

Role of Working with Nature in Climate Change Adaptation

A Viewpoint from PIANC WG 178



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Potential Climate Change Impacts

Maritime navigation infrastructure may need to adapt to:

Increases in flooding frequency or severity due to sea level rise or precipitation changes

Increased frequency of extreme wind, wave or storm conditions, potentially exacerbated by sea level rise, affecting the frequency and duration of periods of disruption of operations and requiring improved infrastructure resilience

Changes in sediment transport, erosion and accretion affecting navigable depth, or beach, foreshore or built infrastructure integrity

Potential for changes in fog characteristics or other visibility issues

Increases in air and water temperature or changes in ocean chemistry, leading to changes in characteristic species with potential consequences for:

- new developments
- operations and maintenance activities (e.g. due to non-indigenous or invasive species or the distribution of target species for commercial fishing, angling or wildlife watching)

Changes in ice cover with consequences for navigation infrastructure provision / demand

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Adaptation Preparedness

What do Ports Need to Know ?

- What magnitude of change can reasonably be expected and when?
- Changes in mean/typical conditions; increased frequency/intensity of extremes; both?
- Is there existing adaptive capacity within the system; adequate redundancy?
- Are there benefits of a temporary or interim solution vs. a longer-term option
- Could changes in operations, maintenance or management help improve the longevity of physical infrastructure?
- Does existing infrastructure need retrofitting?
- Is new infrastructure climate-proof?



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Be Aware ...

- Climate change will affect both existing and new navigation infrastructure
- Change will not be equally distributed; most profound effects may be experienced by those least well-resourced to adapt
- Adaptation needs will vary between locations
- Some ports may require little adaptation in the short to medium term (10-20 years) because existing infrastructure can cope with the projected changes
- Others are less well prepared
- Resilience is vital: accommodate, protect, relocate
- Resilience is more than engineering design: environmental resilience; social resilience, economic resilience; flexibility; robustness ... Working with Nature has an important role!



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Introducing PIANC WG 178

- PIANC Technical Working Group 178 on climate change adaptation for ports and inland waterways
- 30 members from 20 countries
- Objectives include:
 - develop a guidance framework for climate change adaptation planning and delivery
 - provide guidance on addressing challenges and identifying priorities
 - generate a portfolio of adaptation options including non-structural (e.g. behavioural/institutional) as well as structural measures
- Due for publication later in 2018



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WG 178 Guidance: Key Steps

- Define the challenge
- Identify/engage stakeholders; raise awareness; develop ownership
- Prepare inventory of infrastructure assets and operations
- Highlight critical assets and operations
- Understand key climatic drivers, observed changes, monitoring
- Future climate scenarios/ projections, uncertainties
- Consider exposure, sensitivity, consequence, likelihood, risk, timings
- Explore options: WG178 portfolio of structural / physical; behavioural / operational; and institutional measures
- Understand key concepts: maladaptation; resilience; adaptive management; quick wins; win-wins; low hanging fruit; no/low regrets
- Evaluate, select, implement and monitor preferred option



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Working with Nature Role in Climate Change Adaptation

- **Working with Nature** has a potentially important role as a tool in helping to facilitate effective climate change adaptation, including by capitalising on natural resilience
- Adopting the WwN approach should both:
 - help to ensure understanding of the implications of changes in temperature, precipitation, sea level, etc. for the natural environment; and
 - allow the user to ‘climate proof’ future navigation infrastructure



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How Can this Work in Practice?

WwN Steps 1 and 2

1. Establish project need and objectives

- ***Include an objective to ‘climate proof’ the development’ (i.e. to reduce vulnerability, and to increase resilience to the effects of climate change)***

2. Understand the environment

- ***Understand and incorporate relevant climate change projections – both how climate change will be manifested in terms of changes in high or low flow, water temperature increases, etc. and – importantly – how ecosystems are likely to respond. The latter understanding should include both adverse and beneficial impacts of climate change on the natural environment.***



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How Can this Work in Practice?

WwN Steps 3 and 4

3. Make meaningful use of stakeholder engagement; identify win-win options

- ***Consider what is needed to adapt to climate change both from a technical specification and from a nature perspective, for example, seeking to protect vulnerable habitats or to deliver positive ecosystem outcomes***

4. Prepare project proposals/design to benefit navigation and nature

- ***Design a project which helps to improve the resilience and/or reduce the vulnerability of both navigation and nature***



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Examples of WwN Adaptation Solutions*

- Predicted Impact: High flow or extreme wave conditions
 - Measures that can be used to address more prolonged or frequent high in-channel flow or extreme sea (wave) conditions. Some of these measures might also be relevant where climate change is impacting on flows or currents in estuaries.

*Portfolio of measures not intended to be a comprehensive list of possible solutions. Rather it is intended as a source of ideas and inspiration.



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Examples of WwN Adaptation Solutions

- Physical measures: structures; systems; technologies; services
 - Construct new or modify existing breakwaters (e.g. armour unit selection, orientation, height)
- Social measures: people; behaviour; operations; information
 - Use adaptive management to improve flexibility in scheduling and working arrangements (e.g., berthing), working times and conditions (e.g., fishing fleet)
- Institutional measures: governance; economics; regulation; policy
 - Relocate fairway to less exposed location



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Examples of WwN Adaptation Solutions

Multiple WwN solutions are included in the WG 178 Portfolio of Measures, available at:

<https://pianc.org/climatechangeadaptation.php>

Thanks for listening!



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