



Climate change adaptation for ports and inland navigation

Key messages from the PIANC Working Group 178 workshop and seminar held at the Institution of Civil Engineers, London, 7th March 2016

1. Understanding and interpreting the climate science

There is a clear need to simplify the science - in other words to interpret and present it in a meaningful way. Recipients need to understand 'what is climate change likely to mean for me'? This is linked to sensitivity and vulnerability assessments, critical thresholds and triggers for action: see 2. below.

There are concerns about conventional methods of using the past to project to the future, especially with the already prevalent increase in the frequency of extreme events. On the one hand, recent trends should be taken into account, but on the other serious consideration needs to be given to the possibility of an 'off the scale' event¹.

We should act on what we know. Temperatures are increasing, sea levels are rising in most areas, and precipitation characteristics are changing. However, there are also recognised gaps in knowledge e.g. in relation to waves, wind, fog, storm surges and tropical storms.

Monitoring can play an important role: improved observations can inform trend analysis. Quantitative information is more useful than qualitative information but both can have a role. Partnering with providers of local weather data can be useful.

Notwithstanding the uncertainties about rates of change, extremes remain more difficult to project than changes in the mean. In-combination effects should always be considered.

The development and use of climate change scenarios, including extreme scenarios, offers a promising way forward - enabling data quality and levels of uncertainty to be explicitly acknowledged, and allowing for a proportionate level of detail (and hence cost) to be selected.

Climate practitioners also need guidance.

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¹ See for example <http://www.ceh.ac.uk/news-and-media/blogs/north-west-floods-hydrological-update> or <http://www.ceh.ac.uk/news-and-media/news/record-uk-rainfall-river-flows-december-2015-flooding>

2. Identifying and assessing the risks, facilitating engagement, developing ownership

Knowing your assets and operations is critical to understanding how these might be affected.

Discussion about existing/known risks can be a useful precursor to discussion about future risks: familiarity can help to facilitate engagement.

Many port and navigation operators have an inadequate understanding of existing risks and vulnerabilities, but it is important to avoid being alarmist. Better to use business case arguments based on risks to current operations to facilitate engagement; to focus on business continuity.

Risk assessment needs to be a structured, but proportionate process: sensitivity (risk, hazard, exposure) and vulnerability assessments can be used to identify critical thresholds and triggers for action.

Irrespective of the scale of interest, a strategic or site or facility level scoping exercise will be vital to focus in on critical issues and critical thresholds.

Stakeholders – both internal and external to the organisation – need to be engaged in discussions about climate risks and adaptation requirements as early as possible.

There may be a need to overcome scepticism: depending on the circumstances, this might be best achieved with sound, verified evidence backed by scientific facts, and/or by gathering and using local examples based on local conditions.

Owners, operators and other stakeholders are best placed to understand the required performance of an asset and its risk tolerance (agility of the asset; flexibility of operations, etc.). However, external experts can bring fresh ideas. Finding the right balance for the particular situation is vital.

Bottom up approaches can be useful, not only for raising awareness, but also for developing ownership of the problem and stimulating discussion about possible solutions. Changing perceptions and changing behaviour are often vital to identifying and implementing sustainable solutions.

Barriers to engagement can be cognitive, normative, political or economic.

It can sometimes be useful to promote discussion about climate adaptation in the context of social, environmental or reputational opportunities.

It is always important to stress the financial or economic benefits of adaptation. However, in some cases financial incentives or, in others, fines may be needed to facilitate change.

Establishing risk ownership and risk transfer opportunities can be vital in some situations: the current owner or operator is not always best placed to manage future risks.

3. Measures to strengthen resilience and adapt waterborne transport infrastructure

Resilience is vital; always have a Plan B.

Structural and non-structural (operational) solutions will likely be needed. Operational solutions may provide quick wins.

Use adaptive management techniques: identify critical effect thresholds and staged responses. Consider new technological solutions: solutions with adaptive capacity (e.g. flexible weirs); plan and design to include capability for upgrading or future modification.

Plan and design to 'fail gracefully'. Understand likely failure mechanisms and plan to minimise damage/maximise recovery opportunities. Ensure infrastructure and operations in hinterland are resilient.

Cost benefit assessment is essential but it needs to be proportionate *inter alia* to the level of risk: it is also important to understand risk appetites. When undertaking cost-benefit analysis, always consider the costs of inaction; know the daily cost of downtime to each relevant operation. Use whole-life costing: consider maintenance; post-event recovery; future modifications; business continuity. Take opportunities to reinforce the business case.

Aim for a costed adaptation plan: implementable, achievable.

Look for financing opportunities: finance is often available if relevant criteria are met.