Climate change impacts and adaptation for coastal transport infrastructure in the Caribbean

United Nations Conference on Trade and Development – UNCTAD

Full documentation available at: **SIDSport-ClimateAdapt.unctad.org**

Background

Small Island Developing States (SIDS) share many socio-economic and environmental vulnerabilities. Their climate, location, geomorphology and dependence on international maritime and air transportation for food and energy security and access to world markets make them prone to natural disasters and particularly vulnerable to Climate Variability and Change (CV&C). At the same time, SIDS have limited capacity to conduct targeted risk and vulnerability assessments for their critical assets/resources and identify, prioritize and implement requisite adaptation options. Against this background, and drawing on earlier work, UNCTAD has carried out a technical assistance project focusing on port and airports in two Caribbean SIDS, namely Saint Lucia and Jamaica..

The main objective of the project has been to strengthen the capacity of policymakers, transport planners and transport infrastructure managers in SIDS to take appropriate adaptation measures to mitigate climate change impacts on their critical international transportation assets (seaports/airports).

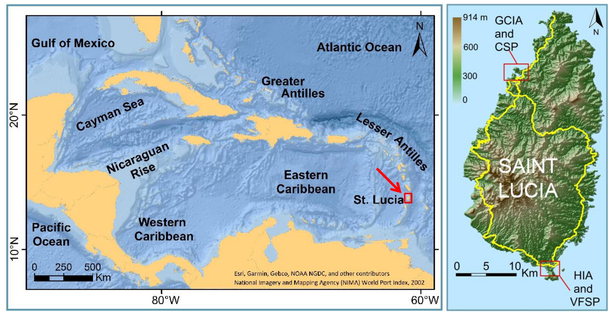
To this end the project included:

- ❑ Development/application of a methodology to assist transport infrastructure managers and other relevant entities
- ❑ Case studies to enhance the knowledge and understanding at the national level
- ❑ Workshops for training/demonstration and feedback by a wide range of stakeholders

The case study

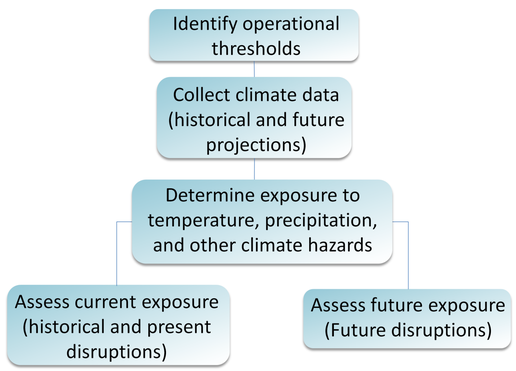
Here, the main results of one of the case studies (***Saint Lucia),*** are presented. The case study sought to:

- ❑ assess the potential CV&C impacts on critical transport assets (seaports/airports) under different climatic scenarios, including at the 1.5 °C global warming level (projected to be reached in 2030s
- ❑ project the exposure to coastal erosion under CV&C
- ❑ support the development of a methodological framework that can be generally applied for rapid vulnerability assessments
- ❑ identify options for adaptation responses



In ***Saint Lucia***, the assessed critical assets are: the George Charles International Airport (***GCIA***), the Port Castries Seaport (***CSP***), the Hewanorra International Airport (***HIA***) and the Vieux Fort Seaport (***VFSP***)

Operational thresholds method to assess CV&C impacts



Implementation of the methodology showed (amongst others) that:

1 under the 1.5 °C Specific Warming Level (SWL), staff working outdoors at the Saint Lucian critical assets could be at 'high' risk for 2 days/year (d/yr). Under a standard SRES A1B scenario, such days could increase to 30 and 55 d/yr, by 2056-2080 and 2081-2100 respectively.

2 Boeing 737-500 aircraft, currently using HIA, will have to decrease their take-off load for 32 and 70 d/yr, by 2056-2080 and 2081-2100 respectively.

