Global Supply Chain Forum
(Bridgetown, Barbados, 21–24 May 2024)

Parallel Session A7

Climate change adaptation, resilience-building and disaster risk reduction for ports

23 May 2024

Presentation by

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Parallel Session A7

DAY 3:
THURSDAY, 23 MAY

09:00 – 10:00 (GMT-4)
Room Frangipani

Global Supply Chain Forum
Barbados

Climate change adaptation, resilience-building and DRR for ports

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CV & C : potential for damage, disruption and delay to port/shipping operations

Huge potential costs associated with inaction:

Estimates vary

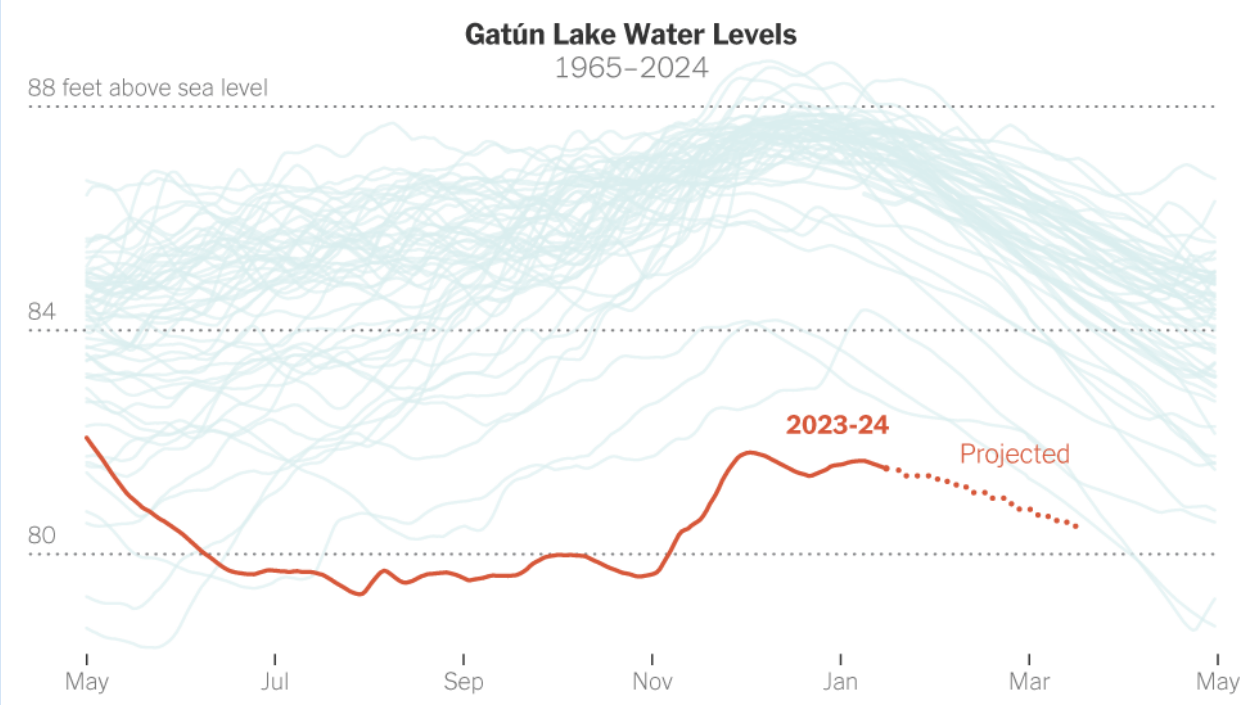
- By 2100, **damages/port disruption: up to US$ 25.3 billion/year** (*EDF, 2022, Act Now or Pay Later: The Costs of Climate Inaction for Ports and Shipping*)
- **Current annual port-specific risk (natural hazards): US$ 7.5 billion/year** (*Verschuur, et al.*, 2023a)
- **Current annual systemic risk to global maritime transport, trade and supply-chain networks: US$ 81 billion/year** (global trade) / plus **US$122 billion** (economic activity) (*Verschuur, et al.*; 2023b)

