



Autorità di bacino distrettuale del fiume Po

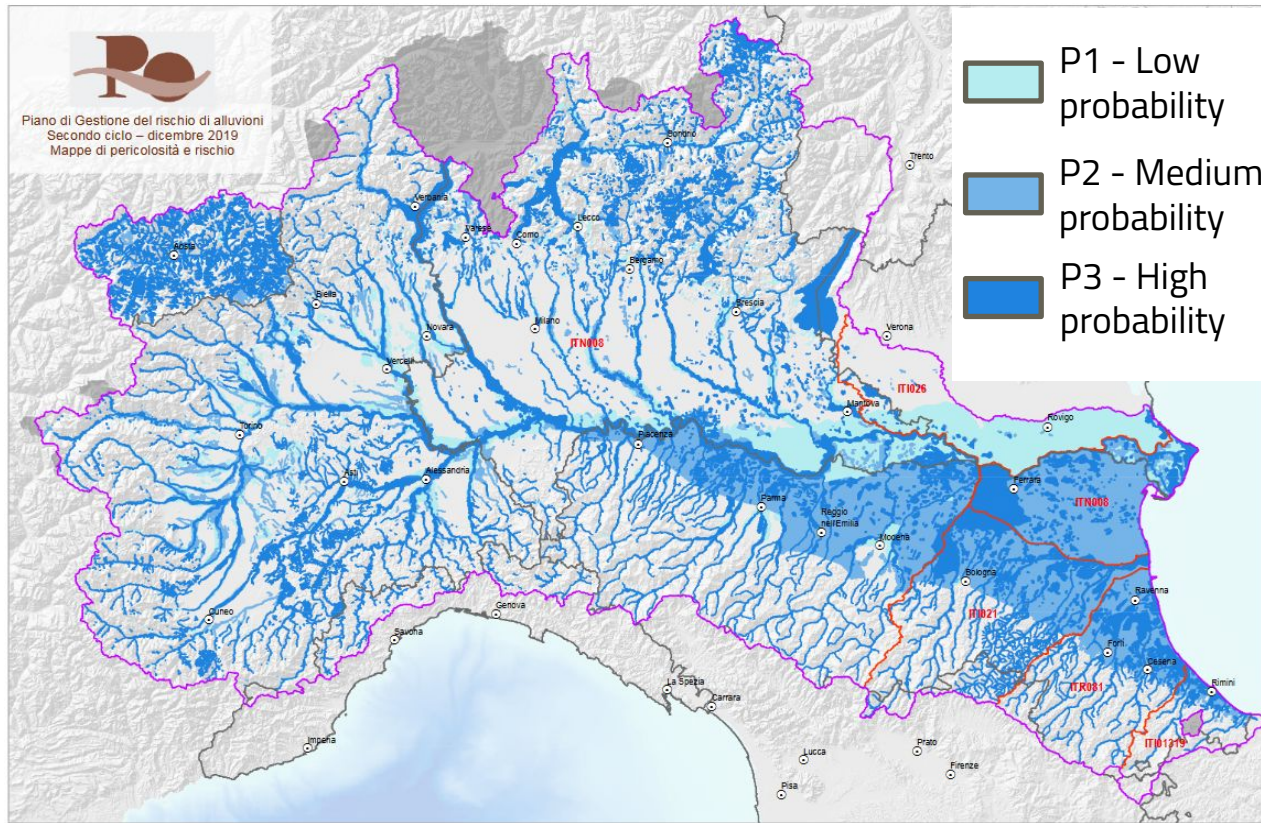
Session 2 - Adapting to climate change: how to better manage and prevent floods?

Flood risk mitigation in the Po River District: problems, challenges and strategies

