

# Role of Working with Nature in Climate Change Adaptation

A Viewpoint from PIANC WG 178



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**34<sup>th</sup> PIANC World Congress  
Panama City, Panama  
May 2018**

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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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