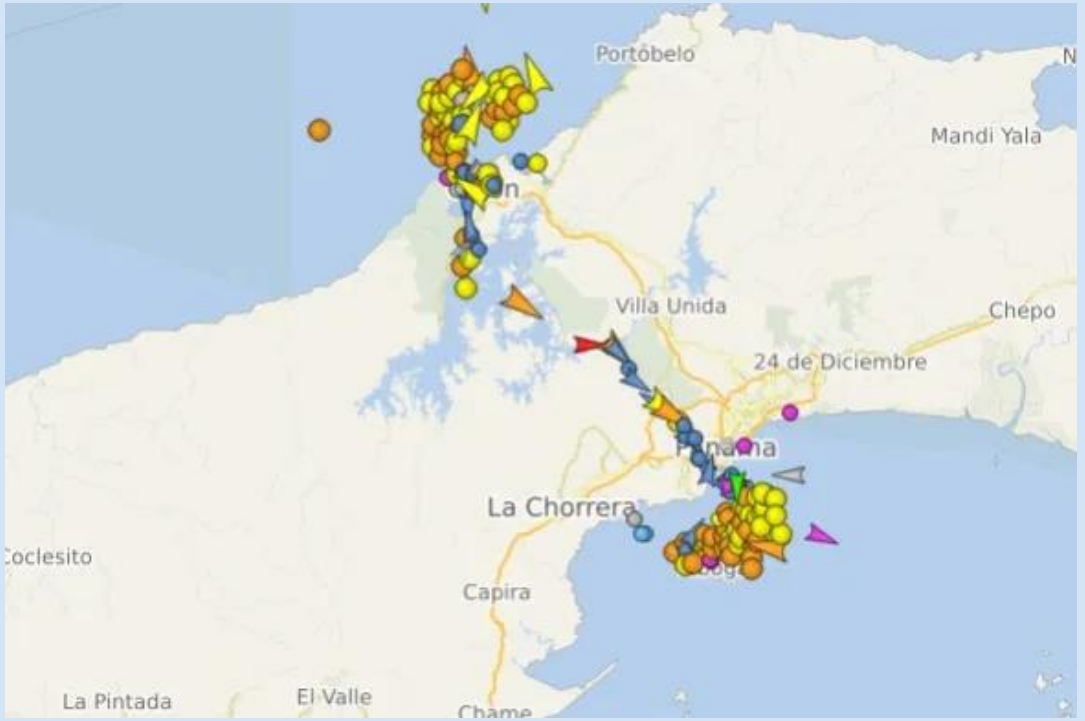
Port of Providence (RI, USA): Flood simulation due to a Category 3 storm surge (26f surge) and 0.5m mean sea level (MSL) rise (Becker et al. 2014)

BUT

- **Hurricanes/Tropical Storms,** e.g. **Sandy** (2012): over **US$ 62 billion** losses (including 1 week shut-down of NY/NJ container port)
- For SIDS, a **single extreme event** can cause L&D amounting to a significant share or multiple of GDP
- **Typhoon Maemi** (2013): Busan port **inoperable for 91 days** (*Lam et al., 2017*)
- **Drought - Panama Canal** (2023) – **delay/disruption** affecting key artery of global trade (3% of world maritime trade / 46% of containers NE Asia – East US)