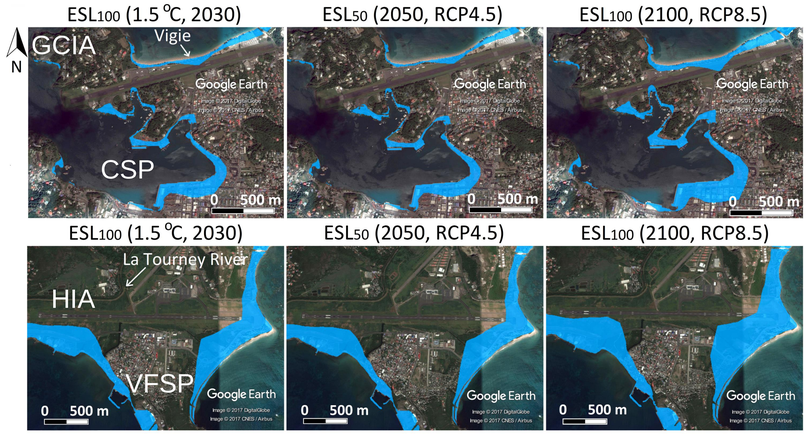
3 for the Saint Lucian seaports, the 1.5 °C SWL will increase the baseline energy requirements by 4% for 168 d/yr.

Coastal transportation asset flooding

Extreme coastal inundation is driven by extreme sea levels (***ESLs***), considered here as the sum of the mean sea level, the astronomical tide and the episodic coastal water level rise due to storm surges and wave set ups. Inundation maps for the critical transportation assets were obtained using the Lisflood-ACC (LFP) dynamic inundation model, a local Digital Elevation Model, and ESL projections by the Joint Reserach Centre JRC-EC (Ispra).

All assets appear increasingly exposed to CV&C.

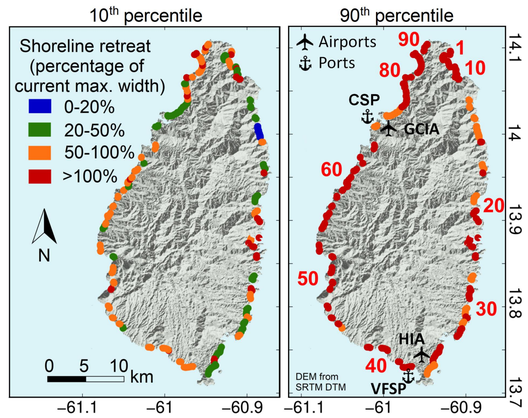
Exposure to extreme events (e.g. under the 1 in a 100-year extreme sea level (***ESL_{100}***) is very high for all assets, even under 1.5 °C SWL.



Sandy shore (beach) erosion

Many Caribbean islands are major international tourism destinations. Sun, Sea and Sand (3S) tourism accounts for 11 - 79 % of the *GDP* of the Caribbean SIDS, and is dependent on the aesthetics, carrying capacity and environmental health of their sandy shores. Future beach erosion in Saint Lucia has been projected for a wide range of environmental conditions and different climatic scenarios.

Under the ***ESL_{100}*** and RCP4.5, according to the lowest 10% of estimates (conservative scenario), about 47% of all beaches will lose at least 50% of their current maximum width, and 25% will be completely overwhelmed in 2050; in terms of backshore asset exposure, at least 16% of those beaches presently fronting infrastructure/assets will be completely eroded during the ***ESL_{100}*** storm event, suggesting substantial backshore infrastructure and asset damages, even in the case of a total post-storm beach recovery. The situation is projected to be much worse if the 90th percentile is considered.



In order to conserve beaches under increasing mean sea levels, beach nourishment schemes will be required. By 2050, mitigation of beach erosion and retreat from the projected mean sea level rise alone, would require between 1.06 and 3.1 million m^3 of suitable replenishment material.

Poster prepared by: Regina Asariotis, Policy and Legislation Section, UNCTAD; Isavela N. Monioudi, University of the Aegean, Greece.

For technical details, see also **Monioudi et.al**, ***Climate change impacts on critical international transportation assets of Caribbean Small Island Developing States (SIDS): the case of Jamaica and Saint Lucia***. Reg Environ Change (2018) https://doi.org/10.1007/s10113-018-1360-4

UNDA 1415O (2015-2017)
SIDSport-ClimateAdapt.unctad.org

Implementing agency: UNCTAD
Project Coordinator: Policy and Legislation Section, TLB/DTL, **unctad.org/ttl/legal**

Partners: UNECLAC, UNDP, UNECE, UNEP, CCCCC, ECJR, OECS Comm, International/regional academic experts