Climate Security Observatory
GUATEMALA

Summary for policymakers

Guatemala is considered to be one of the most exposed and vulnerable countries in Latin America to climate variability and extreme weather events, as well as non-climatic natural events. It is also a primary hotspot for climate change, as it is highly exposed to extreme weather events like tropical storms and droughts and has low capacity to cope with these impacts.

While Guatemala is an upper-middle income country, poverty and inequality rates are among the highest in Latin America, particularly affecting indigenous peoples, women, rural populations, and those employed in the informal sector.

The country also faces high levels of violence and insecurity mostly related to gang violence and organized crime. It is geographically situated in the middle of a drug-smuggling route from South to North America where there has been an increase in violence linked to drug trafficking, micro-trafficking, extorsion and money laundering activities. Conflicts over natural resources-mainly water, forest, and agricultural land and disputes related to extractive industries-commonly occur across the national territory, often involving indigenous communities.

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The Climate Security Observatory is an evidence-based decision support tool helping researchers, policy makers and other practitioners working at the intersection of climate, peace and security to understand and respond to climate-related security risks.

We are using a mixed-method approach to give answers to four lead questions:

- **HOW** does climate worsen the root causes of conflict?
- **WHERE** are the most vulnerable areas to climate induced insecurities and risks?
- **WHO** are the vulnerable groups to climate and security risks that should be targeted?
- **WHAT** needs to be done to break the cycle between climate and conflict?

Climate context

43.9
ND-GAIN index

1.5°C
Projected increase in temperature by 2050

Conflict / political context

2.139
Global Peace index

3.4
Governance index

Socio-economic vulnerability context

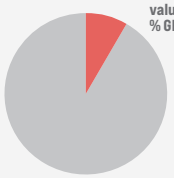
48.3
GINI index

0.664
Global Gender Gap index

3.9 million
Acute food security rate

242,516
IDPs

9.3%
Agriculture, forestry & fishing
value added as % GDP



29%
Employment in Agriculture

3%
Unemployment rate

1.5%
Population growth

CGIAR FOCUS Climate Security

CGIAR INITIATIVE ON Climate Resilience

CGIAR INITIATIVE ON Fragility, Conflict, and Migration

CGIAR INITIATIVE ON Livestock and Climate

CGIAR AgriLAC Resiliente: Resilient Agrifood Innovation Systems in Latin America and the Caribbean

