

UNCTAD National Workshop Saint Lucia
24 – 26 May 2017, Rodney Bay, Saint Lucia

**“Climate Change Impacts and
Adaptation for Coastal Transport
Infrastructure in Caribbean SIDS”**

**Background and introduction of the
project objectives and context**

By

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*UNCTAD National Workshop Saint Lucia
"Climate change impacts and adaptation for coastal transport
infrastructure in Caribbean SIDS", 24-26 May 2017*

**UNDA project on "Climate change impacts on coastal
transport infrastructure in the Caribbean: Enhancing
the adaptive capacity of Small Island Developing
States"**

**Background and introduction of the project
objectives and context**

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UNCTAD: UN system focal point for integrated consideration of trade and development
Doha Mandate (2012):

UNCTAD to "advise SIDS on the design and implementation of policies addressing their
specific trade and trade logistics challenges linked to their remoteness and
geographical isolation"

- Ad Hoc Expert Meeting on the subject ahead of the Samoa Conference, July 2014
- Review of Maritime Transport 2014: Chapter on the maritime transport of SIDS
- Expert Meeting on the subject, following the Samoa Conference, November 2014
- "Closing the Distance: Partnerships for Sustainable and Resilient Transport Systems in SIDS"
- Ongoing work under UN Development Account funded project



Shipping – international, regional and domestic [1]

1. Cargo volumes and imbalances

- Small cargo volumes: limited scope for SIDS to benefit from economies of scale or attract shipping services and investors
- Due partly to their small size/narrow resource base, SIDS face significant trade imbalances (imports exceeding exports); this increases transport costs

2. Access to global shipping networks

- Remoteness from the major global markets (E. Asia, N. America, Europe, the Mediterranean, W. Asia and the Indian subcontinent)
- weighted average distance from markets: about 8,200 km for Caribbean SIDS and 11,500 km for Pacific SIDS
- SIDS are not in the path of the main shipping lanes network, but are served primarily by N-S shipping routes through major relay or trans-shipment hubs located on the E-W container belt



Shipping – international, regional and domestic [2]

3. Inter-island regional and domestic shipping

- Regional and for some SIDS, inter-island domestic transport is vital to:
 - connect islands, spread across distances and facilitate productive sectors (e.g. tourism, fisheries and agriculture)
 - ensure access to education, health and business and deliver service and infrastructure development

4. High degree of dependency on energy imports

- SIDS are highly dependent on fossil fuel imports (most spend more than 30 % of their foreign exchange earnings, annually)
- Transport consumes about 70 % of the total fuel imports in the Pacific region, with maritime transport being the majority fuel for some States (e.g. in Tuvalu (2012), 38% of total fuel imports - 64 % of all transport fuel was for maritime use)



Shipping – international, regional and domestic [3]

5. Shipping market structure

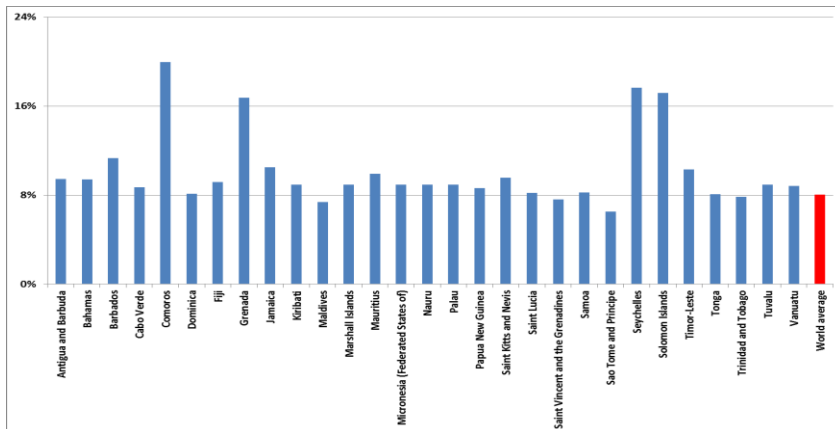
- Liner shipping is a highly concentrated industry: 10 companies account for about 60 % of global container-carrying capacity and 20 companies controlling 80 %
- In relation to the SIDS, concerns have been expressed about anticompetitive practices, including collusion in setting freight rates

6. Freight rates and transport costs

- SIDS generally face higher freight costs for their imports, due to their unique features/vulnerabilities, in particular, remoteness, smallness and insularity
- According to UNCTAD estimates (Fig. 1), the 10-year average (2004–2013) of selected SIDS expenditures on international transport costs as a share of their imports value was about 10 %, i.e. 2 % higher than the world average (8.1 %)



10-year average expenditure (2004-2013) of selected SIDS on international transport as a percentage of the value of imports



Source: UNCTAD estimates. UNCTAD Review of Maritime Transport 2014. Chapter 6.