Recent Panama Canal drought

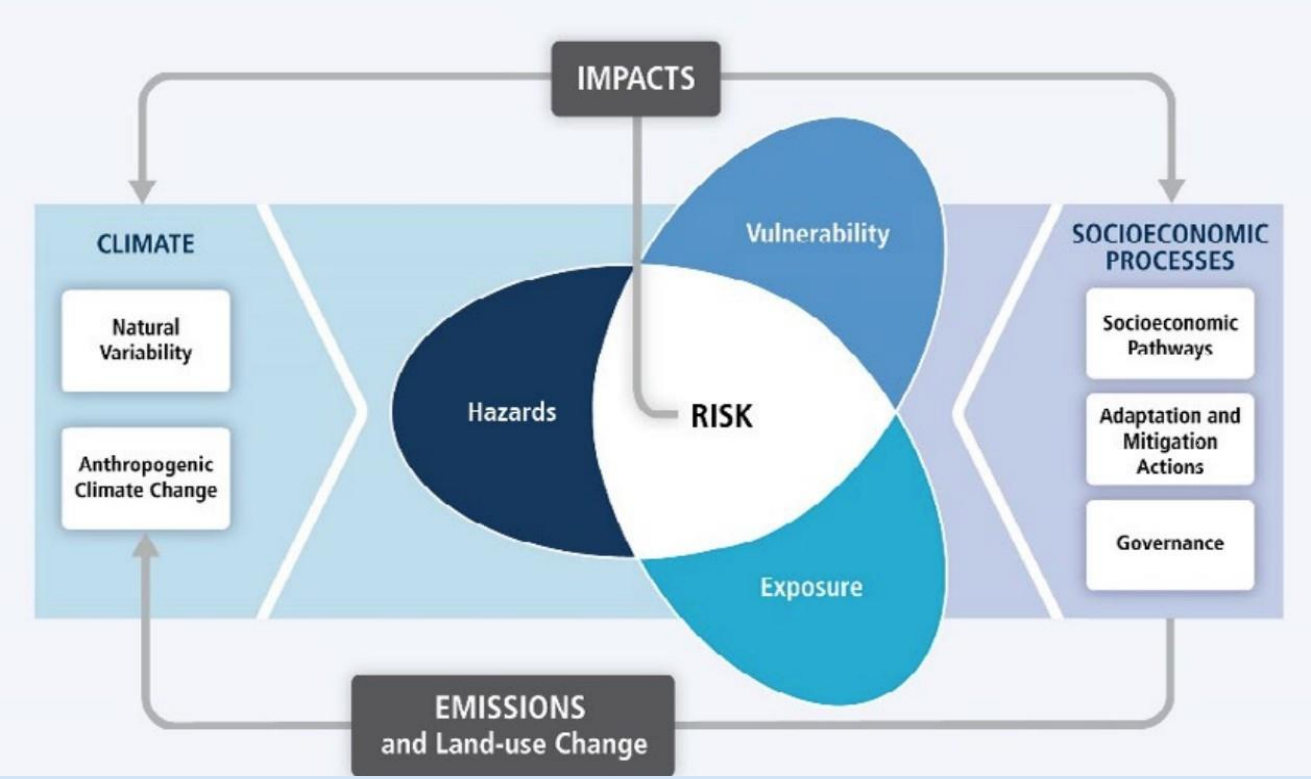




In 2023-2024, there has been an **unprecedented drought** in the Canal area

Very severe impacts on maritime transport and related **supply chains**

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



IPCC, 2014

Port risk is a function of:

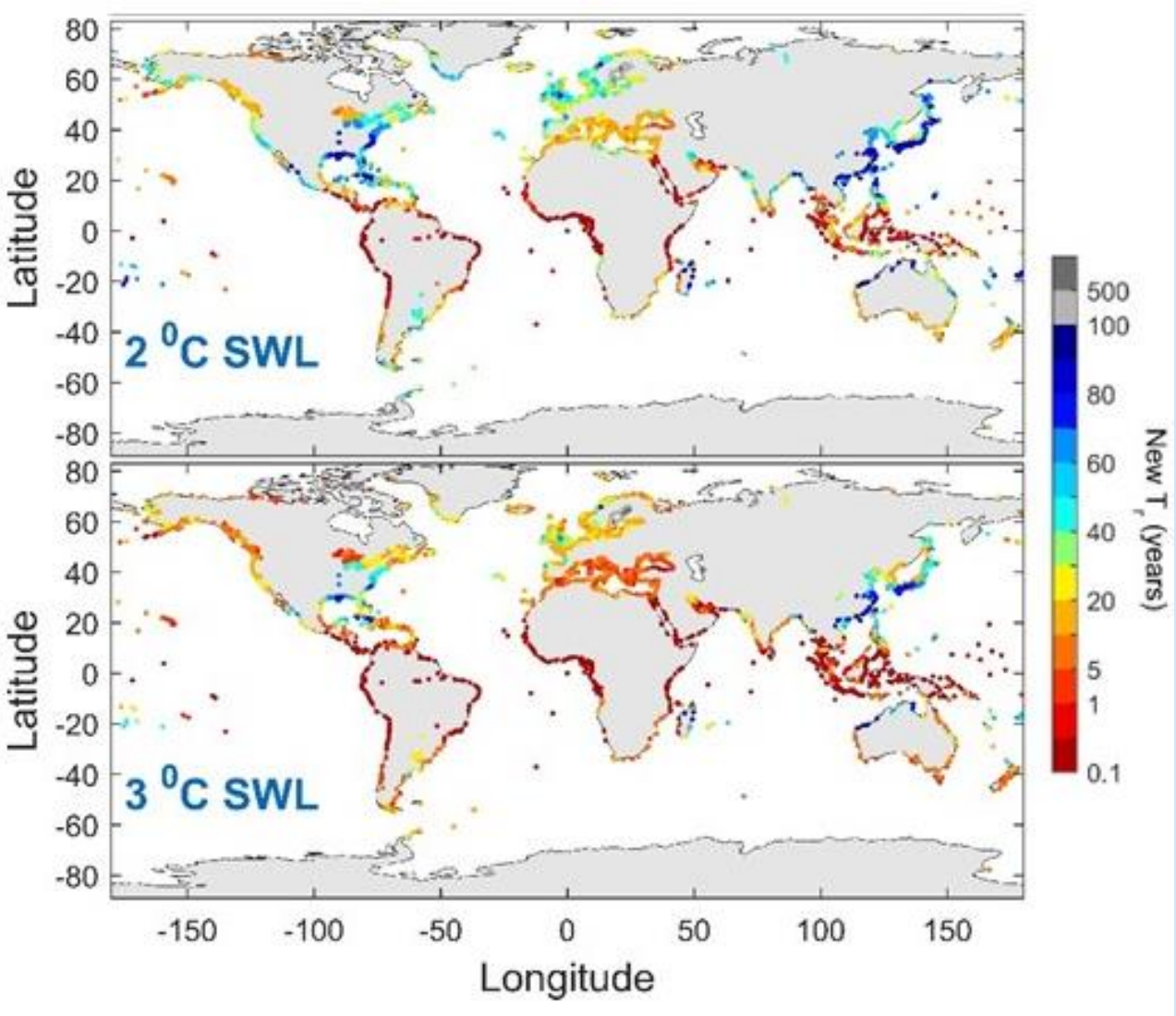
Climatic hazards – changing climatic factors, dependent on climate scenario/ emissions

Exposure of port infrastructure /operations to hazards

Vulnerability – 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 e.g. 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

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



All global ports affected - effects worsening with the SWL (Specific Warming Level)

