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The World Association for Waterborne
Transport Infrastructure

Perspectives for enhancing navigation and environmental protection in the scope of climate change

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Where do we want to be?

Navigation systems, infrastructure and operations that are, in a climate change context:

- Sustainable
- Resilient
- Reliable
- ...

What are the challenges for river engineering?

An exercise in reconciliation ...

- minimising climate change-related disruption, while
- contributing to achieving net zero, and
- protecting/improving ecological status (which itself is threatened by the changing climate)
- ... in the face of significant uncertainty

What is PIANC doing, and how can this help?



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EnviCom WG Report
n° 176 - 2018

Permanent Task Group for Climate Change, headed by the Netherlands



GUIDE FOR APPLYING WATERBORNE TRANSPORT INFRASTRUCTURE TO NAVIGATION INFRASTRUCTURE

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EnviCom WG Report
n° 188 - 2019



CARBON MANAGEMENT FOR PORT AND NAVIGATION INFRASTRUCTURE

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Managing Climate Change Uncertainties in Selecting, Designing and Evaluating Options for Resilient Navigation Infrastructure



Permanent Task Group for Climate Change
Technical Note No. 1 - 2022



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EnviCom Task Group
n° 193 - 2020



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EnviCom WG Report
n° 178 - 2020



CLIMATE CHANGE ADAPTATION PLANNING FOR PORTS AND INLAND WATERWAYS

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Some key messages from WG 176

- Working with Nature objective: **design project to benefit both navigation and nature**
- Consider **climate resilience from the outset**
- Potential benefits of nature based solutions (NBS)
 - Healthy ecosystems can **reduce infrastructure vulnerability**
 - NBS are typically win-win or **low regret solutions**
 - Habitat creation or enhancement such as wetland rehabilitation, buffer strips, etc. are better for nature and can be less expensive than hard engineering
- **No one-size-fits-all**

Some key messages from WG 178

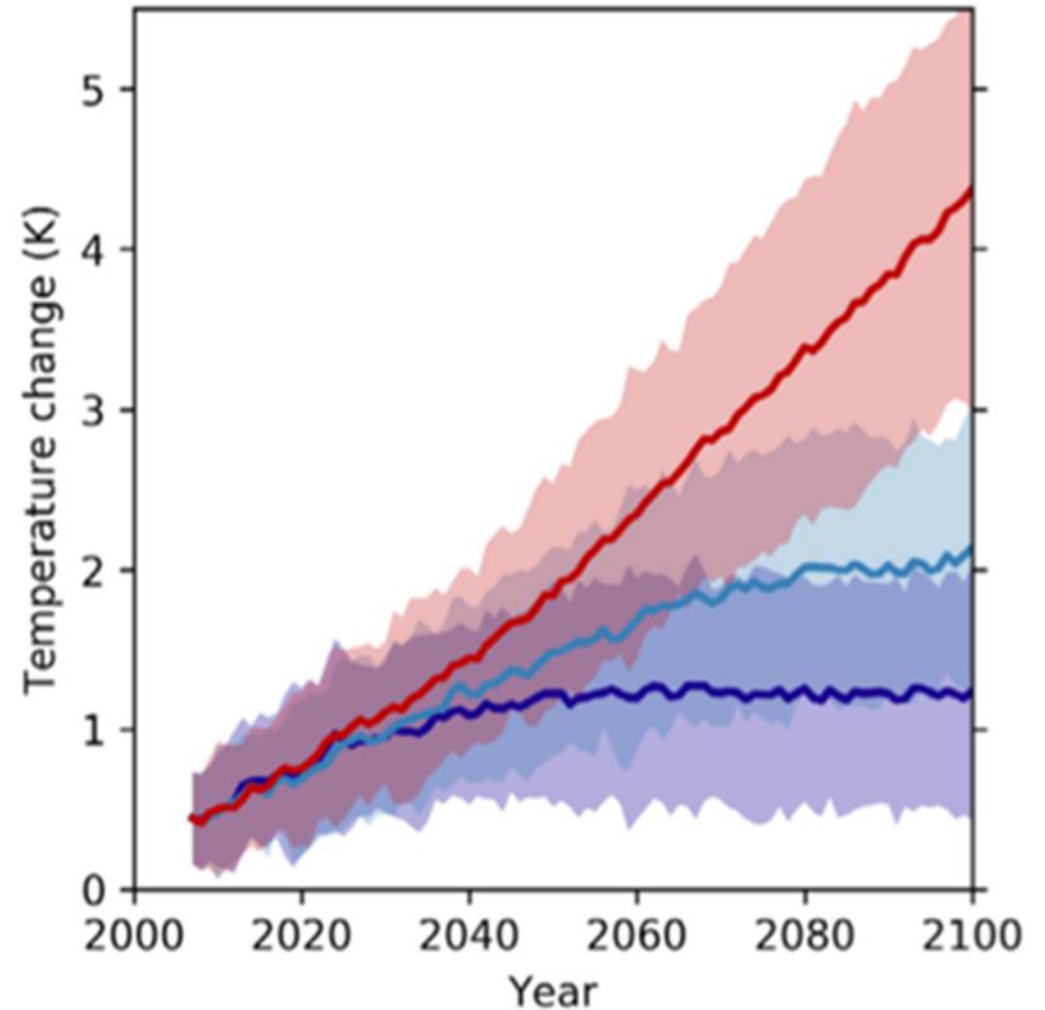
- Climate change adaptation planning: practical, four-stage methodology including a portfolio of measures
- Not only **structural/technological** but also **operational and institutional (policy/economic) interventions**
- Examples for flooding, high flow, low flow, sediment regime, erosion, visibility, extreme cold, extreme heat, water biology, water chemistry
- **No one-size-fits-all**