Seaport infrastructure and equipment

Infrastructure and equipment

- Costly rehabilitation/reconstruction may be necessary; relocation of facility generally not an option
- Maintenance of port infrastructure/equipment is essential, but may be costly and available financing is often inadequate
- Port infrastructure facilities often pre-date containerization and do not meet requirements for rapid container handling
- Growing tourism has resulted in increased cruise ship calls; in the absence of dedicated berthing facilities, cruise ships may be given priority berthing at cargo-handling facilities, resulting in cargo-handling delays that increase imports costs and reduce export competitiveness

Financial constraints

- Financing is a key challenge when developing, rehabilitating and maintaining port infrastructure/facilities
- SIDS are often highly indebted and – in view of their classification as middle- income countries – may have limited access to concessionary loans and resources



Air-transport and cruise-ship transport for tourism

Strong nexus between transport and tourism:

- Tourism is a key source of export earnings for all SIDS and, on average, may account for about 30 % of total employment and up to 50 % of GDP
- High air transport prices can lead to declining tourist flows/revenues, as price is an important tourist choice determinant
- The Caribbean is a major destination for cruise ships; other SIDS, such as Cabo Verde, Fiji and Seychelles, are also important ports of call
- Cruise ships require port investments to accommodate the increased size/number of vessels; since berthing space is limited, cruise ships often compete with cargo vessels to berth
- SIDS-tourism generates significant revenues/jobs in the tourist home countries

Seaports are lifelines for the Caribbean SIDS



Ports: Gateways for imports of energy, food, most manufactured goods and for bulky exports

Critical to tourism industry (cruise ships, yachts) and fisheries

Berthing & airport landing fees-significant foreign exchange contributions

Disaster Risks

Natural hazards: Geological and hydro-meteorological hazards (extreme events)

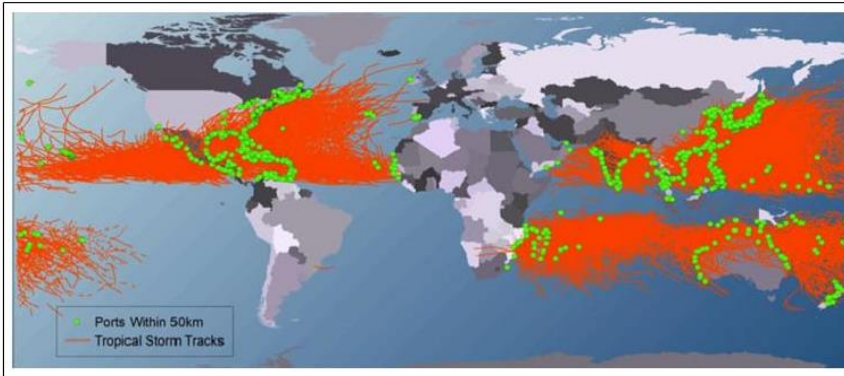
Many SIDS lie at tectonically-active margins or volcanic 'hot spots' and, thus, are vulnerable to earthquakes, volcanism and tsunamis

SIDS are exposed to extreme meteorological events, such as storms, floods, landslides, droughts and heat waves, and changes in climatic patterns e.g. monsoons

These events can compromise infrastructure integrity and disrupt/delay port and airport operations with detrimental effects on SIDS's economies

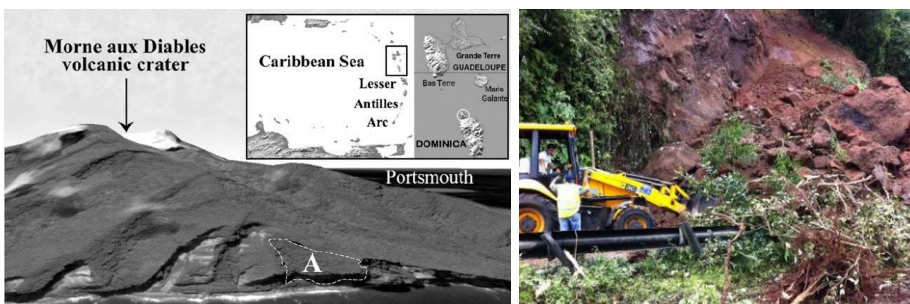
Disaster-risk reduction for transport infrastructure and services is key

