Ad Hoc Expert Meeting on

Climate Change Adaptation for International Transport: Preparing for the Future

16 to 17 April 2019

Climate change adaptation guidance for ports and inland waterways

Presentation by

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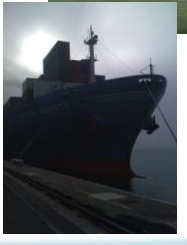
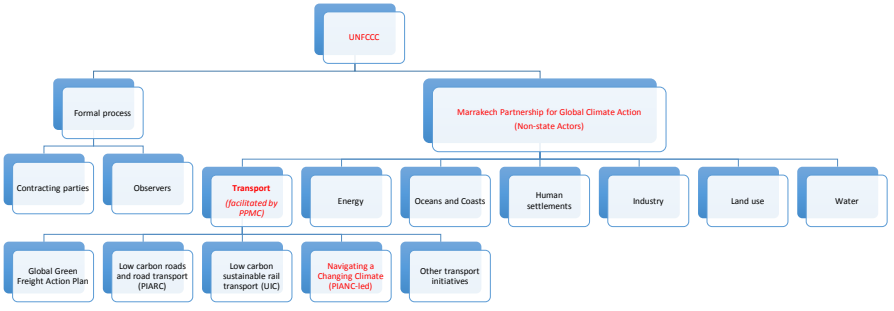
UNCTAD Ad Hoc Expert Meeting, 16th April 2019

Navigating a Changing Climate



- A Marrakech Partnership 'Global Climate Action' Initiative
- Partners:
  - The World Association for Waterborne Transport Infrastructure (PIANC)
  - International Association of Ports and Harbors (IAPH)
  - International Harbour Masters' Association (IHMA)
  - International Maritime Pilots' Association (IMPA)
  - Smart Freight Centre (SFC)
  - European Dredging Association (EuDA)
  - European Sea Ports Organisation (ESPO)
  - Institute of Marine Engineering, Science and Technology (IMarEST)
  - Inland Waterways International (IWI)

Navigating a Changing Climate
UNFCCC context



Navigating a Changing Climate
Objectives

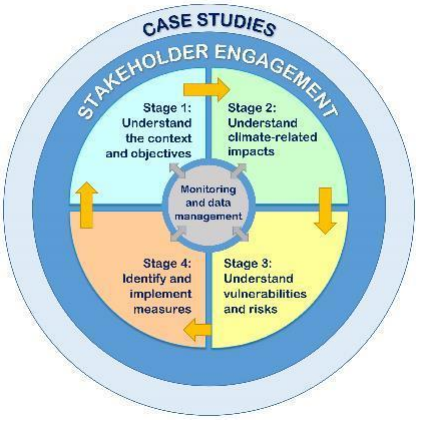
- To **improve sector-wide awareness** of climate change challenges and opportunities
- To **create and facilitate knowledge networks** to share experiences and good practice on mitigation, adaptation and integrated solutions
- To develop **technical good practice guidance**, training opportunities and web-based resources e.g. **PIANC WG 178 Adaptation**
- To provide a **coordinated, global focal point** to support the owners, operators and users of waterborne transport infrastructure in building the capacity needed to navigate the changing climate
- See our **Action Plan** or sign up as a **supporter** at http://navclimate.pianc.org

Methodological framework

PIANC WG 178 guidance comprises a **four stage methodological framework** to help the user understand:

- the **context** and **objectives**
- climate-related **hazards** and **impacts**
- **vulnerabilities** and **risks**
- climate change **adaptation and resilience measures**

Also covers case studies; the role of monitoring and data management; and the importance of stakeholder engagement



Stage 1
Context and objectives

STEPS

Engage with relevant internal and **stakeholders** (e.g. via a meeting or workshop)

- Develop **climate change adaptation goals**
- Compile an **infrastructure inventory**, identifying critical assets, operations and systems, and highlighting their current status e.g. design life, residual life
- Establish adaptation **roles and responsibilities**
- Set specific adaptation and resilience **objectives**, recognising boundaries, constraints and possible opportunities

Stage 1
Key considerations

Stage 1: engage with stakeholders, develop goals, prepare inventory of critical infrastructure, establish roles and responsibilities, set objectives

DON'T FORGET!

- Climate change could affect onward transport, utilities, services, local communities, etc. – internal and external **collaboration can** help to identify mutually beneficial solutions and thus **reduce adaptation costs**
- **Criticality** can relate to business continuity; network connectivity; threshold exceedances; health and safety requirements; social needs; etc.
- The status of an asset or system will influence its future **adaptive capacity**: monitoring and awareness are vital in decision making
- Objectives should reflect an **'acceptable' level of risk**
- Adaptation may mean modifying an asset, operation or system to strengthen its **resilience** or enable it to cope with future changes

Stage 2
Climate hazards and impacts

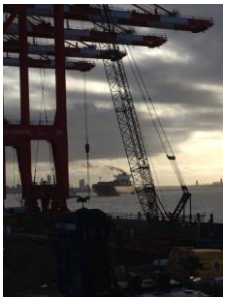
STEPS

Work with stakeholders to develop an understanding of **projected changes in relevant climate-related parameters and processes**

- Confirm climate parameters and processes (hydro-meteorological or oceanographic) to which **each critical asset**, operation or system is **sensitive**
- Consider **thresholds**: is asset or operation already affected?
- Identify and review projected future changes in parameters and processes using global or regional information; refer to locally-relevant **downscaled data** if these exist; acknowledge any uncertainties and data inadequacies
- Understand **how** the projected **changes could impact on critical infrastructure** (i.e. identify the climate hazard) under each scenario
- Implement **monitoring** to understand local trends in key parameters and processes and to inform future decision making

Stage 2
Key considerations

Stage 2: understand projected changes and critical asset sensitivities, refer to relevant projections, understand possible impacts, implement monitoring



DON'T FORGET!