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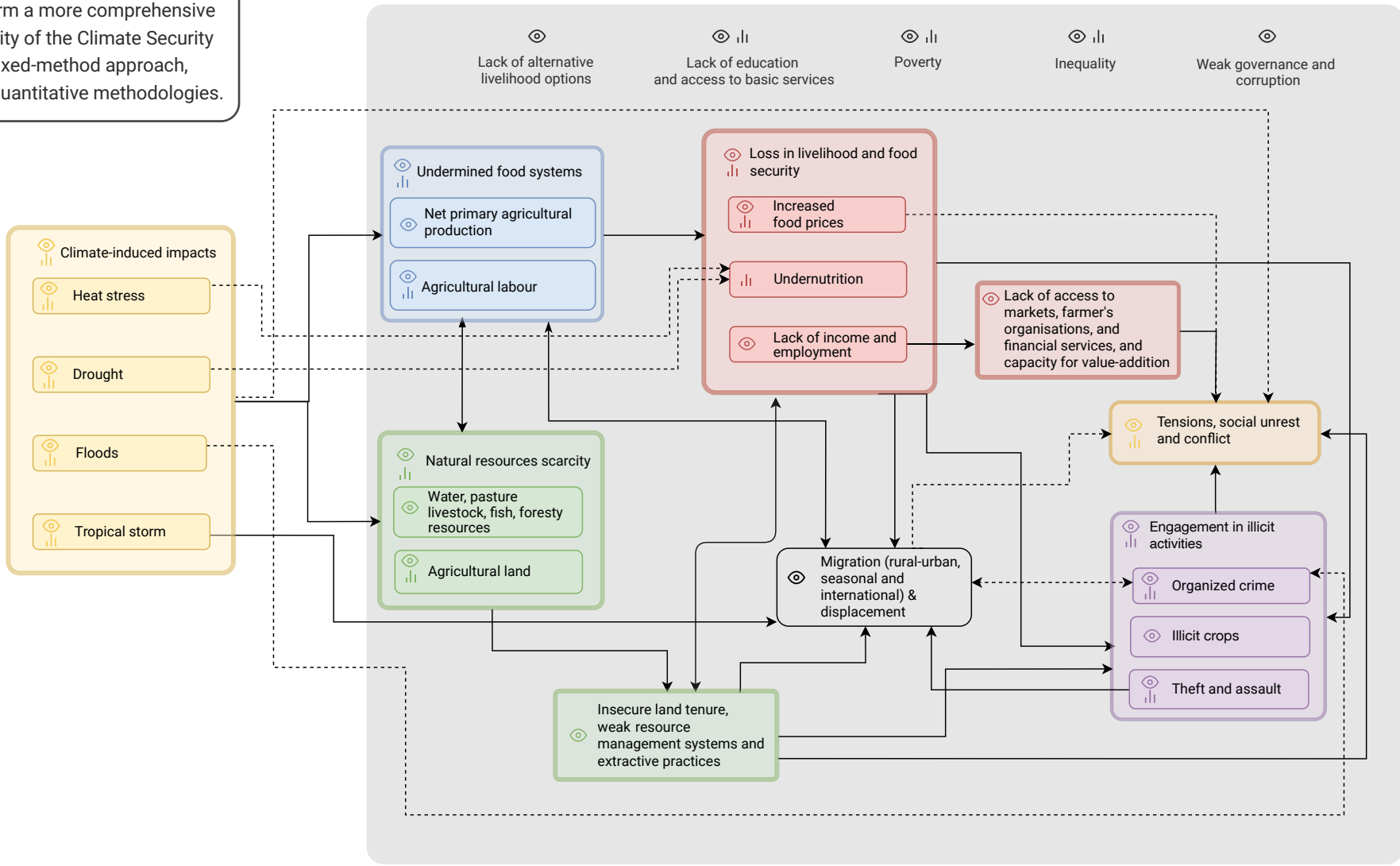
Understanding the links between climate and security is challenging, but it is critical for defining intervention and conflict mitigation. To untangle the linkages, and to form a more comprehensive picture of the complexity of the Climate Security Nexus we employ a mixed-method approach, using qualitative and quantitative methodologies.

Climate security pathways in GUATEMALA - *The diagram shows the relationships between drivers of the Climate Security Nexus identified through 4 qualitative and quantitative analyses (Climate Security Pathway Analysis, Network Analysis, Econometric Analysis, and Social Learning Theory). Specific drivers are either analyzed qualitatively quantitatively or both . The grey box shows the contextual factors, while the black box highlights socioeconomic and political vulnerabilities that also play a role in these pathways.*

Direct relationship
Indirect relationship
Quantitative analysis
Qualitative analysis



Qualitative insights:

The following pathways represent mechanisms for how Guatemala's climate security nexus might operate:

RESOURCE AVAILABILITY AND ACCESS PATHWAY

Climate change is negatively impacting on water, land, and food systems in the country, further degrading the country's natural resources, which is already affected by overexploitation over land and water resources, deforestation and slash and burn subsistence agricultural practices. The combination of climatic and non-climatic factors undermine the access and availability to natural resources, which increase the risk of competition over diminishing resources and may lead to tensions and conflicts. This is further compounded by socio-economic and environmental factors such as environmental degradation, poverty, marginalization, and insecure and irregular land tenure arrangements.

LIVELIHOOD AND FOOD INSECURITY PATHWAY

The effects of climate change negatively impact agricultural productivity, particularly affecting vulnerable communities dependent on rain-fed subsistence agriculture, contributing to increased food and livelihood insecurity. This may heighten migration dynamics either towards urban areas or abroad, sometimes exposing migrants to various human security risks. The lack of alternative forms of livelihood may also lead to increased involvement in illicit activities and gang recruitment, indirectly contributing to the growth of organized criminal networks.