Key challenge = recognise and accommodate climate-related **uncertainty**

Dealing with uncertainty (1)

Challenges of handling uncertainty

- Uncertainty about rates of change present : an issue given design life



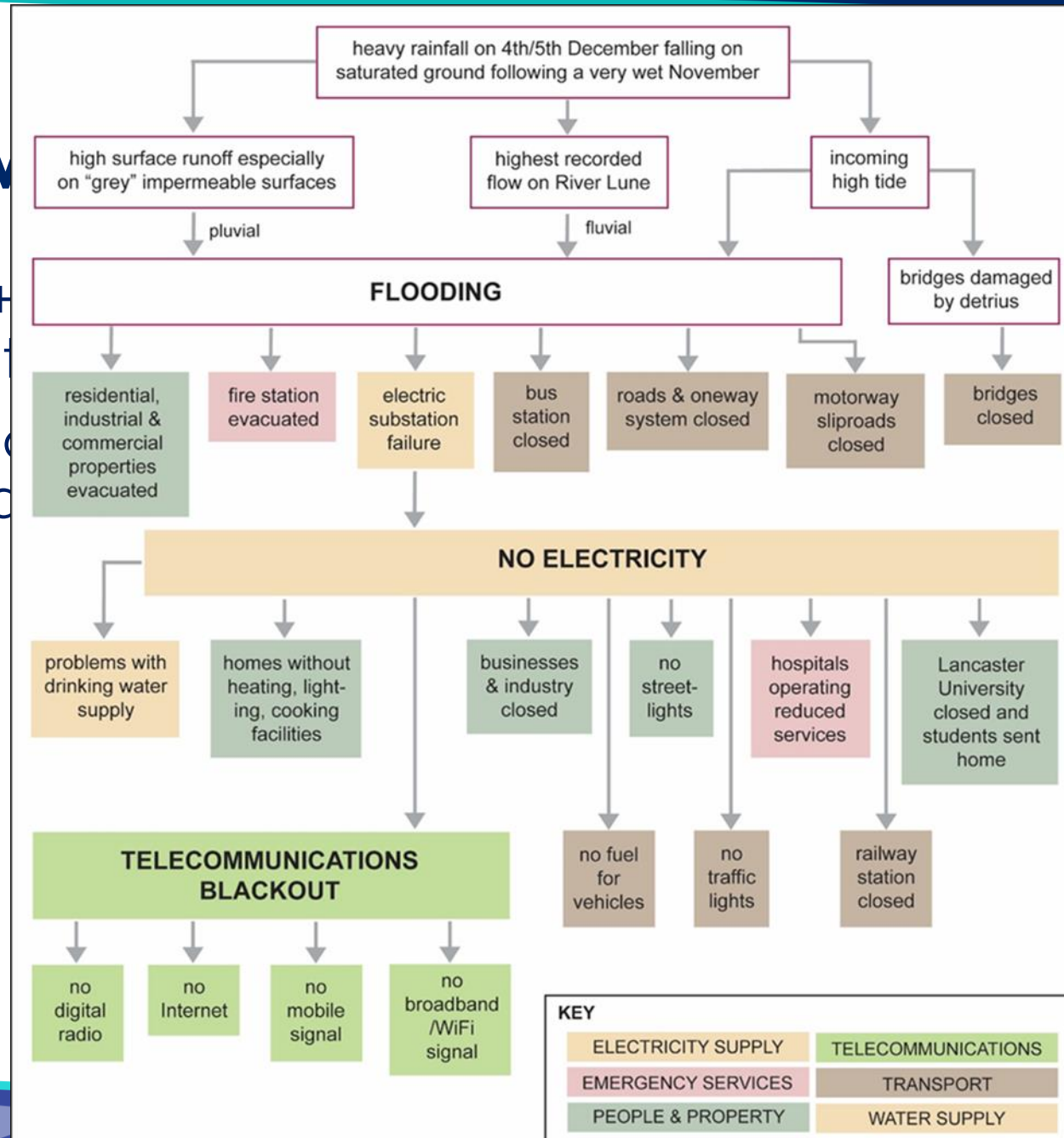
Dealing with uncertainty (1)

Challenges of handling uncertainty = barrier to adaptation

- Uncertainty about rates of change increase beyond 10 years from present : an issue given design life of navigation infrastructure
- Conventional statistical methods that rely on historic data to predict the magnitude of low probability future events are increasingly less appropriate
- For investments beyond 10 years, test sensitivity and tolerance to a range of climate change scenarios

Dealing with

- Include H+ term invest
- Understand and cascade



high value or long
point occurrences



Dealing with uncertainty (3)

- Consider adaptive and flexible solutions; ability to modify as conditions change
- Importance of redundancy; adaptive capacity
- Role of structural and non-structural interventions
- Explore no-regret options
- Apply adaptive management for informed decision-making
- Select climate change-appropriate evaluation methods
- Understand the consequences of inaction

Concluding thoughts

- Aim: sustainable, resilient navigation systems, assets operations
- Nature-based solutions may offer 'no regret' option to reduce vulnerability, to benefit navigation and nature
- But no one-size-fits-all
- Recognise challenge of accommodating uncertainty
- Test sensitivity to range of climate change scenarios including the 'unprecedented'
- Consider flexible, adaptive solutions
- Explore operational and institutional as well as structural solutions
- Understand the consequences of inaction



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