

EURO-INBO 2025 – Session 2 Report

Adapting to Climate Change: How to Better Manage and Prevent Floods?



Parma, Italy - May 2025

Inviting authorities:



In partnership with:



Thematic context

Over the past 30 years, floods have affected 5.5 million people in the European Union, causing 3,000 deaths and more than 170 billion euros in economic damage. Climate change is already leading to an increase in the frequency and the intensity of floods. In 2023 only, a third of European rivers overcame the "high" flood threshold, and 16% exceeded the "severe" flood threshold, impacting around 1.6 million of people. Since the beginning of 2024, flooding has been responsible for almost 340 deaths in Europe, mainly in Spain, Bosnia-Herzegovina, Italy, and Poland.

In 2007, the European Union adopted a specific directive on the assessment and management of flood risks. The Flood Directive requires each EU Member State to prepare flood hazard and risk maps and establish flood risk management plans for all river basins and coastal areas. Considerable progress has been made, and the harmonization of practices between EU states brings many benefits: for example, it greatly facilitates cooperation to overcome flood risk management in transboundary basins. These flood risk management plans involve a combination of relevant structural (green and grey infrastructure) and non-structural measures (including public awareness and warning systems).

However, many challenges remain. Funding is still insufficient to ensure the implementation of the measures proposed in these plans, even though the cost of inaction exceeds the investment required. Flood risk assessment still does not systematically include hydroclimatic modelling and

forecasting, despite the progressive obsolescence of the flood frequencies and intensities previously used. Coordination between the different levels of government responsible for flood risk management needs to be improved. In addition, the objective of restoring the natural floodplain of the river (room for the river approach), while increasingly necessary and urgent, is complex to achieve for technical and, above all, socio-economic reasons. For embanked watercourses, in an era of climate change, making room for the river means identifying areas outside the embankments where controlled flooding can take place, avoiding breaches and reducing the flood volumes downstream. Finally, land-use planning measures (and not just on the watercourse) throughout the river basin (ex: soil sealing) are insufficient.

It is important to check the progress reached in the common implementation strategy for the water framework directive and the floods directive. This strategy promotes coordinated action between member states, exchange of information and experiences, discussion and dialogue.

This session presented experiences, tools, and methods to overcome the challenges of flood control in European countries and river basins.

Session Report

SESSION 2 - ADAPTING TO CLIMATE CHANGE: HOW TO BETTER MANAGE AND PREVENT FLOODS?



Project Director of "Support to Ganga Rejuvenation", German Agency for International Cooperation (GIZ)



Head of Department, General Directorate of Water Management, Hungary



Senior Policy Officer Transboundary Rivers, Ministry of Infrastructure & Water Management, The Netherlands



President, Rhine-Meuse Basin Committee, France



Manager technical area, Po River District Basin Authority Hydrographic Confederation, Spain



President of the Júcar



Executive Secretary, International Sava River Basin Commission

Challenge 1: Financing Flood Protection and Climate Adaptation

Flood protection and climate adaptation require sustained, significant investment. Across Europe, the cost of inaction or reactive recovery far exceeds that of prevention. In France, an estimated €60 billion is needed to meet climate adaptation goals, half expected from public funds.

In Italy, flood damage restoration costs around €3 billion annually, while prevention receives only about €300 million. Andrea Colombo (Manager Technical Area, Po River District Basin Authority, Italy) stressed the need for multi-year investment strategies, particularly for large infrastructure and nature-based solutions (NbS). He also called for better coordination among funding sources.

The Netherlands allocates over €1.6 billion annually to flood protection and invested €2.3 billion from 2000–2019 in projects like dyke relocation and floodplain restoration. Erik Meis (Senior Policy Officer Transboundary Rivers, Ministry of Infrastructure & Water Management, The Netherlands) explained that the country's geographical vulnerability demands this level of commitment, showing the benefits of consistent funding.

Elsewhere, in Hungary, Lábdy Jenő (Head of Department, General Directorate of Water Management, Hungary) explains that the country classifies dyke systems by development needs to improve investment targeting. Dragan Zeljko, (Executive Secretary, International Sava River Basin Commission) explains that the Sava River Basin commission (ISRBC: Bosnia Herzegovina, Croatia, Serbia,

Slovenia) uses a model of regular contributions from member countries supplemented by external donors.

These cases show that strategic financial planning, coordination, and political will are essential to mitigate future risks.

Challenge 2: Integrating Hydroclimatic Modelling and Forecasting

Many flood risk assessments still rely on outdated assumptions. Integrating hydroclimatic modelling is now crucial to reflect changing rainfall patterns and rising flood frequency.

Ms. Jana Tejkalová (Head of Unit of International Cooperation, Planning and Flood Protection, Ministry of the Environment, Czech Republic) noted the need to improve models to capture diverse flood types, from sudden flash floods to large-scale riverine floods. Miguel Polo Cebellán (President, Júcar Hydrographic Confederation, Spain) emphasized the need to enhance modelling tools to account for local nuances, linking hydrological data to real-world impacts for informed decisions. This demands greater availability of hydrological data and improved data-sharing mechanisms.

