Multi-year Expert Meeting
on Transport, Trade Logistics and
Trade Facilitation
8th Session

Climate Change Adaptation for Seaports in Support of the 2030 Agenda for Sustainable Development

27–28 October 2020

Understanding the Challenge

Presentation by

Ms. Regina Asariotis
Chief, Policy and Legislation Section
Trade Logistics Branch, Division on Technology and Logistics,
UNCTAD

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UNCTAD Multiyear Expert Meeting on Transport, Trade Logistics and Trade Facilitation (8th session)

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Climate Change Adaptation for Seaports in Support of the 2030 Agenda for Sustainable Development

– Understanding the Challenge

Regina Asariotis
Chief, Policy and Legislation Section, TLB/DTL
UNCTAD
regina.asariotis@unctad.org

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Port impacts under Climate Variability and change (CV & C)

Factor/hazard changes	Impacts on Seaports
Mean sea level rise (SLR)	Permanent inundation risk making ports inoperable without port elevation/coastal protection; changes in port and key transit access (e.g. the Kiel Canal); insurance issues
Increased extreme sea levels (ESLs); changes in wave energy/direction	Increasing frequency/depth of facility flooding and damages; losses due to operational delays; breakwater instability, scouring and overtopping from storm waves; increasing protection costs; wave penetration affecting operations; navigation channel silting-higher dredging requirements; insurance issues
Precipitation: Changes in means and/or in the intensity, type and frequency of extremes causing pluvial/fluvial flooding	Infrastructure flooding and damages; poor manouvrability of locks and vessels from changes in water level and speed; poor visibility from increasing fogs
Temperature: Higher means; heat waves; changes in warm/cool days	Deterioration of paved areas; inoperable cranes; navigational equipment/cargo damages; higher energy consumption for cooling; health/safety issues for personnel/passengers
Reduced arctic snow cover and ice	New arctic shipping routes, longer seasons, lower fuel costs; reductions in snow/ice removal costs; but arctic seaports will face increasing sea storm hazards
Permafrost degradation	Ground subsidence, slope instability,drainage issues, affecting port structural integrity
Wind: Changes in frequency/intensity of exteme events	Damages to terminals and navigation equipment; problems for vessel navigation and port berthing; difficult crane operations above certain wind speeds

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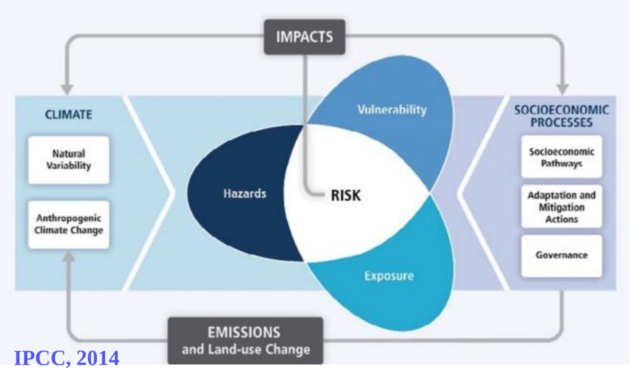
Port Risk under Climate Variability and change (CV & C)



IPCC, 2014

Port risk is a function of:

Climatic hazards - changing climatic factors

Exposure of the port infrastructure/operations to hazards

Vulnerability – depends on capacity to respond to factors that make ports prone to damages/losses from hazards, e.g. availability of technologies and materials for port defenses, elevation; human and financial resources; policy, legislation and management

Note: The IPCC risk definition differs from that of the Insurance Industry which defines risk as a function of the probability of the damaging event(s) and the magnitude of damages/losses: low probability events incurring large losses are high risks

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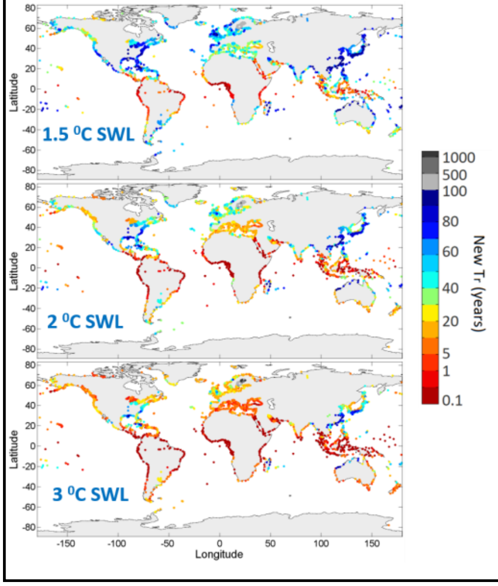
Hazard projections for global ports under CV & C: Extreme sea level (ESL)



All global ports affected, with effects worsening as the SWL increases

Even under SWL of 1.5 °C, the return period of the baseline 1 in 100 years ESL will decrease to every 1 to 10 years in many S. American, African, Gulf S. East Asian and Pacific ports

Under a SWL of 3 °C, many global ports will experience the baseline 1 in 100 years ESL several times per year