Quantitative insights:

- Climate risks and socioeconomic vulnerabilities are highly interconnected in Guatemala.
- Heat stress is affecting net primary production of agriculture, which is closely related to resource exploitation, socio-economic inequality, and undernutrition, while water availability affects agricultural areas.
- Evidence points to lower education levels being associated with higher undernutrition rates, and this also correlates with heat and drought events, illustrating how climate extremes affect Guatemala's most vulnerable populations.
- Inequalities such as healthcare accessibility, agricultural indicators and female education levels are linked to conflict.
- Departments in the country with a 12 month above-average temperature have 31% higher food insecurity incidence rates. A 1% increase in temperature-induced food insecurity in turn increases violent crime risks by 15.3%.[i]
- The network analysis found strong correlations between flooding events and crime, extreme weather events and social unrest, and disasters and crime.

[i] *The model results suggest that other, unobserved factors may have a significant mediating effects within the above average temperature anomalies and violent crime relationship.*

Voices from the field

Maya Chortí, populations in La Lima, Chiquimula An increase in intensity and frequency of tropical storms and heatwaves, alongside mid-summer droughts, have had a profound impact on soil erosion and fertility. According to reports, these climate impacts have reduced agricultural productivity in the region, including increasing the risk of crop losses and decreasing yields. This in turn has led to more of a dependence on the nearby communal forest, which has long been the stage of inter-communal conflicts over access to the forest with the neighbouring Shupá community. It has also increased the population's dependency on seasonal migration, most commonly to coffee plantations both within Guatemala and across the border in Honduras. However, due to increased demand over short-term employment in coffee plantations, as well as the effects of coffee leaf rust over productivity, an increasing number of farmers are forced to find alternative sources of income during the dry periods, mainly migrating to sugarcane plantations to the southwest of Guatemala or to the main urban centres in search of work. This has increased the risk of theft and assault, as well as harsh labour conditions. Lastly, climate impacts have increased agricultural land and water scarcity, which in turn has led to land-based conflicts linked to insecure land tenure arrangements.

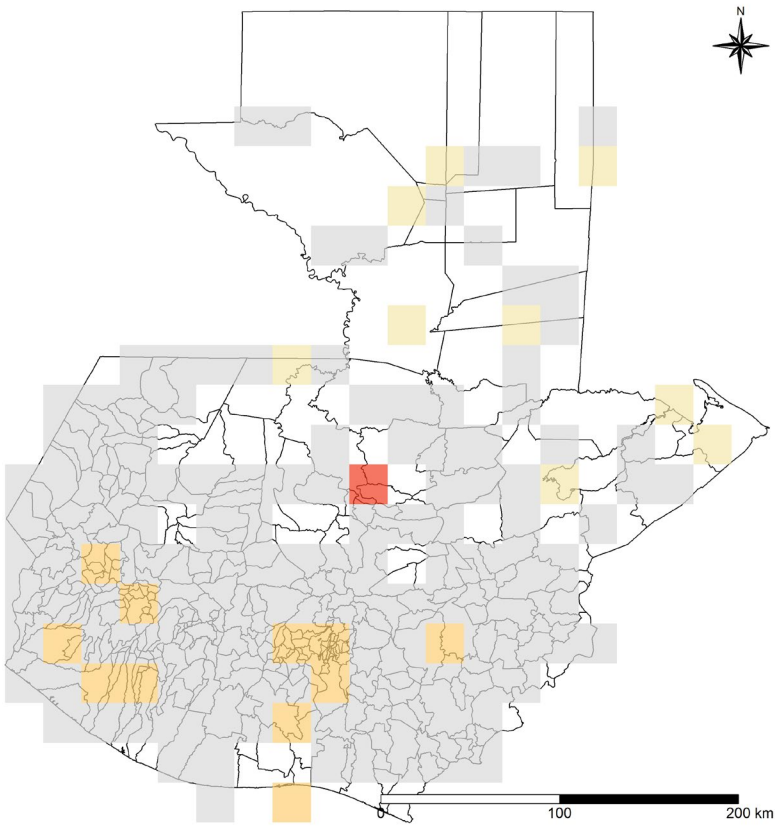
Tenedores, Izabal The increase in frequency and intensity of precipitation in the rainy season and flooding is leading to a loss of harvest and livestock in Tenedores. Coordinated efforts for resilience building have established an early warning and response system, however this has been largely responsive and past impacts have yet to be fully addressed. Furthermore, the unequal distribution of resilience building support by the international community is undermining social cohesion and collaborative capacities for climate adaptation. As a consequence, cattle owners are being forced to sell their cows before the rainy season, leading to a decrease in cattle market prices and profitability, while farmers are struggling to make a profit due to higher risks of crop losses and increasing prices of agricultural inputs. This is coupled with low land availability and land tenure that is highly insecure and irregular, leading to many community members depending on short-term and informal leasing agreements. This is fuelling grievances between landowners and land leasers. The high availability of alternative livelihoods such as temporal and assisted migration to Canada, sand harvesting and work in the banana plantations, have so far strengthened adaptive capacities, but there is recognition by the locals that the low levels of land availability and tenure are a potential source of conflict.