Ing. Andrea Colombo, Po River District Basin Authority

22nd EURO-INBO INTERNATIONAL CONFERENCE, 21/05/2025 Parma, Italy

Flood hazard in the Po river basin District



Some flood risk numbers

34%

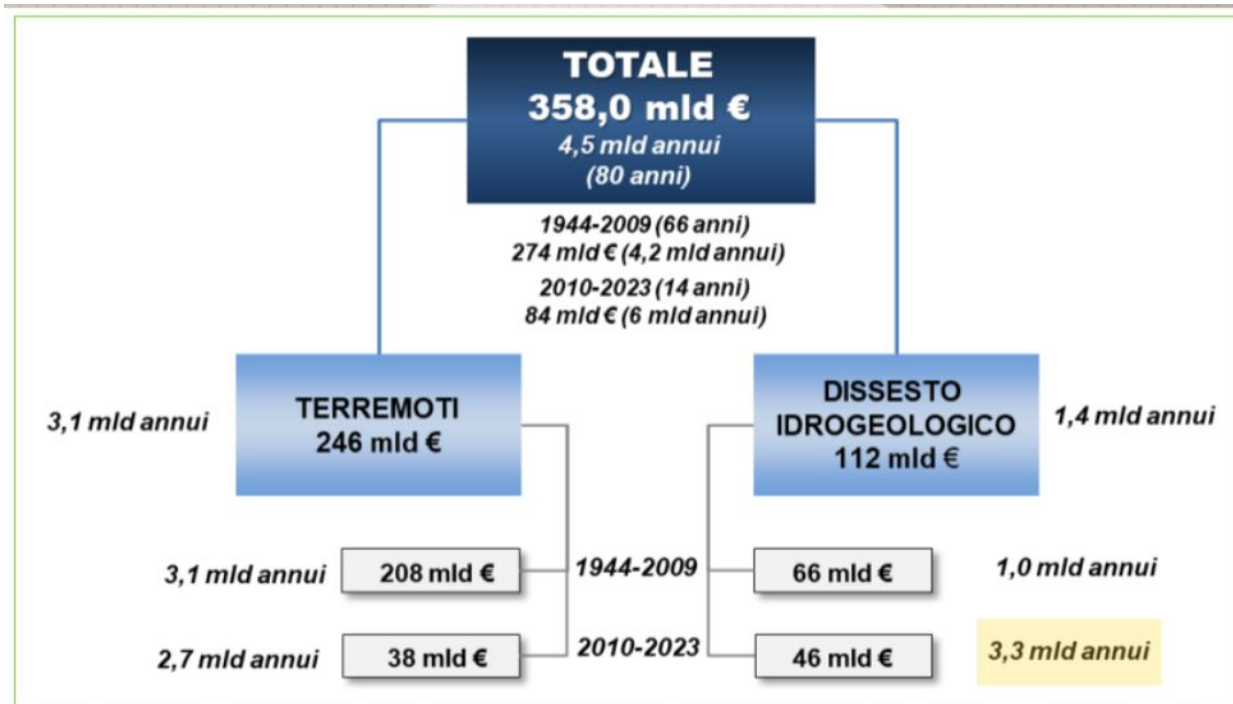
District area potentially subject to flooding

> 3 million

District inhabitants living in areas with medium flood hazard level (P2)

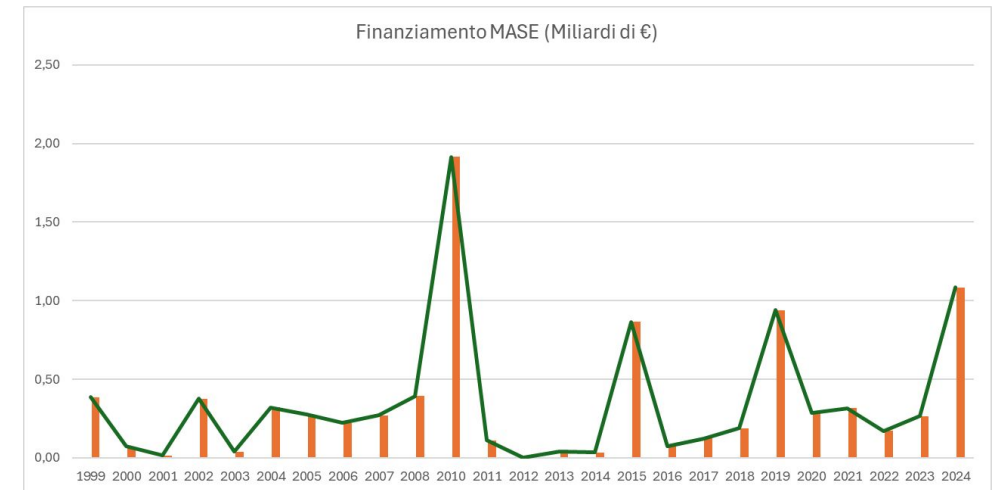
Cost of damages vs investments in prevention and protection measures (national level)

Cost of damage caused by earthquakes and hydrogeological risk (floods and landslides)



Fonte: Elaborazione Cresme su dati Centro Studi Consiglio Nazionale dei Geologi, Protezione Civile, Servizio Studi camera dei deputati, MASE, ISPRA, Agenzia per la Coesione Territoriale, Corte dei conti

Funds of Ministry of the Environment (MASE) for mitigation of hydrogeological risk (floods and landslides) - period 1999 - 2024



Total: 7 billion euros

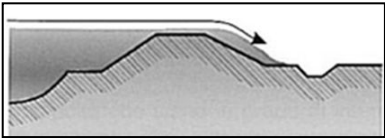
Mean: 350 million Euro/year

Total amount request: **about 26 billion euros**

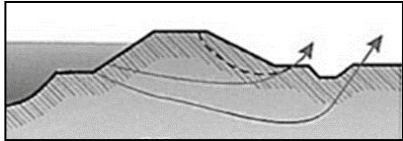
The biggest challenge is multi-year funding planning.