Shipping and seaports are vulnerable to storms



Seaports within 50 km of tropical sea storm tracks (1960–2010). Port and storm data from National Geospatial-Intelligence Agency (2011) and Knapp et al. (2010). (Becker et al., 2013)

Caribbean SIDS transport networks are also exposed to landslides due to their
(a) mostly volcanic nature and (b) extreme precipitation events

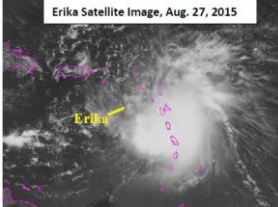


Oblique view (to south) of the north flank of Morne aux Diabes volcano, Dominica. Area A is a landslide block of ~1 million tons (Teuw et al., 2009 EOS, 90)

Caribbean landslides often block main arteries between port/airports and resorts



Storm impacts on SIDS: Tropical storm Erika impacts on Dominica



Rainfall on 27th August: 434 mm



Transport infrastructure damages: (a) bridge and (b) airport apron

An initial assessment of impacts:

Tropical Storm Erika resulted in total damage and loss of EC\$1.30 billion (US\$483 million), equivalent to over 90 % of Dominica's GDP

The majority of damages and losses were sustained in the transport sector (60 %), the housing sector (11 %) and agriculture, fisheries, and forest (10 %)

(Source: Rapid Damage and Impact Assessment, Tropical Storm Erika – August 27, 2015 Report by the Government of the Commonwealth of Dominica September 25, 2015)



Climate Change Impacts on Transport

Climate change/extreme events likely to have *direct* and *indirect* impacts on transport infrastructure and services in SIDS

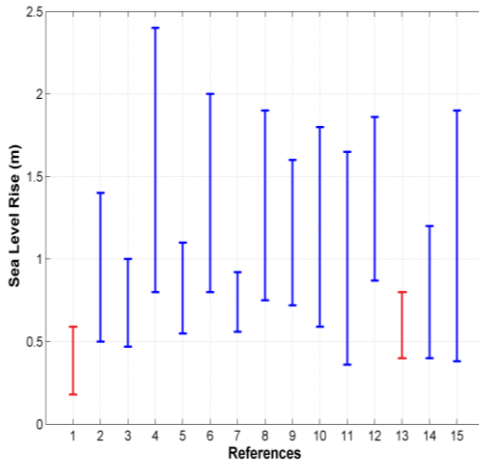
Sea-level rise, temperature and precipitation changes, extreme storms and floods and other climatic factors are likely to

- affect ports, airports and other coastal infrastructure, as well as hinterland transport nodes
- affect demand for shipping/air transport, increasing transport costs
- exacerbate other transport-related challenges

Enhanced climate resilience / climate change adaptation for coastal transport infrastructure is key



Recent mean sea level rise projections (2100)



Key: 1, IPCC (2007), 0.18-0.59 m; 2, Rahmstorf et al. (2007); 3, Horton et al. (2008); 4, Rohling et al. (2008); 5, Vellinga et al. (2008); 6, Pfeffer et al. (2008); 7, Kopp et al. (2009); 8, Vermeer and Rahmstorf (2009); 9, Grinsted et al. (2010); 10, Jevrejeva et al. (2010); 11, Jevrejeva et al. (2012); 12, Mori et al. (2013); 13, IPCC (2013); Horton et al., 2014; and Dutton et al., 2015. Projection variability reflects differences in approaches (UNECE, 2016).