El Caripintero, Chiantla Huehuetenango - Water for domestic consumption and irrigation in El Carpintero comes entirely from springs in the region, most of which were sold by the municipal government to surrounding municipalities during the last few decades to larger urban communities. This has led to the community only owning a few of the springs within El Carpintero, which are for the most part privately owned. The community reports a reduction in water flow during drier periods and the need to acquire the remaining water springs for water security. They have however, been unable to do so, in part due to a low willingness of community members to pool resources in buying the land. The scarcity of water and privatization of water springs has increased the risk of conflict between and within communities in accessing nearby water springs and, on several occasions, conflicts have already occurred with varying degrees of violence. The lack of water availability also reduces agricultural productivity and associated incomes, increasing their dependence on using irregular migration as a coping mechanism. Irregular migration however is associated with human security risks, as those on the move are more prone to assault, theft, and kidnapping.

WHERE are the most vulnerable areas to climate induced insecurities and risks

Conflict events and number of fatalities across Guatemala are low but are spread out across the country. High conflict areas include, but are not limited to, the municipality of Ixcán in Quiché, Cobán and San Juan Chamelco in Alta Verapaz, Puerto Barrios and El Estor in Izabal, San Benito and Sayaxché in Péten, Escuintla and Guanagazapa in Escuintla, Cabricán and El Palmar in Quetzaltenango, and Sipacapa and Tejutla in San Marcos.

High conflict areas*1 co-occur with areas experiencing high levels of precipitation and high waterlogging in the northern and eastern areas of the country, while for the Western Highlands and south it corresponds with moderate-high levels of precipitation, and high levels of water stress. Overlaid socioeconomic hotspots show that these high conflict areas are exposed to different combinations of socioeconomic and environmental vulnerabilities related to inequality and undernutrition. The community profiles illustrate that where there are climate-conflict overlays there is also high inequality and either above average stunting or wasting prevalence for under 5 years. Climate and conflict also correspond to negative net migration and a below the average absolute wealth, as well as livelihoods dominated by the agriculture industry.



High conflict [low levels of precipitation/moderate-high levels of water stress: e.g. Alta Verapaz

High conflict [high-moderate levels of precipitation/low levels of heat stress/high levels of water stress]: e.g. Escuintla, Guatemala, Jalapa

High conflict [high precipitation/low levels of heat stress/high water logging]: e.g. Izabal, Quiché, and Petén

