



INNOVATION FUND

Use of data and tools to map and monitor coastal informal settlements (MINDSET)

Parent project: Harnessing Innovative Technologies to Support Resilient Settlements on the Coastal Zones of the Caribbean (HIT RESET Caribbean)

PROJECT COORDINATOR

University of Technology (UTECH), Jamaica

PARTNERS

Acacia Consulting & Research, Canada  
Nouvel Strategies, Saint Lucia

LOCATION

Jamaica, St. Lucia

PERIOD

April 2023 - October 2024

EU FUNDING

EUR 300,743.89

SECTOR

Urban development

KEYWORDS

Climate change, natural hazards, coastal settlements, environmental research, digital technologies, community mapping

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CHALLENGE

Rapid population growth in a concentrated number of urban areas, combined with inefficient housing delivery systems and inadequate incomes, has generated a strong but unmet demand for housing, resulting in a large and growing housing deficit in Saint Lucia and Jamaica that contributes to unplanned and unauthorised residential development referred to as 'informal settlements'.

Households living in these areas often experience poverty and lack access to municipal services. Those residing in coastal areas are vulnerable to climate and disaster risks, such as sea-level rise, coastal flooding, erosion and wind damage, coupled with unsustainable land use practices (e.g., excessive deforestation, poor building practices, unplanned settlements in environmentally sensitive areas and inadequate solid and liquid waste management).

One critical limitation of planning for the regularisation of informal settlements is the lack of knowledge about the extent of unauthorised and unplanned developments, including housing characteristics and socio-economic profiles of inhabitants. Typically, informal settlements are monitored through door-to-door household surveys which do not determine boundary delimitations or integrate additional variables, such as climate risks. Further, collected data is not updated frequently, making it difficult to track change overtime.

PERSPECTIVES

Using digital technologies and novel data sets, the project will develop a cost-effective and reliable methodology to map and monitor informal settlements. Data that is regularly updated, accessible and reflects local conditions can be used to inform public interventions that serve to mitigate hazards and improve the socio-economic and housing conditions for residents of informal settlements. An updated inventory and profile of informal settlements and their inhabitants also serves as a benchmark for tracking changes to demographics, boundaries and housing conditions overtime.



JUSTIFICATION

National and local governments require tools for the efficient use of land in coastal zones occupied by informal settlements, in the form of land use or coastal zone management plans, policies or strategies that support the creation of climate-resilient and sustainable coastal zones. One of such tools could be a methodology that produces a spatial dataset containing variables on informal settlements, housing conditions and socio-economic characteristics of the inhabitants that should be integrated with existing climate and environmental risk data.



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**METHOD**

Mapping and monitoring of informal settlements by mapping settlement boundaries using novel datasets, such as utility data, drones and field validation, and linking the informal settlement boundaries to 2021 census data. Geospatial data will be produced that contains variables on informal settlement boundaries, housing conditions and socio-economic characteristics.

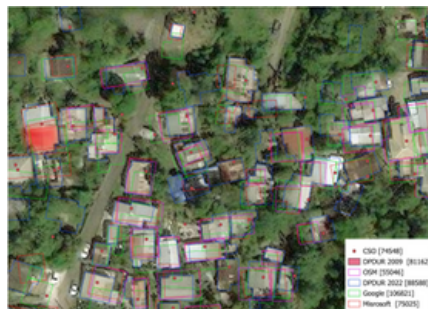
A coastal informal settlement monitoring system (CISMS) will be developed and piloted in Saint Lucia. As Jamaica is currently conducting a countrywide door-to-door squatter census in informal settlements to collect data on settlement boundaries and inhabitants, the project will use this data to validate the piloted methodology in Saint Lucia in selected parishes in Jamaica. By applying the methodology in both countries, the project will be able to determine the effectiveness and cost/time-saving value of using a digital technology and census data versus traditional door-to-door methods in informing analysis and decision making on informal settlements.

National and local government entities responsible for land use planning and coastal zone management in Saint Lucia and Jamaica will be trained in the use of CISMS.

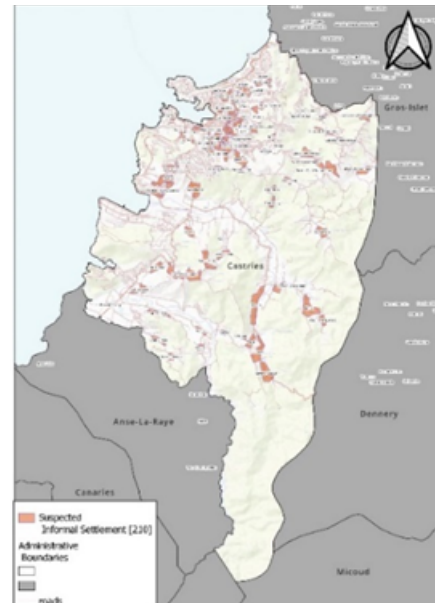
**INNOVATIVENESS**

A Coastal Informal Settlement Monitoring System with the capacity to integrate high quality and accessible spatial data, developed at a faster pace and at a lower cost than conventional methods, including:

- Integrating multiple data sets using open source mapping software;
- Relying on open source data sets from Google and Bing;
- Relying on crowd sourced data such as Open Street Map;
- Integrating and interpretation of drone imagery into data sets;
- Linking geographic files to household survey data (census) to develop building and household profiles without the requirement for a door-to-door survey; and
- Use of machine learning to replicate and scale up results to city-wide or island-wide systems.



Data variation in housing footprints in the community of Bises, Castries District, Saint Lucia.



Potential informal settlements in the Castries District in Saint Lucia with estimated boundaries of informal settlements based on an analysis of several criteria using various date sources in 2022.

**EXPECTED RESULTS**

**Impact**

- Informal settlements integrated into climate-resilient and sustainable formal coastal zone development in Saint Lucia and Jamaica.

**Outcome**

- National and local government entities responsible for land use planning and coastal zone management in Saint Lucia and Jamaica actively using the monitoring system - developed by the project - to plan for the efficient use of land in coastal zones occupied by informal settlements.

**Outputs**

- National and local governments have access to the coastal informal settlement monitoring system (CISMS).
- National and local government entities responsible for land use planning and coastal zone management in Saint Lucia and Jamaica enabled to use coastal informal settlement monitoring systems.

**HIT RESET** is implemented by UWI in partnership with CDEMA and AdeKUS. **HIT RESET** provides support for projects that develop innovations to increase resilience in coastal communities of the Caribbean and strengthens institutions', national and local governments' ability to leverage information and knowledge for policy amendments.

HIT RESET supports 9 projects implemented in Barbados, Dominican Republic, Jamaica, Saint-Lucia, and Trinidad & Tobago that focus on:

- Digital and modelling technologies utilised by coastal development agencies and high-level decision makers in CARIFORUM countries to predict the impacts of climate change and natural disasters, and to plan and manage coastal communities.
- Government entities, coastal development agencies and coastal communities in CARIFORUM countries developing urban planning policies and/or plans that are conducive to the use of digital and modelling innovations for sustainable coastal development.

