



BIG DATA

FOR SOCIAL GOOD

Case Study:

Building communities resilient to climatic extremes



Food and Agriculture Organization of the United Nations

The GSMA represents the interests of mobile operators worldwide, uniting more than 750 operators with over 350 companies in the broader mobile ecosystem, including; handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors.

The Big Data for Social Good initiative convenes public and private organisations to accelerate the mobile industry's impact against the UN SDGs. Infectious diseases, pollution, earthquakes, floods and other disasters are among the greatest challenges the world faces today. Mobile operators can provide powerful and unique insights based on anonymised, aggregated network data to help solve these complex problems.

Mobile Big Data can help public health organisations to more effectively respond to epidemics and plan targeted health interventions. It can support emergency relief agencies to more accurately and efficiently direct their resources in times of crises, or allow governments to better understand the impact of pollution and climate change on citizens.

Through the GSMA, mobile operators and partners across geographies have come together to accelerate and scale the opportunity for Big Data for Social Good. The GSMA offers a unique platform to establish a common framework and best practice approaches, while respecting and protecting individuals' privacy.

Summary

Internal displacement is quickly becoming a silent world crisis. In 2017, an estimated 19 million people in 135 countries were displaced from their homes and forced to move elsewhere in the country, in order to survive.¹ In the last decade, estimates suggest an average 25.5m people have been displaced internally each year due to natural disasters; with weather related hazards, particularly storms, accounting for the majority of these displacements. For example, in the last year alone, floods and storms have contributed to the internal displacement of 16.1 million.²

Latin America is among the regions that are most fragile and vulnerable to the impact of climate variability. By 2050 as many as 17 million people in Latin America could be forced out of their homes by persistent slow onset climate change.

Alarming, these numbers are likely to be underestimated, as data on Internally displaced persons (IDPs) is inherently difficult to collect. This is particularly the case in low and middle-income countries, where IDPs are more likely

to live in remote locations with poor infrastructure, or may be surrounded by volatile security situations. Thus, measuring migration patterns becomes a very complex task, compounding the economic and social impact on these individuals, families and communities. This results in IDPs becoming invisible to the state and international organisations, with their needs unaccounted and unprepared for.

In Latin America, Telefonica and the United Nations Food and Agriculture Organisation (FAO) have partnered to address this knowledge gap through mobile Big Data. By using mobility patterns as a proxy for human behaviour, Telefonica was able to measure and map previously unseen migration patterns. By providing this critical data, Telefonica and FAO are able to support agencies and policy makers in understanding where people are moving from and where they are going, enabling the government to implement social protection measures that enhance citizens capacity to manage the economic and social shock(s) of displacement, reduce climate-related displacements and build more resilient communities.

1. Internal Displacement Monitoring Centre. "Global Report on Internal Displacement 2018". Web. 21 Sept. 2018. <http://www.internal-displacement.org/global-report/grid2018/>

2. *ibid.*

The climatic variability challenges

Within South America, Colombia has the highest occurrence of major natural hazard events, such as cyclones, landslides, and floods. To quantify this:

- 84% of the population are vulnerable to experience two or more extreme climate events.³
- The World Bank estimates that there are 3.7 million people in Colombia vulnerable to climate-related impacts.⁴
- The IDMC estimates that in 2017, 25,000 people were displaced due to disasters in Colombia.⁵

Catalysed by these circumstances, Telefónica's Data Unit LUCA and FAO are working to help Colombia respond more effectively and efficiently to climatic variability and address the plight of IDPs.

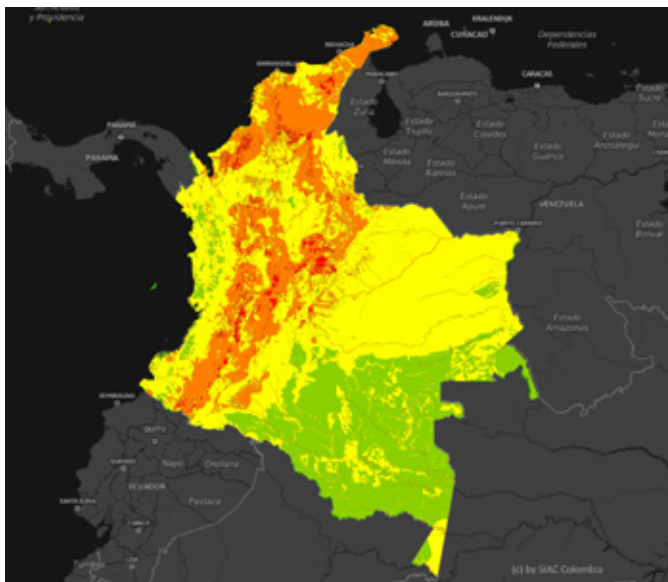
The Sistema de Información Ambiental de Colombia has mapped the potential impact of climate change in Colombia to 2040 (see Figure 1 and 2), providing insight into displacements spurred by climatic variability. The repercussions of these events often result in involuntary evacuations, particularly for those in coastal communities and rural areas. These evacuations are often the first step in citizens becoming a longer-term IDP.