Projected changes in the return period of the baseline (mean of 1986-2014)) 1 in 100 years ESL under CV &C for about 3700 global ports.
Key: SWL (Specific Warming Level) in °C above pre-industrial times. Tr (years) return period. Seaport location from World Port Index 2019 https://msi.nga.mil/Publications/WPI; hazard modelling results from JRC-EC

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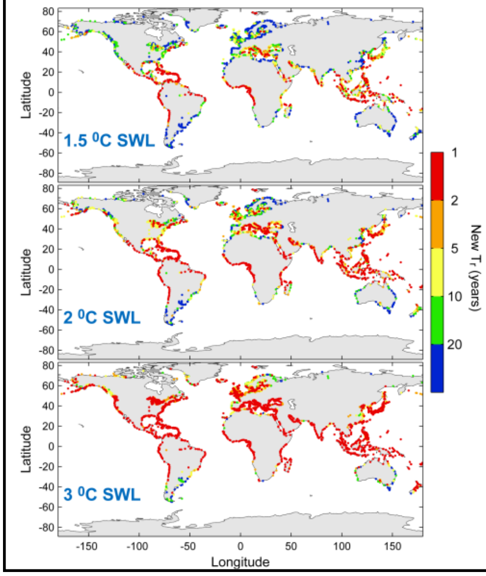
Hazard projections at global ports under CV & C: Extreme Heat



All global ports will be affected, with the effects worsening as the SWL increases

Even under a SWL of 1.5 ⁰C, the return period of the baseline 1 in 100 years extreme heat event (the average of 1976-2005 period) will decrease (down to every 1 to 5 years) in most tropical/subtropical settings

Under a SWL of 3 ⁰C, most global ports (except some ports in higher latitudes) will experience the baseline 1 in 100 years extreme heat event at least every two years

Projected changes in the return period baseline (mean of the period 1970-2005) 1 in a 100 years extreme heat event at about 3700 global ports*. Key: SWL (Specific Warming Level) in degrees (⁰C) above pre-industrial times. Tr (years) = return period.*

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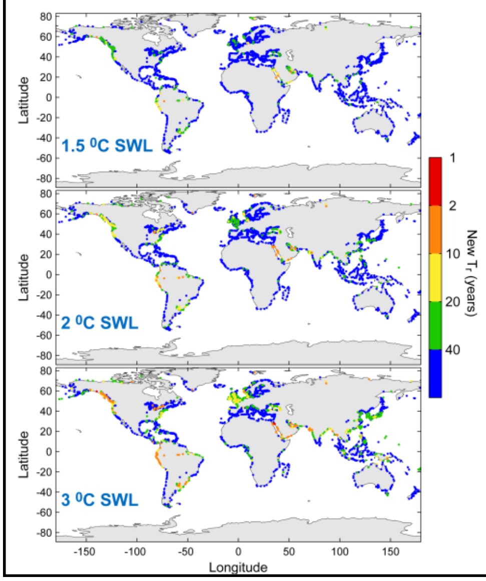
Hazard projections under CV& C: Extreme water runoff



Many global ports will be affected, with the effects worsening as the SWL increases

The change in the extreme runoff will not be as severe as that of ESL and extreme heat events, but it will be also felt in many parts of the world

Projected changes in the frequency of the baseline (mean of the period 1970-2005) 1 in a 100 years extreme runoff event for about 3700 global ports*. Key: SWL (Specific Warming Level) in degrees (⁰C) above pre-industrial times. Tr (years) = return period.*

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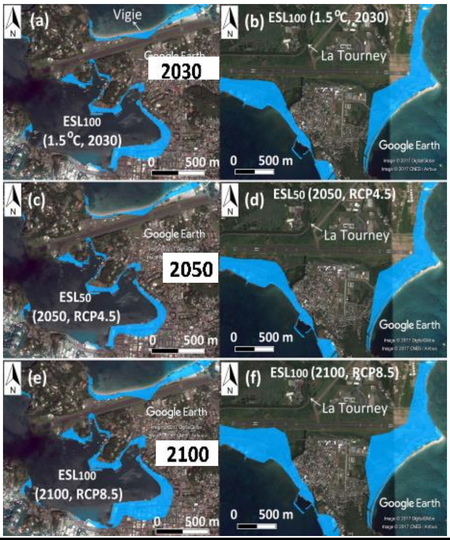
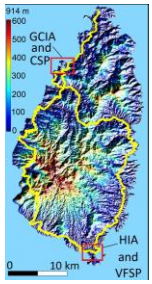
Exposure - Coastal flooding projections under CV & C:

SIDSport-ClimateAdapt.unctad.org





Exposure needs to be understood to adapt effectively

Requires risk assessment at local / facility level modeling

All international transport assets (seaports/airports) of Saint Lucia are at high risk, under all scenarios, and from as early as 2030s

Marine flood maps:

(a, c, e) George Charles Int. Airport; Castries seaport; (b, d, f) Hewanorra Int. Airport; Vieux Fort seaport for the: 1-100 year extreme sea level event, ESL100 (1.5C SWL, 2030); 1-50 year extreme sea level event, ESL50 (2050, RCP4.5); ESL100 (2100, RCP8.5)

(Monioudi et. al., 2018, Reg Env Change; IPCC 2018; IPCC 2019)

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How prepared are we?