Lábdy Jenő from Hungary points out that while most modelling data is publicly available, the growing number and complexity of hydraulic models require significant investment in IT infrastructure and staff. The current open-access model does not generate revenue, raising concerns about the sustainability of these systems over time.

The Sava River Basin has operated a transboundary forecasting platform since 2018. Initially built with limited data, it now integrates topographical and hydraulic inputs. With support from the World Meteorological Organization it now also serves drought forecasting and navigation. Planned upgrades aim to harmonize flood warnings across countries.

Challenge 3: Strengthening Coordination and Public Engagement

Effective flood risk management extends beyond technical solutions; it depends on coordinated governance and meaningful public participation. In many countries, fragmented institutional responsibilities reduce policy efficiency. Jana Tejkalová stressed the need for coordination to switch from emergency response, to long-term planning, involving all actors: water agencies, local authorities, emergency services, and communities. Andrea Colombo noted institutional fragmentation in Italy, while Miguel Polo Cebellán emphasized the importance of multidisciplinary, well-trained teams and proactive public communication before crises strike.

Transboundary coordination is critical. Hungary relies on upstream collaboration to manage downstream long-lasting flooding episodes affecting the country. The devastating 2014 floods in the Sava Basin led to the creation of a joint governance system with shared plans and forecasting, managed by the Sava River Basin Commission.

Public buy-in is essential. In the Netherlands, floods in the 1990s galvanised support for the “Room for the River” programme, including land purchases and resident relocations. In France, water committees allow diverse stakeholders to reach consensus on land-use and water management decisions. These participatory structures help align community values with technical solutions, fostering a sense of shared responsibility.

Outside Europe, Laura Sustersic, (Project Director of the “Support to Ganga Rejuvenation” project at GIZ), presented an EU-German funded initiative in India’s Barak River Basin that combines traditional top-down flood control with participatory planning approaches inspired by the EU Water Framework Directive.

Challenge 4: Restoring Natural Floodplains Amid Legacy Constraints

The deployment of nature-based solutions (NbS) such as the restoration of floodplains are increasingly recognised as sustainable approaches. However, Europe's legacy of land use — urban sprawl on floodplains, channelised rivers and agricultural encroachment — poses barriers.

In Italy, years of expansion into flood-prone zones have heightened vulnerability. France is reversing past policies by re-meandering rivers, planting hedgerows, and de-impermeabilizing urban areas. Audrey Bardot (President, Rhine-Meuse Basin Committee, France) highlighted a successful programme that turned schoolyards into green, absorbent spaces—simple, participatory, and effective.

The Netherlands uses multifunctional planning: side channels along navigable rivers reduce flow speed, encourage sedimentation, support biodiversity, and improve recreation. In the Po Basin, “controlled flooding” in designated agricultural zones reduces pressure on levees, avoiding catastrophic failure.

With the support of GIZ, India's Barak River Basin project aims to balance traditional engineering solutions with NBS, adapting European methods to local ecological needs.

However, acquiring space for rivers is a major challenge. These projects often affect private lands, requiring negotiations with farmers and residents. In the Netherlands, relocation schemes have succeeded by offering flexible, individualized solutions through direct dialogue with affected farmers.

Pascal Berteaud (Director General of the Center for Studies and Expertise on Risks, the Environment, Mobility and Planning (CEREMA), France, President of the International Office for Water) emphasized that financial incentives and

inclusive engagement are more effective than coercion in gaining public support for nature-based solutions. While legal tools for expropriation exist for example in France, building consensus is often the more sustainable and socially acceptable path.

Challenge 5: Integrating Flood Risk into Land-Use Planning

Land-use planning significantly influences flood exposure. Urban development in flood-prone areas has increased vulnerability, requiring a shift in how and where we build.

Miguel Polo Cebellán highlighted that risk reduction involves not only preventing floods but also minimizing their potential impact. This includes discouraging construction in high-risk areas and encouraging relocation.

The limitations of traditional engineering approaches are becoming clear. In Italy's Po River Basin, continuously raising and extending levees led to higher water levels during floods, increasing rather than decreasing risk. Andrea Colombo emphasizes the need for alternative strategies that align with the natural dynamics of rivers.

Historical planning decisions also shape today's risks. In France, the mid-20th century trend of straightening rivers to support farming inadvertently increased flood risks and reduced biodiversity. Today, efforts focus on restoring natural river patterns.

In the Netherlands, land-use planning balances flood protection, drought adaptation, and river navigation. Along the Rhine corridor—a hub of population and commerce—reserved spaces for river expansion have become essential climate adaptation tools. Ultimately, long-term flood resilience requires holistic, integrated strategies that combine ecological restoration, strategic zoning, and inclusive governance. Europe's evolving practices offer valuable

lessons for regions worldwide facing

similar climate and water-related challenges.

