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Sustainable and resilient transport and trade facilitation in times of pandemic and beyond: key challenges and opportunities

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Managing Climate Change Uncertainties in Assessing Options for Resilient Navigation Infrastructure

Presentation by

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www.pianc.org

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Technical Note objectives

Help project owners, designers and financers reduce climate change-related risks by:

- Referring to a range of climate change **scenarios**
- Reducing reliance on the use of **past data** to predict low probability future events
- Considering **unlikely-but-plausible scenarios** if making major, long-term investments
- Preparing for the **unprecedented**, including joint occurrences and cascading failures
- Adopting **adaptive and flexible solutions**; considering non-structural (e.g. operational, institutional) as well as structural interventions; exploring no-regret options
- Using **monitoring** to inform decision making (adaptive management)
- Selecting **evaluation methods** that recognise and accommodate uncertainty.

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Sources of uncertainty

- **How quickly** will climate-induced changes take place? **Magnitude** of that change? Will **critical thresholds** be crossed? When? How often?
- How effective will **measures to reduce greenhouse gas emissions** be, globally? How and when will these measures be delivered?
- What will happen regarding **socio-economic and environmental changes** that may take place, at both local and system level, in the meantime?
- And, **uncertainties in the models** that simulate the changes in the earth's climate: their resolution, scale and levels of detail; representation of certain processes; simulation where there are delays, tipping points or nonlinear effects…

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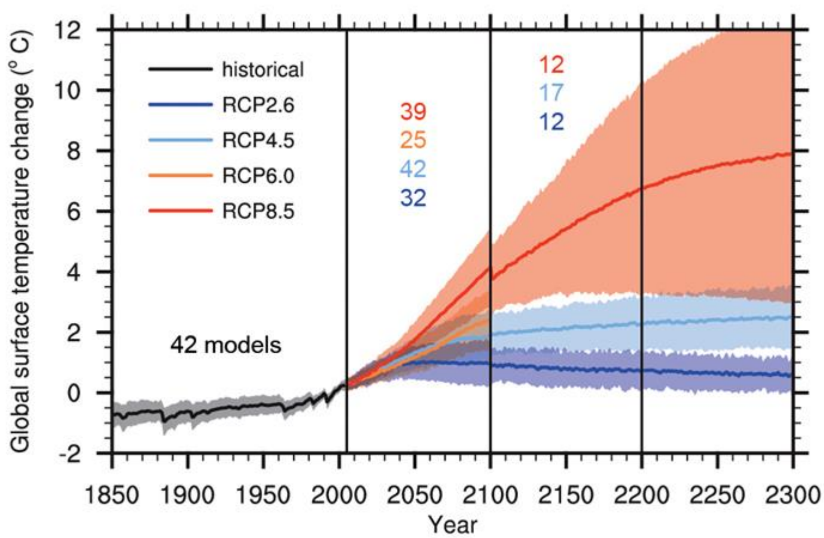

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Why use scenarios?

- **Conventional statistical methods** that rely on historic data about past events to predict the magnitude of low probability future events **will become increasingly less appropriate** as climate change continues
- Testing an asset or operation's **sensitivity and tolerance** to possible future climates helps avoid maladaptation (e.g. investment risks, stranded assets)
- Scenario selection is determined by the **relative exposure/vulnerability** of the asset or operation
- The **more susceptible** to weather or climate-related damage or disruption, or the greater the magnitude of **investment**, and the longer the intended **lifespan** = the more important to explore full range of scenarios

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Which scenarios to use?

- Unless the asset or operation is temporary, moveable or sacrificial, PIANC recommends for a design or operational life of…
  - **<10 years** and adequate data available on recent trends: may not need to apply scenarios
  - **<30 years**: use (reduced number of) climate scenarios for sensitivity testing e.g. selected grouping or combination of projections
  - **Beyond 2050** (or particularly sensitive to damage/disruption or for high value investments): wide range of possible future climate scenarios should be considered. Also 'unprecedented' conditions (high ++)

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Flexible and adaptive design

- Not necessarily about designing to withstand the extremes; rather take action to **strengthen both engineered and operational resilience**
- Not only physical measures such as **engineered redundancy**, but also non-structural measures such as mapping or **zoning**; **contingency** plans; identifying thresholds for action; early **warning systems**; other **adaptive capacity** improvements
- Structures/operations prone to failure should be **designed to fail 'gracefully'** rather than 'catastrophically' … implement measures to manage the consequences of failure
- Acknowledge/accommodate **risks** of **joint occurrences**, or **cascading failures** where interdependencies exist between natural and socio-economic systems and sub-systems
- Design to allow **future raising, strengthening** etc. as conditions change
- Identify **adaptation pathways** (sequences of risk-reduction actions) to be implemented progressively, depending on how the future unfolds

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Importance of data

- Local **hydro-meteorological/oceanographic data**: compare local trends with projections; inform location-specific adaptive management decisions; facilitate optimal selection of design criteria
- **Condition**/performance **of physical assets**: help decide *when* a response is needed or a measure should be implemented
- Post-event data from **extreme weather events**: validate predictions about likely impact zones or models of future conditions
- Costs/consequences of **damage, disruption or downtime**: support business case for intervention via informed assessment of financial/economic benefits of adaptation vs. consequences of inaction
- Knowledge about **performance of** already-implemented adaptation and resilience **measures**: inform decisions on future modifications or measures.
- **Monitoring** should be proportionate and fit-for-purpose

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Appropriate evaluation methods

- Understanding the consequences and **costs of inaction** helps demonstrate the **benefits of expenditure on** improved **resilience**
- Option **evaluation methods** should be climate-change appropriate; assessments that only extrapolate from past experience may no longer be fit-for-purpose
- Conventional **cost-benefit assessment** or net present value calculations may not adequately reflect climate change complexities even with low discount rates
- Difficult-to-quantify **social and environmental impacts can be important** to avoid underestimating potentially serious climate change consequences
- Identifying **adaptation pathways** can help deal with uncertainties; **adaptive management** is an important concept

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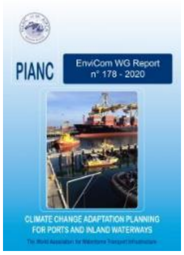
Thanks for listening
… and here are some links!



Uncertainties Technical Note No.1 WG 178 Adaptation Planning Guidance

https://www.pianc.org/publications/envicom/ptgcc-1

https://www.pianc.org/publications/envicom/wg178

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