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UNCTAD Port Industry Survey on Climate Change Impacts and Adaptation

Online survey to
- improve the understanding of weather and climate-related impacts on ports
- identify data availability, information needs and levels of resilience and preparedness

Respondent port sample collectively handle more than 16 % of global seaborne trade and can be considered as representative

- The majority of respondents had been impacted by weather/climate related events, including by extremes;
- The survey revealed important gaps in information available to seaports of all sizes and across regions with implications for effective climate risk assessment/adaptation

Key messages: **Better data/information** needed; **mainstream CC considerations**; '**piggyback' climate resilience** when upgrading infrastructure/operations

Other surveys related to transport provided similar results (e.g UNECE, 2013; 2019)

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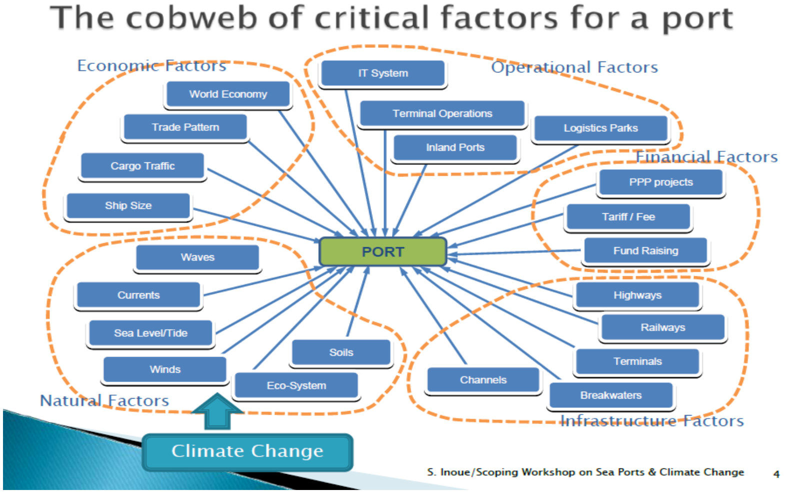
Seaport risk assessment and adaptation: A complex exercise



S. Inoue, Scoping workshop on Seaports and Climate Change, ECJRC March 2013

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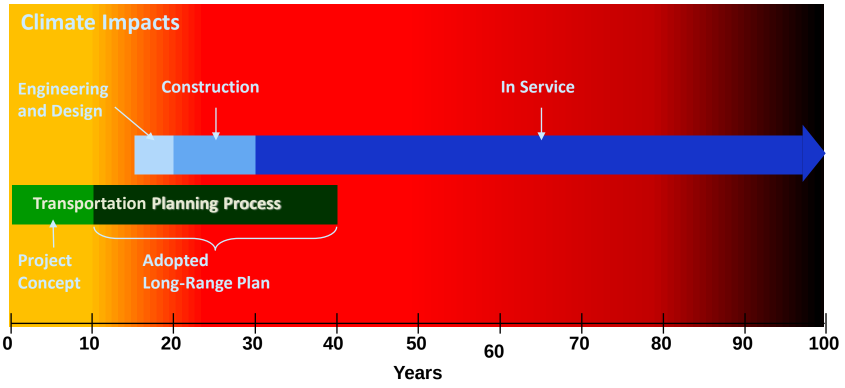
Transportation Infrastructure: Timeframes vs. Climate Impacts



Source: Savonis, 2011

Key considerations

- Seaports are critical facilitators of global trade and development
- Seaports are at considerable risk of climate change impacts, which is growing
- Significant economic costs of inaction and threat to development prospects of the most vulnerable
- Much is at stake - Failure to adapt is not an option
- The need to adapt and build / strengthen the climate resilience of seaports is urgent
- But this presents significant challenges (technical, capacity and finance, governance, management, policy and legislation)
- To address these effectively requires concerted collaborative action, involving all stakeholders - governments, industry, civil society, science, academia
- Need for technical, capacity, finance and policy solutions

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Action needed to adapt and build resilience

Accelerate action to ensure that by 2030 critical transport infrastructure is climate resilient to 2050 *(cf. MPGCA Milestones for 'Transport' and 'Resiliency')*

Risk assessments, based on the best available science and data will be needed, as well as **innovative adaptation responses** (regulation, management and technical measures)

- **Improve understanding** of impacts on transport infrastructure/operations; **improve data** collection/availability; **plan early** (asset lifespan); **systems approach**;
- **Mainstream** CC considerations in transport infrastructure planning/operations;
- **(Funding for) technical risk/vulnerability assessments to inform policies, plans, action**;
- **Capacity building (human resources, at local levels) and better access to climate finance**;
- **Ecosystem approaches to adaptation:** important elements in any future strategy;
- Integrate relevant considerations into **National Adaptation Plans and NDCs;**
- Adaptation strategies need to be underpinned by **strong legal, regulatory and policy frameworks**; as well as **standards, guidance, methodological tools**

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Thank you!

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