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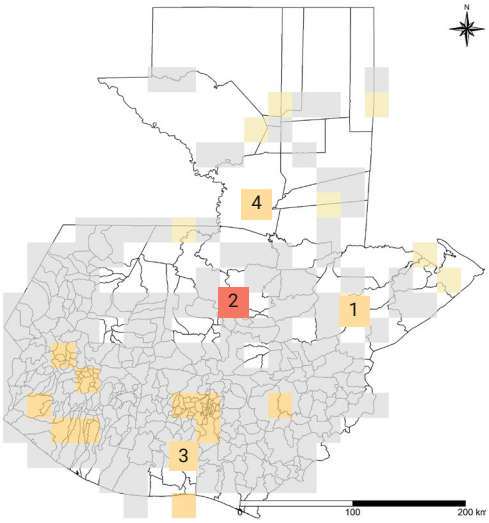
We create conflict and climate clusters*1, describing multi-annual severity levels (low to high conflict clusters, favorable to adverse climate conditions), and overlay these with socio-economic vulnerabilities identified as most relevant in previous quantitative analyses. The resulting hotspot map identifies where climate security hotspots are and how the vulnerable communities living in these hotspots are characterized.

**1 Conflict clusters refer to low to high conflict areas, based on six conflict-related indicators. The high conflict cluster is characterized, among others, by a high number of conflict events (51 median count), and high number of fatalities (17 median count). Climate clusters describe a range of suitable to adverse climate condition, based on six agroclimatic indicators. The different climate clusters are, among others characterized by 1. Low levels of precipitation (median of 1129.82 mm) / Moderate-High levels of drought stress (73.89 days with ratio of actual to potential evapotranspiration below 0.5), 2. high-moderate levels of precipitation (median of 1696.5 mm) / low levels of drought stress (45.69 days with ratio of actual to potential evapotranspiration below 0.5), and 3. high precipitation (median of 2172.39 mm) / low levels of heat stress / High water logging (median count of 60.28 days). Both clusterings represent aggregates of multi-annual time series data.*

WHO are the vulnerable groups to climate and security risks that should be targeted?



CLIMATE SECURITY HOTSPOTS

	1	2	3	4	
Municipality/department level	**El Estor, Izabal**	**Cobán, San Juan Chamelco, San Pedro Carchá, Santa Cruz Verapaz, Tactic, Tamahú**	**Escuintla, Guanagazapa, Masagua, Palín, San Vicente Pacaya**	**Sayaxché, Péten**	
Socio-economic hotspots[2]	Inequality(I)	Inequality(I)	Inequality(I)	Inequality(I)	
		Community profiles			**National figures**
Population	9946	95612	82392	14751	N/A
Years of education female Φ	5.05	4.11	5	3.82	5.34
Years of education male Φ	5.08	5.33	6.04	4.48	5.99
Wasting prevalence (under 5 years) (%)	2.54	2.26	3.51	2.97	2.48
Stunting prevalence (under 5 years) (%)	33.58	53.96	32.77	43.87	47.39
Nightlights Φ	0.32	3.31	8.49	0.00	13.61
Piped water (%)	54.62	65.36	54.09	62.26	66.85
Sanitation facilities (%)	14.59	15.96	41.01	15.80	35.41
Estimated Net Migration Φ	-1.27	-10.86	-15.85	-0.15	68.47
Absolute wealth index_index Φ	1975.15	4545.24	4031.30	1526.88	4934.6
Livelihood zones	Fishing, Tourism, Agroindustry and Food crops	Coffee, cardamom, forestry and vegetable production	Coffee production, industrial, agri-business, commerce, and services	Agro-industry and food crops	N/A

Φ Average

WHAT needs to be done to break the cycle between climate and conflict?

Policy frameworks: There is the need for policymakers to comprehensively and systematically integrate climate, peace, and security considerations. Possible measures include conducting a gap analysis for the integration of climate security into the policy framework of relevant sectors, and for policymakers in these sectors to be sensitized to climate change impacts. In addition, climate change-related projections and tools need to be integrated into the policy design and planning processes of peace and security actors specifically. There also needs to be more effective engagement between the different sectoral policy actors to ensure integrated policy coordination on climate security.

Multilevel governance: To modify current practices for climate adaptation and peacebuilding towards integrating a climate security sensitive approach, there is the need for a community of practice for climate security in Guatemala that fosters multi-level governance approaches. Moreover, Guatemalan government actors should reflect on what existing multi-level climate policy instruments that are used to transpose national level objectives into local level realities could become vehicles through which to integrate climate, peace, and security considerations into sub-national level planning and implementation.

