complications among humans – demonstrates the symbiotic relationships affected and highlighted by climate change at the level of local ecosystems.
- **The conservation of cultural practices by rural communities – intrinsically linked to agricultural economies – was a key factor driving the willingness of residents to adapt to climate change in place**, including through crop diversification and other climate-sensitive/responsive agricultural practices, which were notably facilitated through community-based support mechanisms (Cooperativas). The latter also served as a basis for sharing best practices, lessons learned and other knowledge relevant to climate change adaptation and mitigation. Stated differently, agriculture, community and local adaptation were key elements of the response to climate change observed in Costa Rica.
- **Migration away from rural areas was therefore not perceived as a palatable adaptation strategy – nor even as a form of adaptation at all – by many (if not most) research participants and survey respondents**. Rather, the ultimate objective of adaptation was to remain in place, meaning that internal or international migration away from local communities in areas such as Dota was essentially perceived to imply a failure to adapt to climate change.



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Image 10. Men waiting at bus stop in town square of Santa Maria de Dota, Costa Rica. Photo credit: Nicole Stoumen, Samuel Hall, 2024.



# About Us

**Samuel Hall** is a social enterprise specialising in research, program evaluation, and data analysis in migration and displacement contexts. Since 2010, we've focused on understanding the disproportionate impacts of climate change on vulnerable communities. Our work across Africa, South, and Central Asia shows that real change often begins at the grassroots level, where local activists, migrants, and displaced people lead constructive dialogues and actions.

**The Greater Caribbean Climate Mobility Initiative (GCCMI)** is a joint undertaking coordinated by the Global Centre for Climate Mobility and the Association of Caribbean States, bringing together 25 countries, amongst them numerous Small Island Developing States, whose people are most at risk from the impacts of sea level rise and other climate related stressors. The initiative's partners include the World Bank, the UN Development Programme, the UN Office for Disaster Risk Reduction, the UN Framework Convention on Climate Change and the International Organization for Migration (IOM).