

ADAPTATION OF INLAND WATERWAYS INFRASTRUCTURE FOR CLIMATE CHANGE IMPACTS

PROPOSED TECHNICAL WORKING GROUP

TERMS OF REFERENCE

1. Historical Background Definition of the problem

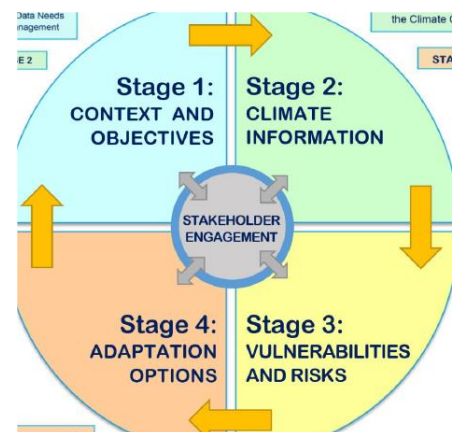
The need for adaptation of inland waterways (IW) systems is obvious given the climate change that has occurred already along with the near-term changes that are expected to happen. It is important to assess the various impacts on IW infrastructure, including the waterways and rivers. It will be necessary to adapt both structures and operations, and in some cases even the waterways themselves, to the effects of climate change which includes increasing resiliency to extreme boundary conditions.

Therefore, it is an important task to assess the variation in boundary conditions and give guidance on adaptation measures for various IW systems (including physical and digital infrastructure). This includes guidelines for structural and non-structural solutions. While adaptation is likely necessary for many IW systems, there are several considerations that must be considered before implementing any solution. This WG intends to help address some of the knowledge gaps regarding how to evaluate and select adaptation measures for IW systems.

2. Objectives

Considering climate change impacts, the issue of adaptation measures that will be needed for inland navigation systems is diverse. The overall objective of this work group is to summarize adaptation measures available to navigation management organizations and the process in selecting a reasonable measure. The specific objectives are:

- 1) Develop summary of likely impacts for IW systems from climate change.
- 2) Develop summary of potential adaptation measures that IW will need now and into the future; building on relevant portfolios of measures from Annex 4 of WG 178.
- 3) Develop process, which can be used as a framework for IW systems to determine risk of future climate changes and how to develop adaptation alternatives. (see Fig, WG 178, 2020).





3. Earlier reports to be reviewed

The key PIANC documentation related to climate change that needs to be reflected or referred to in Working Group technical reports is understood to be the following:

- EnviCom 178: Climate Change Adaptation Planning for Ports and Inland Waterways (2020)
- INCOM WG 203: Sustainable Inland Waterways - A Guide for Inland Waterway Managers on Social and Environmental Impacts , 2023
- PTGCC Technical Note 1 - Uncertainty guidelines (2022)
- PTGCC Task Group 3 - Update to Climate Change Drivers and Impacts Related to Ports and Waterways (in progress)

Other documentation may be of interest:

- IPCC Sixth Assessment Report (or latest Assessment Report release)
- IPCC special reports (e.g. SROC 2019)
- CCNR: Act now on low water and effects on Rhine navigation¹

Other PIANC publications will likely be needed along with peer-reviewed journal publications.

4. Scope of work

The work will focus on using existing references to develop IW focused measures. In addition to elaborating on Objectives 1) to 3) above, the key tasks with this work group will include:

- a. Development of adaptation pathways (for the mid-term (2050) and for the long term (2100), which include uncertainty of future climate projections on IW systems.
- b. Development of Working with Nature (WwN) based solutions to address adaptation from climate change in IW systems. Within this task an evaluation of what WwN solutions can be used now and identification of issues these solutions may present with management of IW systems.
- c. Development of recommendations for IW novel solutions to use both WwN and other engineering options for future scenarios. Recommendations should include possible transformational changes as well as incremental measures (transformational changes could include relocating assets or even ports, or significantly modifying river management regimes).

Whereas extreme low and high flow conditions will be a particular focus, the scope of work should also include other projected changes of relevance to inland waterways in relation with physical parameters, for example, changes in between low and high flow conditions, modification of rainfall regime, flooding, sediment dynamics, , salinity etc.,.

¹ https://www.ccr-zkr.org/files/documents/workshops/wrshp261119/ien20_06en.pdf



5. Intended product

Working group report along with future technical presentations.

6. Working Group membership

Working group members are still to be identified. At the time of drafting this ToR, these are the tentative members.

- Katja Rettemeier (INCOM), Jeremy Giovando (mentor)
- Inland waterways experts, from IW community, PTGCC
- National section representatives with a range of expertise/experience including climate change, river engineering, WwN solutions, inland ports, River Commissions, finance specialists

7. Target audience

The intended audience for this report will be IW managers, designers, and other stakeholders who are seeking guidance on specific adaptation measures for IW systems. The synthesis of information from several documents will provide technical detail to a range of technical backgrounds.

8. Relevance

8.1. Relevance to countries in transition, etc.

This will be relevant for both transitioning and developing countries because it will provide specific adaptation examples for expected impacts from climate change on IW systems. The discussion will cover both high and low flow conditions. The information from this report may be an important technical resource for design and construction of new IW infrastructure.

8.2. Climate Change and Adaptation

This work group will use PIANC climate change resources (e.g. WG 178, WG 203, ..) in the discussion of adaptation measures. Information from other key climate change related documents (i.e., IPCC, CCNR) will also be utilized.

8.3. Working with Nature

Discussion of Working with Nature measures that may increase adaptability of IW systems to climate change will be included. Combinations of measures which have been found effective will also be covered.

8.4. UN Sustainable Development Goals

Goal 9: Industry, innovation, and infrastructure

Goal 13: Climate Action



PIANC

The World Association for Waterborne
Transport Infrastructure

9. References

PIANC WG203 (2023): Sustainable Inland Waterways - A Guide for Inland Waterway Managers on Social and Environmental Impacts ,

PIANC PTGCC (2022). Managing Climate Change Uncertainties in Selecting, Designing and Evaluating Options for Resilient Navigation Infrastructure

PIANC WG178 (2020). Climate Change Adaptation Planning for Ports and Inland Waterways

IPCC, 2022: Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. Cambridge University Press, Cambridge, UK and New York, NY, USA, 3056 pp., doi:10.1017/9781009325844.

Addendum (EXCOM 23 May 2023)

Contributions may include:

- Differentiate the types of rivers (rivers fed by water coming from icy mountains; or rivers fed by rainwater).