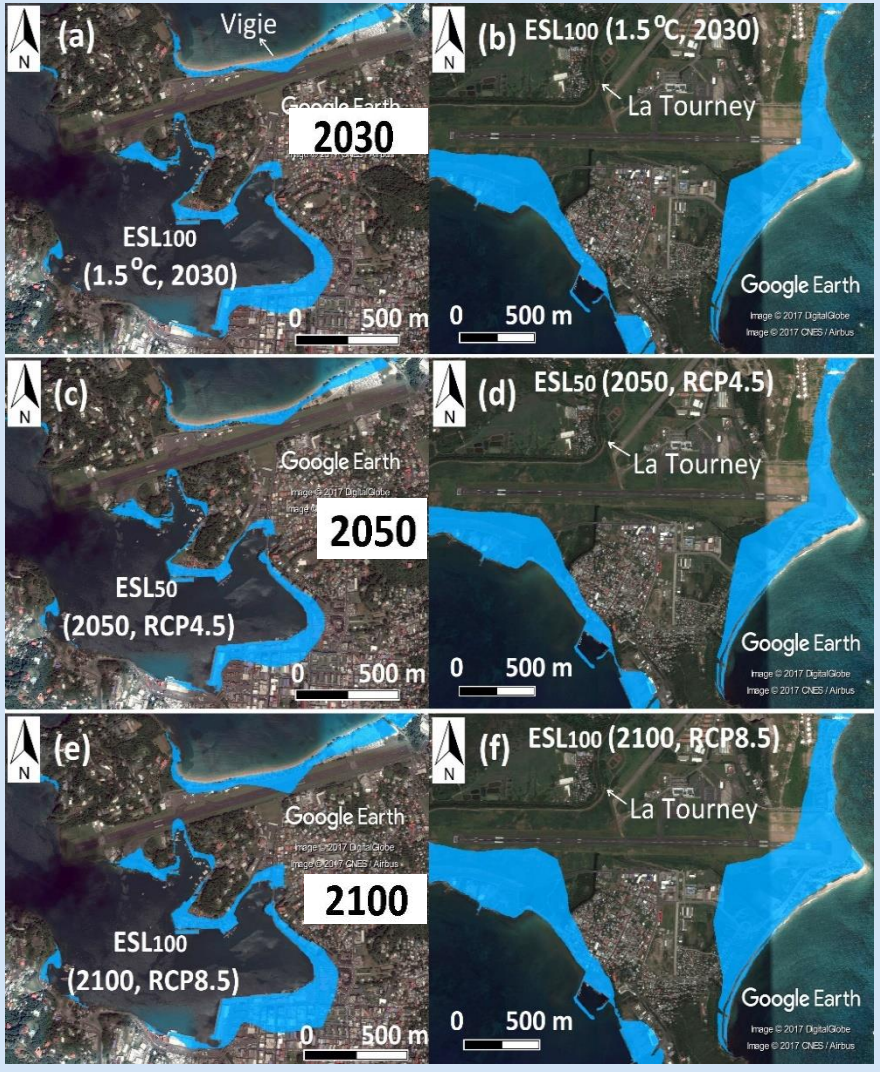
Under a **2 ^{0}C SWL (2050s),** the return period of the **baseline 1-in-100 years ESL** will decrease to every **1-10 years** in many S. American, African, Gulf, SE Asian and Pacific ports

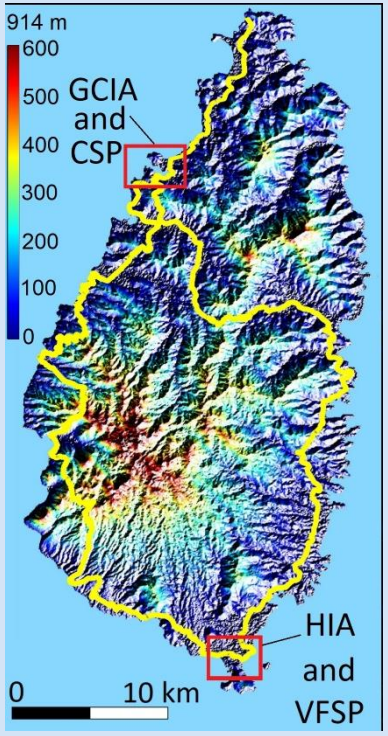
Under a **3 ^{0}C SWL (2100?)**, many ports will experience the **baseline 1-in-100 years ESL, several times per year**

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 ^{0}C above pre-industrial times. Tr (years) return period. Pport location from World Port Index 2019. $ESLs_{100}$ projections for the global coastline EC-JRC data collection (see also Vousdoukas et al. (2018). See Asariotis (2021)*

Exposure projection for seaports under CV & C: Extreme sea level (ESL)

SIDSport-ClimateAdapt.unctad.org – 8 Ports and Airports in Jamaica and Saint Lucia