- The **planning horizon** matters! If this is more than 10 years, analysis of historical data alone will not capture the future climate accurately …
- In addition to projected **trends** in weather-related, hydro-meteorological or oceanographic parameters, take account of increases in the frequency or severity of **extreme events**, and possible **joint occurrences**
- To reduce the risk of **maladaptation** develop and use a range of **plausible climate change scenarios**; include 'most likely' and 'worst case' scenarios

Stage 3
Vulnerabilities and risks

STEPS

Work with stakeholders to **identify and assess the potential risks** to critical infrastructure assets, operations and systems under each scenario…

- Is the critical asset, operation or system **exposed**?
- Is the critical asset, operation or system **vulnerable** if climate parameters or processes change?
- Is there existing and future **adaptive capacity** adequate or is there is a need to **strengthen resilience**
- What are the financial/economic, environmental and social consequences of each scenario; the potential **costs and consequences of inaction**?
- **When** might these consequences be expected?

Carry out **risk assessment** to understand how climate change is likely to affect critical to assets, operations and systems

Stage 3
Key considerations

Stage 3: identify and assess risks, exposure, vulnerability, adaptive capacity, costs and consequences of inaction, timing of impacts, overview of risks

DON'T FORGET!

- **Risk assessment** can be simple or complex
- Change in climate parameters can have a **range of consequences**
- Adaptive capacity is a function of (i) **redundancy** in the system e.g. design overcapacity or operational flexibility; (ii) **residual asset life**; (iii) level of **exposure** and (iv) **availability of alternatives**
- Without adaptation action, future costs could include clean up, damage **repair or replacement, disruption or downtime**. Awareness of such costs and consequences helps inform adaptation decision making
- **Presentation** matters! A colour-coded matrix, highlighting the main risks, can be a useful aid to decision making

Stage 4
Adaptation measures

STEPS

Work with relevant stakeholders to **identify**, **evaluate**, **implement** and then **monitor** measures to strengthen resilience or adapt …

- Identify possible short-term/interim and long-term measures: reference to a **portfolio of measures**
- Screen a long list of potential options to focus in on a **shortlist** for more detailed evaluation
- Develop, agree and apply option **evaluation criteria**
- Prepare an **adaptation** plan, strategy or programme (**pathway**) for implementation: adaptation is likely to be a **phased** exercise
- Develop **monitoring** programmes and effective **data management** to inform decisions on *when* adaptation action is needed

Portfolio of measures

Measure types

- Physical (structural): engineered, technological, service-based)
- Social (people): educational, information-related, behavioural)
- Institutional (governance): economic, laws and regulations, policy and programmes)

Climate-related impacts addressed include:

- Frequency, severity or duration of flooding
- Extreme, high or low river flow or wave conditions
- Sediment or debris transport, erosion, deposition
- Visibility
- Wind
- Air temperature change
- Water chemistry, acidity, salinity
- Biological temperature induced changes

Table 4.3 Indicative combinations of adaptation and resilience measures

Impact	Measure 1	Measure 2	Measure 3
Sea level rise leading to increased flooding of certain berths	Modify berthing arrangements or schedules	Monitor asset condition and performance	Depending on residual life of berth, retrofit or replace with elevated structure
Increased frequency of extreme wave and wind conditions exacerbating erosion	Strengthen legal protection for remaining vegetated shorelines	Educate local communities in role of marsh or mangroves	Habitat restoration and re-planting projects; create breakwaters (e.g. using dredged material filled geo-tubes)
Increased storm frequency impacting breakwater integrity	Retrofit asset to maximum affordable protection	Prepare disaster risk reduction plan	Educate workforce, local community about risks and risk reduction plan

Stage 4
Key considerations

Stage 4: **identify**, **screen**, **evaluate**, **implement** and **monitor** measures, prepare an adaptation strategy, manage data effectively

DON'T FORGET!

- Climate change adaptation needs **innovation**. As well as more traditional structural, physical or technological options, think about **operational change**, educational or governance measures, or **nature-based solutions**
- **Win-win** or **low-regret** measures can be cost-effective
- Retrofitting can be costly and complex; understand **adaptive capacity**
- Understand the **costs of inaction***. Include in the **business case** to justify the incremental cost of climate-resilience
- Option evaluation can be **simple or complex** – but be aware that conventional methods may not be the most appropriate for use in climate change decision making (e.g. return periods, discounting …)

* NaCC **extreme events** costs and consequences **survey** to launch Q2 2019

Role of monitoring

Develop **monitoring** programmes and effective **data management** to inform decisions on *when* action is needed

DON'T FORGET!

- Monitor **asset condition** also **operational performance**
- Collect data and where relevant develop **real-time** monitoring and **early warning** systems for local weather and hydro-meteorological conditions
- Record impacts and damage costs/losses of extreme events and weather-related disruption to **support business case**
- **Monitoring** does not need to be sophisticated; must be **fit-for-purpose**
- Effective data management is critical to **just-in-time** decision making
- Prioritise **maintenance** to maximise resilience, improve adaptive capacity
- **Adaptive management** can help deal with uncertainties but requires data; temporary or interim measures can 'buy time'

Thanks for listening!

http://navclimate.pianc.org/

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