Programmatic planning: To design and implement programmes that cover the intersection of climate change, conflict and peace, programming staff need to be sensitized to this nexus and related context-specific mechanisms, while project proposals need to integrate a climate perspective and be based on vulnerability assessments that account for conflict risks respectively.

Research and evidence gaps: For a comprehensive perspective on climate, peace, and security there is a need for improving and expanding the current empirical research on this nexus. This includes expanding beyond the traditional understanding of conflict and encompassing climate security risks, incorporating indirect linkages into the analysis, as well as developing intersectional approaches, and building upon community knowledge.

Finance for climate security: There is the need for investments with co-benefits for both adaptation and peacebuilding across Guatemala's hotspots for climate-related security risks. To achieve this, some options include leveraging pre-existing networks and multi-stakeholder platforms to support the development, implementation, and scaling of financial interventions and enhancing organizations' grant writing and fundraising skills. Furthermore, identifying existing climate finance instruments at the national level that could be targeted for improved conflict-sensitivity is likely to facilitate the emergence of more conflict-sensitive and peace responsive funding.

Voices from the field

Participatory workshops held in El Carpintero, Tenedores, and Lima uncovered resilience building local solutions based on collective action that contribute towards sustainable peacebuilding.

To avoid inter-community conflicts surrounding access to water resources, practical solutions were identified such as strengthening the role of water-related committees within community governance to foster engagement with local populations and to increase the capacity for conflict management. An integrated and collaborative water management approach with access to climate information systems was also proposed for active participation at the department-level through the Agro-Climatic Technical Committees, where participants can exchange climate-relevant information such as on climate adaptation practices and climate change developments.

Secondly, to address territorial conflicts over forest resources, a proposal emerged for the use of forest management as a mechanism for conflict management. Mandating the community with developing and updating a management plan, along with monitoring and enforcing regulations and sanctions could potentially strengthen state-society relations and generate a sense of interdependence and a shared identity over the forest, as well as create employment opportunities for those involved in forest management. In addition, to reduce dependence on seasonal and rural-urban migration, which are associated with insecurity risks and hardship, participants proposed the establishment of an association of local coffee producers and a coffee cooperative to strengthen coffee production within the community, thereby potentially generating employment opportunities.

Lastly, to address low access to land, insecure tenure and land-based conflicts that are exacerbated by climate impacts on the agricultural sector, one of the proposed solutions was to create a local farmer's association that would focus on finding alternative arrangements between herders and farmers that increase a secure access to land, which would incentivize farmers to adopt agricultural conservation practices. This would protect livelihoods of both farmers and herders, and open up previously unavailable land, hence potentially reducing the risk of land-based conflicts. Collective action to strengthen market access could potentially also lead to supply chain arrangements that better protect local livelihoods, by organising direct access to local wholesale centres, rather than through individual intermediaries. This could also reduce competition and drop agricultural prices.

Data Sources

Climate: CHIRPS, AgERA5, TerraClimate, NASA MODIS;

Conflict: ACLED;

Socio-economic: Institute for Health Metrics and Evaluation, Socio-economic Data and Applications Center Colombia university, Demographic and Health Surveys, Facebook wealth maps, Malaria Atlas Project, NASA SEDAC at the Center for International Earth Science Information Network, Earth Observation Group, Payne Institute for Public Policy, Colorado School of Mines, FEWSNET,

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Research Team

Where & Who
Andres Camillo Mendez
Alex Orenstein
Benson Kenduiywo
Harold Armando Achicanoy Estrella

How
Ashleigh Basel
Anna Belli
Alessandro Craparo
Charlotte Penel
Ignacio Madurga-Lopez
Leonardo Medina Santa Cruz
Marina Mastrorillo
Tània Ferré Garcia
Victor Villa

What
Bia Carneiro
Frans Schapendonk
Ignacio Madurga-Lopez
Leonardo Medina Santa Cruz

Supervision and management
Peter Läderach
Theresa Liebig
Grazia Pacillo