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

Exposure needs to be understood to adapt

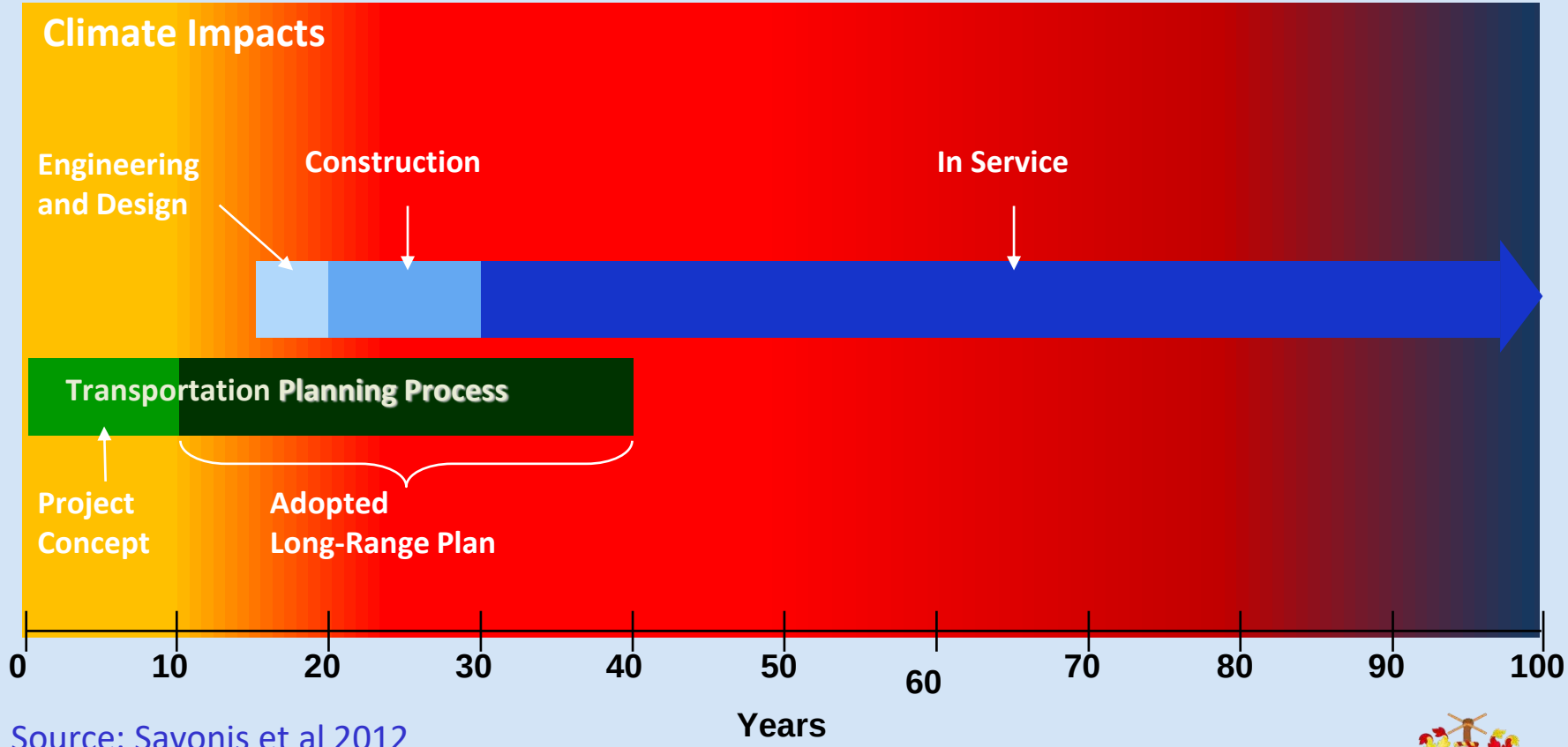
Requires risk assessment at local / facility level

Marine flood maps: *(a, c, e) George Charles Int. Airport; Castries seaport; (b, d, f) Hewanorra Int. Airport; Vieux Fort seaport for the: 1-in-100 year extreme sea level event, ESL100 (1.5C SWL, 2030); 1-in-50 year extreme sea level event, ESL50 (2050, RCP4.5); ESL100 (2100, RCP8.5)*
(Monioudi et al, 2018, Reg Env Change; IPCC 2018; IPCC SROCC 2019)