Major climate change impacts on coastal transport infrastructure

Factor	Impacts
Sea level (mean and extreme)	Coastal transport infrastructure
<ul style="list-style-type: none"> • Mean sea level changes • Increased destructiveness of storms/storm surges • Changes in the wave energy and direction 	Damages in port infrastructure/cargo from incremental and/or catastrophic inundation and wave regime changes; higher seaport construction/maintenance costs; sedimentation/dredging issues in port/navigation channels; effects on key transit points; increased risks for coastal road links; relocation of people/businesses; insurance issues
Precipitation	
<ul style="list-style-type: none"> • Changes in the intensity and frequency of extremes (floods and droughts) 	Seaport, airport and road infrastructure inundation; damage to cargo/equipment; and vital node damage (e.g. bridges)
Temperature	
<ul style="list-style-type: none"> • Higher mean temperatures, • Heat waves and droughts • Increased variability in temperature extremes 	Damage to infrastructure/equipment/cargo and asset lifetime reduction; higher energy consumption for cooling cargo; changes in transport demand; lower aircraft loads allowed-need for runway extension

UNCTAD’s work on climate change impacts and adaptation for coastal transport infrastructure and follow-up

(see further <http://unctad.org/en/Pages/DTL/TTL/Legal/Climate-Change-and-Maritime-Transport.aspx>)

2009	UNCTAD Multiyear Expert Meeting: <i>“Maritime Transport and the Climate Change Challenge”</i>
Follow-up	UNCTAD edited multidisciplinary book: Maritime Transport and the Climate Change Challenge UN-Earthscan (Routledge/Taylor&Francis) (2012) 327 pp
2010	Joint UNECE-UNCTAD Workshop: <i>“Climate change impacts and adaptation for international transport networks”</i>
Follow-up	UNECE Group of Experts on Climate Change Impacts and Adaptation for International Transport Networks (2011-2014); mandate extended in 2015; 2012 International Conference - including session on SIDS 2013 EG Report - Climate Change Impacts and Adaptation for International Transport Networks
2011	UNCTAD Ad Hoc Expert Meeting: <i>“Climate Change Impacts and Adaptation: a Challenge for Global Ports”</i>
Follow-up	Academic paper co-published by Experts (2013) Becker et. al, A note on climate change adaptation for seaports, Climatic Change, 2013
2014	UNCTAD Ad Hoc Expert Meeting: <i>“Addressing the Transport and Trade Logistics Challenges of the Small Island Developing States (SIDS): Samoa Conference and Beyond”</i>
	UNCTAD Multiyear Expert Meeting Small Island Developing States: Transport and Trade Logistics Challenges
Ongoing	UNCTAD Port-Industry Survey on Climate Variability and Change
Ongoing	UNCTAD DA Project <i>“Climate change impacts on coastal transport infrastructure in the Caribbean: Enhancing the adaptive capacity of Small Island Developing States (SIDS)”</i>

Climate change impacts on tourism

Coastal transport infrastructure (seaports and airports): critical lifelines for external trade, food, energy, tourism (cruise-ships and air transport)

Assets are threatened by extreme events (storms) and mean sea level rise

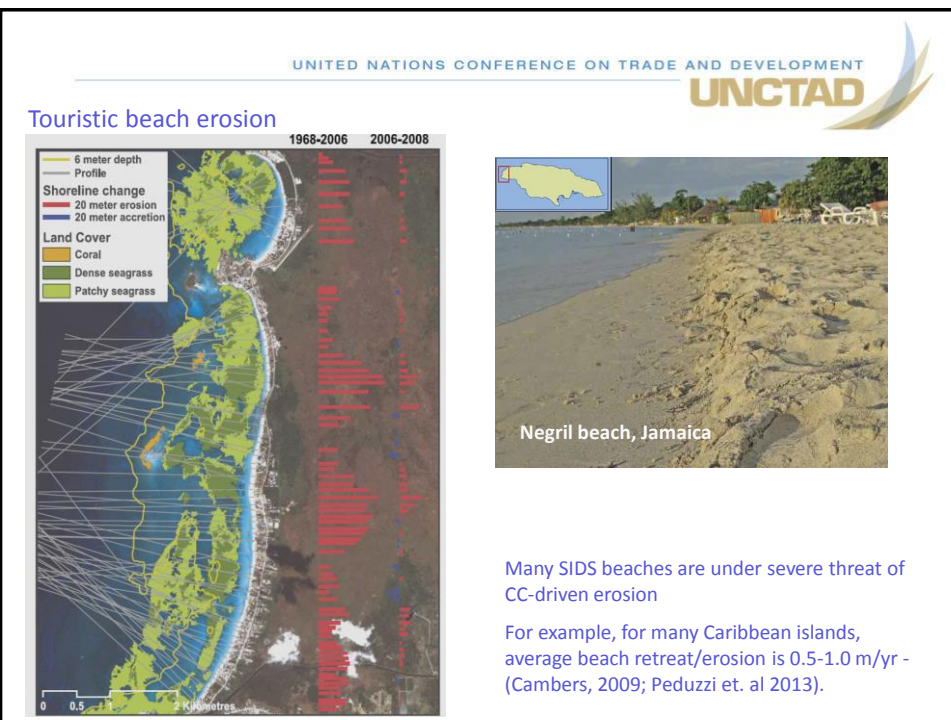
Strong nexus between transport and tourism:

