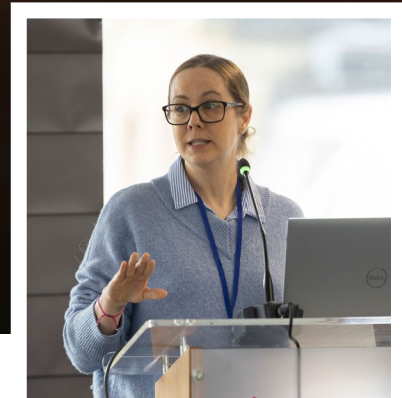




Astrid Werkmeister
University of
Strathclyde
Satellite Applications
Catapult

CASE STUDY

The Challenge

Climate-related displacement is increasing worldwide, yet decision-makers often lack clear, accessible evidence linking environmental hazards to the conditions that lead communities to move. While satellite Earth observation provides valuable environmental information, its role in understanding displacement risk remains unclear and is often misunderstood.

The challenge addressed by this Researcher in Residence project was to explore how satellite-derived evidence can meaningfully contribute to understanding climate-related displacement and resilience. A key question was whether satellites could be used to monitor population movement directly, or whether their value lies elsewhere in the evidence chain. At the same time, many organisations working on resilience, humanitarian response, and climate risk struggle to access and interpret environmental data. Satellite data is technically powerful but often difficult to integrate with socio-economic datasets or translate into formats useful for policy and planning.

The project therefore set out to clarify where satellite data adds real value, develop a framework linking climate hazards to displacement pressures, and translate the findings into accessible outputs that support engagement with researchers, policymakers, and practitioners.

Innovation

The project combined literature analysis, conceptual modelling, and user-oriented communication to develop a new way of framing the role of satellite data in climate-related displacement.

First, the research analysed existing work on climate migration using the CliMig database, identifying patterns in how environmental data, socio-economic data, and satellite observations are used in displacement research. This was combined with a systems approach that mapped the relationships between climate hazards, environmental impacts, human consequences, resilience factors, and displacement pressures.

A key innovation was reframing the role of satellite data. Rather than attempting to use satellites to track population movement directly, the project demonstrated how Earth observation can monitor hazard impacts, infrastructure disruption, and recovery processes that shape displacement risk.

The project also translated these findings into a series of accessible outputs. A collection of five ArcGIS StoryMaps was developed to communicate the research to non-specialist audiences, including case studies of flooding in Pakistan and resilience analysis using night-time lights as a proxy for disruption and recovery.

User engagement conversations with researchers from multiple disciplines further informed the work, highlighting challenges around dataset discoverability, transparency, and uncertainty communication.

Result

The project produced several key outcomes that help clarify how satellite data can contribute to understanding climate-related displacement.

First, the research demonstrated that satellites are currently better suited to monitoring the conditions that influence displacement, such as environmental disruption and recovery, rather than directly observing population movement. This provides a clearer and more realistic positioning for Earth observation within resilience and humanitarian analysis.

Second, the project developed a systems framework linking climate hazards, environmental impacts, resilience factors, and displacement pressures, providing a structured way to integrate multiple data

sources and identify where satellite indicators can add value.

Third, the work produced a public-facing ArcGIS StoryMaps collection titled Decoding Climate Displacement, which translates the research into accessible visual narratives. Since publication, the StoryMaps have received 2,754 views, supported by a LinkedIn dissemination campaign that generated 8,619 impressions and reached 5,267 members.

The project also generated additional visibility through media coverage, including features in Holyrood Magazine, PreventionWeb (UNDRR), and an interview with STV.

Impact

The project provides a clearer pathway for how satellite Earth observation (EO) can support resilience and displacement research. By identifying the most practical role for satellite data, monitoring environmental disruption, recovery, and resilience indicators, it helps organisations avoid unrealistic expectations while strengthening the use of EO evidence in decision-making.

The StoryMaps collection and media outputs make complex research accessible to a wide audience, including policymakers, researchers, and practitioners working on climate risk and humanitarian challenges. These outputs can be reused as engagement tools in future discussions on resilience monitoring, climate risk assessment, and evidence-based policy development.

The framework developed through the project also provides a foundation for future work that integrates satellite indicators with complementary datasets such as digital mobility data. This combined approach has the potential to improve understanding of how environmental shocks translate into displacement pressures.

Beyond the immediate outputs, the project strengthened collaboration between the University of Strathclyde and the Satellite Applications Catapult and created opportunities for future engagement with policy communities and international partners.



Satellite Applications Catapult

“This project shows how Earth observation research can be translated into accessible, user-facing outputs that help researchers and policymakers better understand the environmental conditions that contribute to climate-related displacement.” - Andy Norris

Astrid Werkmeister

“Satellite data is incredibly powerful, but its real value in the climate displacement space is not in tracking people directly. Instead, it helps us understand the environmental disruptions and recovery processes that shape displacement risk.”