Modelling displacement

Justin Ginnetti

Although those seeking a single global prediction will be disappointed, today's models of climate change- and disaster-induced displacement can provide a range of scenarios for specific countries, regions or hotspots.

Empirical models of climate change- and disaster-induced displacement and migration are used to predict how people would be likely to migrate in different scenarios. They have been around for decades[1] but the way such models are being used has evolved over time. The Internal Displacement Monitoring Centre (IDMC) and Climate Interactive[2] have developed a system dynamics model which not only simulates the impacts of droughts, floods and climate change on displacement in northern Kenya but also simulates what happens when different measures are implemented to prevent, mitigate or respond to displacement.

Before undertaking work on a model, IDMC had to decide if an inherently mobile population of pastoralists in the Horn of Africa could become displaced in the first place, coming to the conclusion that pastoralists become displaced by virtue of the loss of their pastoralist livelihood. The next step was to figure out how, when and why pastoralists become displaced. Articulating this causal theory of displacement meant working with other researchers, government officials, NGOs and pastoralists themselves. Over a period of months, this disparate group of actors collectively mapped all of the important factors and causal relationships that connect rainfall and displacement outcomes. These include the interactions between the climate and weather systems, pasture productivity, livestock herd dynamics, livestock prices, and pastoralist decision-making and marketing strategies. Once the causal theory was mapped, stakeholders identified potential entry points for addressing drought-related displacement.

We tested the behaviour of the pastoralist displacement model against historical behaviour of key indicators, in this case dating back to 1990, to see whether the model was able to reproduce the same outcomes. Since pastoralist displacement itself has not been well recorded – or even recognised – this validation and calibration of the model involved other relevant factors such as livestock market prices, livestock and human population data, and livestock birth and death rates. Finding ample historical data to validate every component of the model was impossible, resulting in an increase in uncertainty.

The initial findings of the analysis are both counter-intuitive and encouraging. If droughts become more frequent and severe in the future due to climate change, it will lead to more displacement – but not a large amount more. Secondly, the analysis suggests that the arid and semi-arid lands, particularly in Kenya, could potentially support more livestock and more pastoralists. That said, a greater number of subsistence pastoralists will result in more displaced pastoralists when droughts occur, unless actions are taken to mitigate that risk.

Modelling for policymakers

The model also allowed policymakers to test preventive measures. The Government of Kenya's National Drought Management Authority (NDMA) has used the system dynamics model to test the impacts of different land-use and livestock policies on reducing the risk of drought-induced displacement in the future. IDMC and Climate Interactive plan to work together with the NDMA to simulate the effectiveness of the different policy options and investments outlined in the country's Ending Drought Emergencies plan. The aim of this collaboration is to use the displacement model to take evidence-based decisions to reduce drought-related displacement in the future.

IDMC and Climate Interactive are also using models to help the Government of Nigeria, where four million people have been displaced by floods since 2008. The country's National Emergency Management Authority is interested in identifying the drivers of flood risk and opportunities to address them. IDMC and Climate Interactive are also exploring ways to develop new models and to customise existing ones to support National Adaptation Plans and the World Meteorological Organization's Global Framework for Climate Services.

Some countries that perceive themselves to be likely destinations of people uprooted in relation to disasters and climate change have already invested in understanding these patterns of mobility.[3] Simultaneously, many countries consider themselves to be particularly vulnerable to the impacts of climate change, which is why the Least Developed Countries proposed a displacement coordination mechanism in the latest round of climate change negotiations.

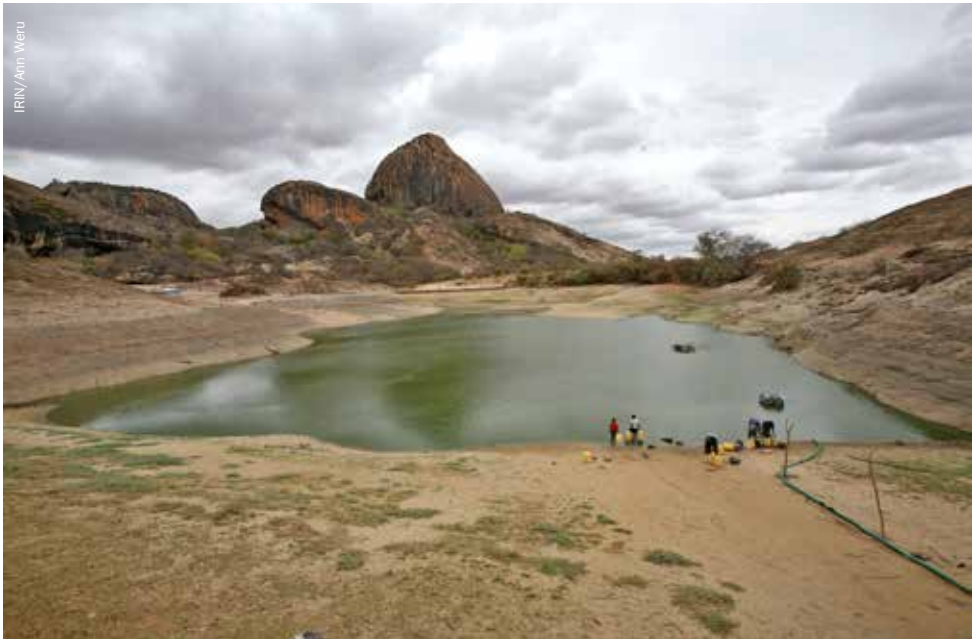
As more and more policymakers and practitioners use these tools, they will better understand how models can be used and, just as importantly, how they cannot. Perhaps ironically, the one question that our models cannot (or, rather, no longer try to) answer is how many people are likely to be displaced globally by 2050 or 2100. While the popular media still crave a single global figure, policymakers, practitioners and modellers have instead focused on more specific and actionable questions.

Justin Ginnetti *justin.ginnetti@nrc.ch* is the Senior Advisor on Research Methodologies and Evidence at the Internal Displacement Monitoring Centre.
www.internal-displacement.org

1. See Smith C, Kniveton D, Wood S & Black R (2008) 'Predictive modelling', *Forced Migration Review* issue 31 www.fmreview.org/climatechange p59.

2. www.climateinteractive.org

3. See, for example, the UK government's Foresight project 'Migration and global environmental change', the European Union's support of initiatives such as 'Climate Change and Migration: Knowledge, Law and Policy, and Theory' and the US Department of Defense's '2014 Climate Change Adaptation Roadmap'.



The Ngomeni rock water catchment dam in Mwingi district, Kenya, which serves hundreds of households, drying up for the first time in years in 2011, according to residents.