“Sea, Sun and Sand - 3S tourism”, often a very significant SIDS industry, is threatened by climate - driven coastal and beach erosion; the same applies to its facilitating transport infrastructure (i.e. seaports, airports, coastal access roads)

Caribbean SIDS: The most air-transported tourist dependent region

Country	Travel & tourism % of GDP (World Ranking, 2010)	% visitors arriving by air
Anguilla	61.0 (5)	84
Antigua & Barbuda	78.5 (1)	95
Bahamas (the)	46.5 (8)	88
Barbados	48.1 (6)	92
Belize	28.2 (17)	85
Bermuda	11.2 (65)	86
British Virgin Islands	43.7 (10)	94
Cayman Islands	23.3 (24)	67
Dominica	23.3 (23)	88
Grenada	24.4 (22)	96
Guyana	11.5 (63)	99
Haiti	7.0 (125)	n.a.
Jamaica	25.4 (20)	92
Montserrat	n.a.	99
St. Kitts & Nevis	30.5 (16)	91
St. Lucia	35.1 (13)	90
St. Vincent & the Grenadines	23.6 (23)	98
Suriname	4.6 (164)	93
Trinidad & Tobago	10.9 (66)	95

In some Caribbean SIDS more than 50 % of GDP (ECLAC, 2011)





Relevance in the context of the SDG 2030 Sustainable Development Agenda

2030 Agenda adopted in September 2015, effective as of 1st January 2016

Consensus by the international community on a ‘plan of action’ involving 17 sustainable development goals with 169 associated targets, which are ‘*integrated and indivisible, global in nature and universally applicable*’

Sustainable and resilient transport is among the cross-cutting issues, of relevance for achievement of progress on several of the goals and targets, e.g.

- SDG 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development

- SDG 13 Take urgent action to combat climate change and its impacts (acknowledging UNFCCC as the primary forum)

- SDG 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation



UNCTAD UN Development Account project to build the adaptive capacity of SIDS, taking into account regional specificities (2015-2017)

Climate change impacts on coastal transport infrastructure in the Caribbean: Enhancing the adaptive capacity of Small Island Developing States

DRR and adaptation of coastal transport infrastructure to climate variability & change is critical for the sustainable development of SIDS

- Focus on key coastal transport infrastructure (i.e. ports and airports) in SIDS
- Case-study approach involving 2 vulnerable Caribbean SIDS (Jamaica and St Lucia)
- Objectives:
 - To enhance the adaptive capacity at the national level (case-study countries)
 - To develop a transferable methodology for assessing climate-related impacts and adaptation options for coastal transport infrastructure in Caribbean SIDS

- Technical expert group meeting held in June 2016, in Geneva, to review, discuss and provide substantive inputs to draft national case-studies and methodology
- National and regional capacity building/training workshops in 2017



Project timelines – to date

- Inception meeting/call with project team - January 2016
- Site visits to Saint Lucia and Jamaica by project team - February 2016
 - Opportunity for meetings and discussion with some stakeholders
- Draft methodology, draft case studies - June 2016
- Technical Expert Meeting on: "Climate change impacts and adaptation for coastal transport infrastructure in Caribbean SIDS", **29 June- 1 July 2016** , Geneva
- **N.B.** National elections held in Jamaica on 25 February 2016 and in Saint Lucia on 6 June 2017
 - In both cases leading to a change in government and restructuring of ministries
- **Setbacks**



Project timelines - Work ahead

National workshops in Saint Lucia and in Jamaica - May 2017:

- to **present and discuss draft case studies** and **draft methodology** and provide relevant **training** and related expert information
- to gather input and feedback from stakeholders
- Finalization of case studies and methodology reflecting feedback/ insights from national workshops
- Preparation of training material, work on web-platform
- Regional workshop to disseminate results and methodology to stakeholders across the region - winter 2017

Thank you!