Action needed to adapt and build resilience

- **High-quality risk / vulnerability assessments**, based on the best available science to **improve understanding** of impacts on ports**,** guide effective **adaptation responses** and **resource prioritization**
- Improve **data** collection/availability; **plan early** (asset lifespan); adopt **systems approach**; **avoid maladaptation** / over-engineering; innovative technical measures; integrate **ecosystem approaches**
- **Mainstream** CV&C considerations in port infrastructure planning/operations
- **Increase capacity building** and **affordable port** adaptation **finance for developing countries** (UNCTAD, 2022)
- Develop and implement: strong **policy and legal frameworks** (UNCTAD, 2020); **standards** (eg ISO 14090; ISO 14091); technical **guidance** (PIANC 2020; 2022; EC, 2021), **methodological fameworks** (e.g UNCTAD, 2018; www.ecclipse.eu)
- Integrate considerations into **National Adaptation Plans & NDCs**, as well as Development, DRR and COVID-recovery policies / planning
- **Concerted collaborative action**, involving all stakeholders - governments, industry, civil society, science, academia

Transportation Infrastructure: Timeframes vs. Climate Impacts



Source: Savonis et al 2012

How prepared are we? *See e.g. UNCTAD, 2018*

Global Supply Chain Forum

Thank you!

PRIDE AND INDUSTRY

UN trade & development UNCTAD

Related work by UNCTAD

2009	**UNCTAD Multiyear Expert Meeting: "*Maritime Transport and the Climate Change Challenge*"**
2010 Follow-up	**Joint UNECE-UNCTAD Workshop: "*Climate change impacts and adaptation for international transport networks*"** UNECE *Group of Experts on Climate Change Impacts and Adaptation for International Transport Networks* 2013 EG Report - *Climate Change Impacts and Adaptation for International Transport Networks* 2020 EG Report - *Climate Change Impacts and Adaptation for International Transport Networks*
2011 Follow-up	**UNCTAD Ad Hoc Expert Meeting**: **"*Climate Change Impacts and Adaptation: a Challenge for Global Ports*"** Becker et. al, **A note on climate change adaptation for seaports**, Climatic Change, 2013
2012 **2014**	UNCTAD ed. multidisciplinary book: **Maritime Transport and the Climate Change Challenge** UN-Earthscan, 327p. (2012) **UNCTAD Ad Hoc Expert Meeting: "*Addressing the Transport & Trade Logistics Challenges of SIDS: Samoa Conference and Beyond*"** **UNCTAD Multiyear Expert Meeting: "*Small Island Developing States: Transport and Trade Logistics Challenges***
2017-18	**UNCTAD Port-Industry Survey on Climate Change Impacts and Adaptation**
2015-2017 Follow up	**UNCTAD DA Project - SIDSport-ClimateAdapt.unctad.org** ***"Climate change impacts on coastal transport infrastructure in the Caribbean: Enhancing the adaptive capacity of Small Island Developing States (SIDS)*** Monioudi et. al, **Climate change impacts on critical international transportation assets of Caribbean SIDS: the case of Jamaica and Saint Lucia**, Reg Environ Change 2018: 2211
2019-2020 **2021-2022** **2023-2024**	**UNCTAD Ad Hoc Expert Meeting**: ***"Climate Change Adaptation for International Transport: Preparing for the Future"*** **UNCTAD – UNEP** ***"Climate-resilient transport infrastructure for sustainable trade, tourism and development in SIDS"*** *Climate Change Impacts and Adaptation for Coastal Transport Infrastructure: A Compilation of Policies and Practices* **UNCTAD Multiyear Expert Meeting**: *"Climate Change Adaptation for Seaports in Support of the 2030 Agenda"* **Climate change impacts on seaports: a growing threat to sustainable trade and development** (2021) **Climate-resilience of seaports: Adequate finance is critical for developing countries but remains a major challenge (2022)** **Asariotis, Climate change impacts on ports – some considerations arising for commercial maritime law (2023)** **AIG podcast: Rising Sea Levels - the impact on port infrastructure, shipping and trade (2024)** **UNDRR GAR 2023 Special Report – Resilience Deficit 10 (2024)** **Sessions A.7-A.9 at the UNCTAD Global Supply Chain Forum co-organized with the Government of Barbados (2024)**

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