3. Global Facility for Disaster Reduction and Recovery. "Colombia." Web. 25 Sept. 2018. <https://www.gfdr.org/colombia>
 4. The World Bank. "Colombia Dashboard Overview". Web. 25 Sept. 2018. http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCode=COL&ThisTab=RiskOverview%20
 5. Internal Displacement Monitoring Centre. "Global Report on Internal Displacement 2018". Web. 21 Sept. 2018. <http://www.internal-displacement.org/global-report/grid2018/>



Figure 1

Potential Impact of Climate Change in Colombia 2011-2040.



Source: Sistema de Información Ambiental de Colombia.

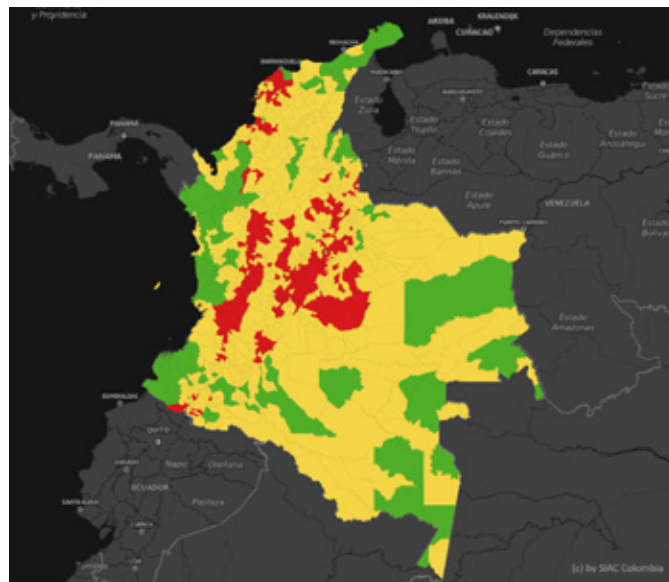
Colour by: Impact

- Very high
- High
- Medium
- Low
- Very low



Figure 2

Adaptation capacity for municipalities of Colombia to Climate Change



Source: Sistema de Información Ambiental de Colombia.

Colour by: capacity

- High
- Medium
- Low

How mobile data can help

In order to identify the focus area in Columbia for the Proof of Concept, partners examined climate-related data from different departments in Colombia, prioritising locales according to their predicted vulnerability to climate extremes. Based on this initial assessment, the north side of the La Guajira department was identified as a high risk area.

Following the geographical analysis, Telefonica aggregated and anonymised Call Detail Records (CDRs) of their 11+ million customers in Colombia and combined this with government and open datasets to produce previously unattainable insight on the population's movements in response to climate extremes. Looking at historical mobile data from 2017, Telefonica were able to model where populations in La Guajira impacted by climatic variability-related natural disasters were located, where they moved when forced

to abandon their homes, and the associated resources available to them.

Telefónica's LUCA used their SmartSteps platform to analyse mobile network data from La Guajira. SmartSteps scans mobile user activity records and builds a mobility profile for each mobile phone line. Insights derived from these profile analyses enable the quantification of migratory flows by groups of people within the department. This information is critical to build a fuller understanding of internal migratory phenomena due to climatic variability. Moreover, because these insights can be generated regularly, the SmartSteps platform can be used to create continuous IDP monitoring tools for FAO, the Government of Colombia and any of the international and local organisations that address internal displacement issues.

Impact of the mobile data solution

This new approach to address the IDP data gap was able to reveal 12,000 people who left the La Guajira region during the drought in 2017. Mapping these combined movements uncovered an outward flow of individuals from rural to urban areas (see Figure 3). The use of mobile Big Data to identify this urbanisation trend will help facilitate FAO and government authorities to provide relevant long-term support to vulnerable communities. This further demonstrates this new methodology of using mobile big data has potential to become an influential mechanism through which climate-related IDPs can be made visible and mitigation strategies informed.

Armed with these new insights and with further analysis of its underlying causes and the impact on agriculture and rural development, FAO indicated they can:

- Facilitate policy dialogue aimed at improving understanding of rural migration and drive sustainable agricultural practices that limit the impact of climate change on citizens.
- Disseminate best practices that help develop innovative IDP support solutions, promote effective management of natural resources and drive diversification to non-agricultural activities.
- Support institutional capacities to manage displacements, disaster risk reduction, adaptation, measures and mitigation to climate change.
- Strengthen partnerships and advocate for the underlying causes of migration to be addressed.
- Advocate and implement financial inclusion practices for the vulnerable citizens in rural areas.

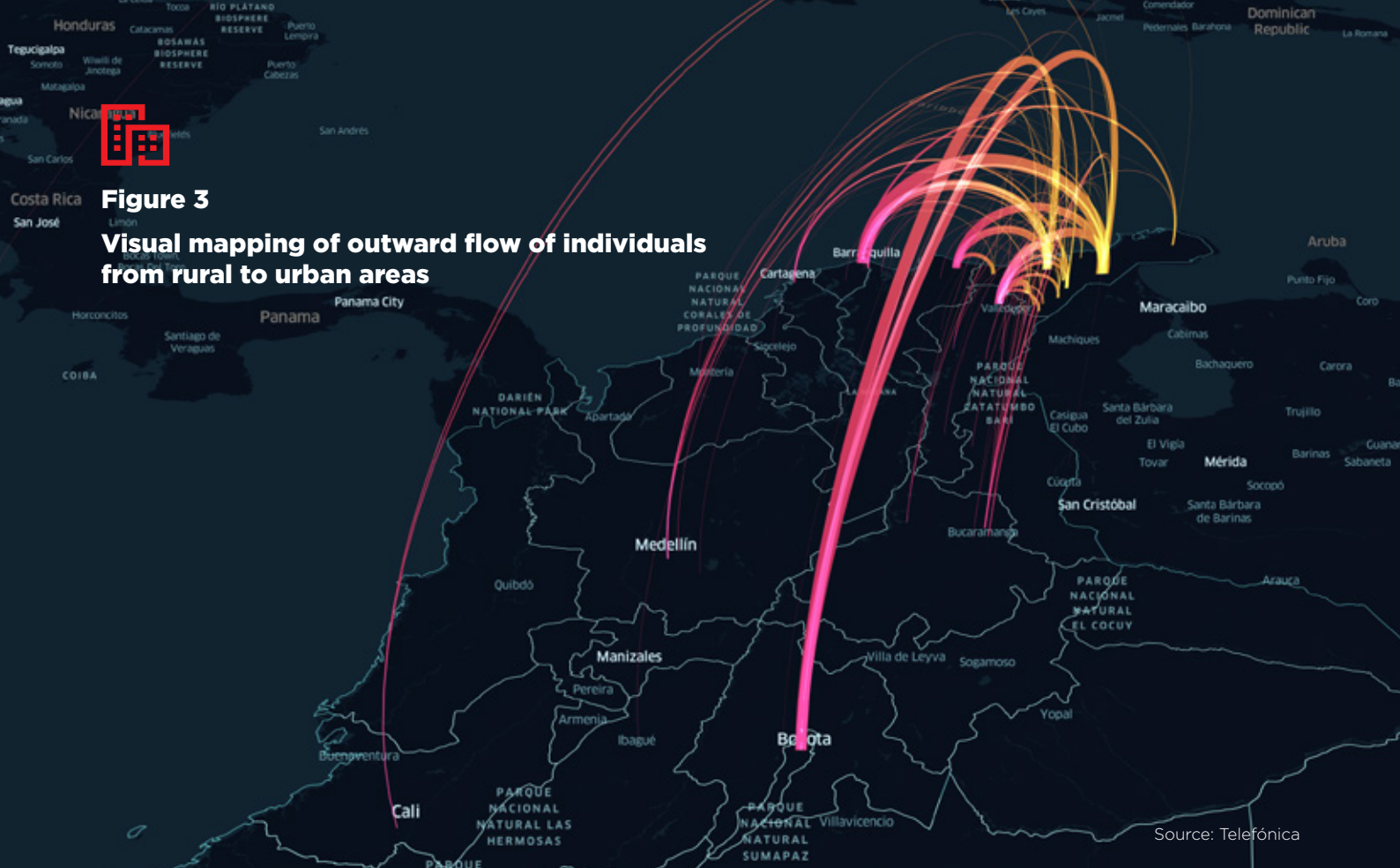


Figure 3
Visual mapping of outward flow of individuals from rural to urban areas

Source: Telefónica

Key Lesson Learned

Consideration of potential bias from other displacement events: Data generated from mobility patterns unrelated to climatic variability must be carefully considered, and removed where possible, to make the insights generated more precise.

Cross-referencing displacement patterns with other data sources, such as surveys with IDPs, can help strengthen the identification of displacement due to climatic variability.

Going forward

Telefónica and the FAO have identified a series of potential next steps



Based on the success of the Proof of Concept, Telefónica and FAO are now replicating the La Guajira model in the Tolima and Huila departments. The data generated will be used to influence national policymaking in Colombia to help reduce the incidence of new and protracted climate-related displacements.



The use of mobile big data to monitor climate induced displacement will support the achievement of SDG 11; aiming to make cities and human settlements inclusive, safe, resilient and sustainable. Adaptation of the approach to monitor natural disasters will also be explored, with potential to use the tool in other Hispanic American countries in which Telefónica operates.

Watch our video, learn about the initiative and contact us for more information: bd4sg@gsma.com

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