Levee criticalities and recent events

Levee overtopping



Levee siphoning



Enza river
2017



Reno river 2019



Secchia river 2014



Panaro river 2020



Sesia river 2020



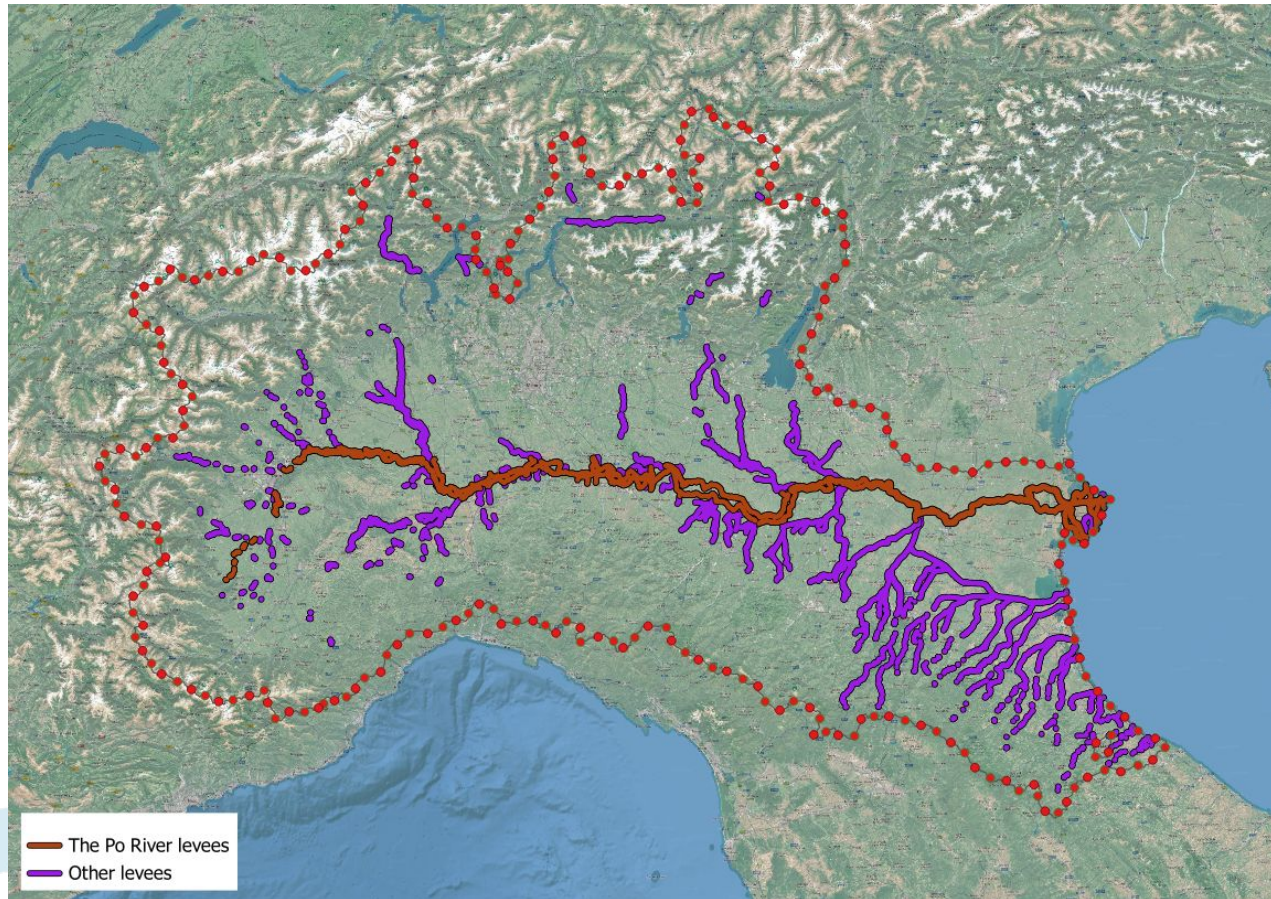
Idice river 2023



Lamone river 2024

The Po River levee system

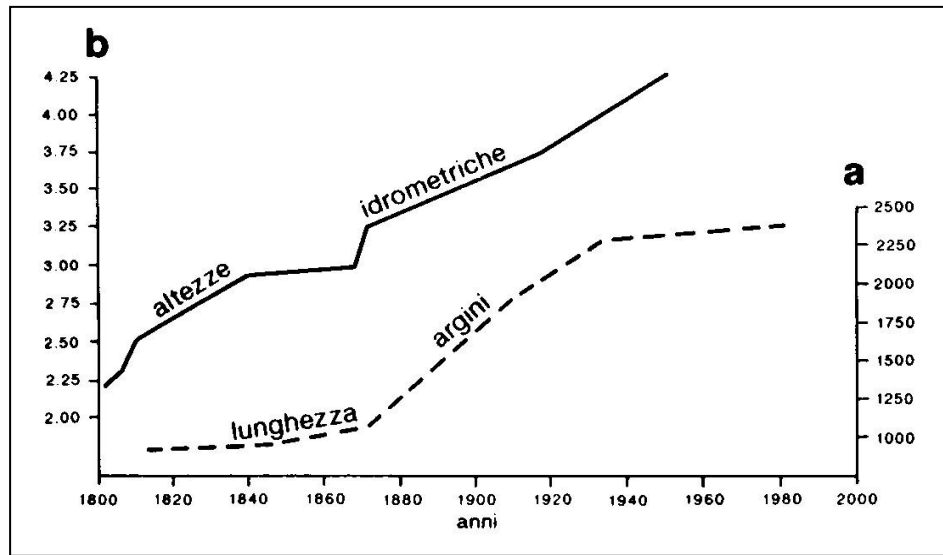
The Po river levee system is a centuries-old work consisting of earthen levees, almost continuous from Turin to the sea, which reach heights of up to about 10 m above ground level in the middle section and can no longer be raised significantly due to structural limit conditions.



Po by numbers:

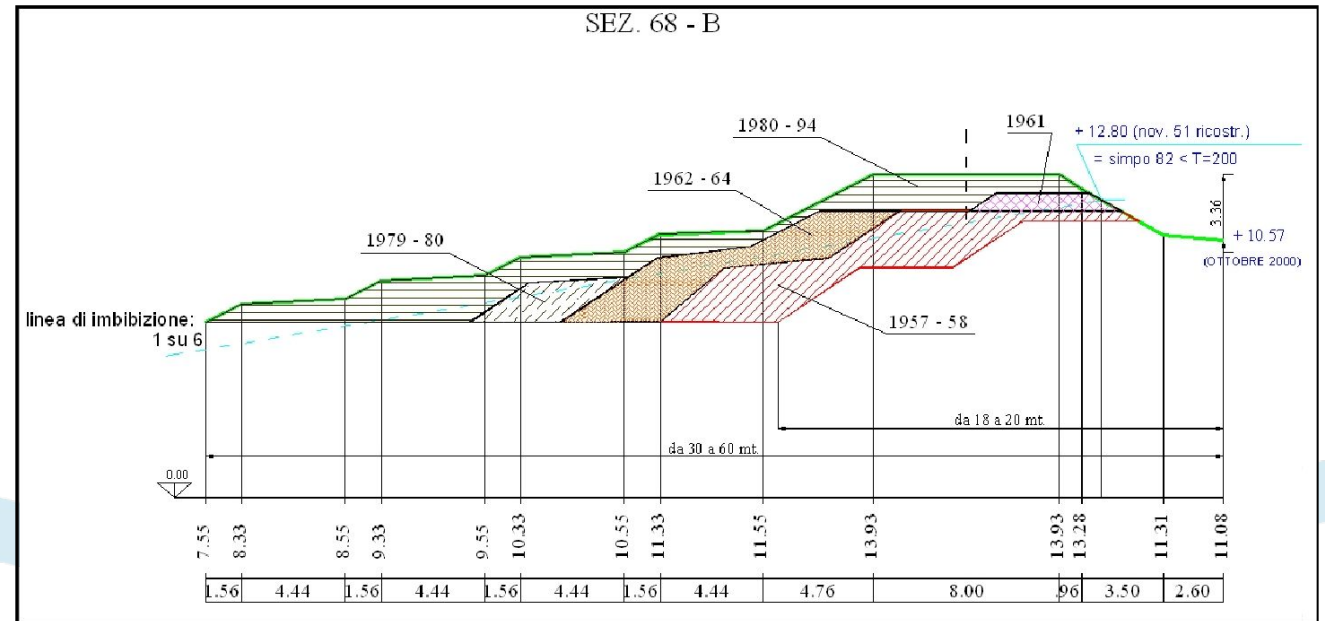
- **652 km** - total length of the Po River shaft
- approximately **1,100 km** - **length of levees** on the Po River over a total of **6,000 km** - **total length** of district rivers levees
- **9,200 km²** of potentially floodable surface area (10% of the District's surface area of 87,000 km²)
- **1.5 million resident inhabitants** (8% of the District's inhabitants)
- **331 municipalities** including several provincial capitals

Criticalities: flood depth and length of levee system



Increase in time of the length (km) of the entire embankment system, since 1800, and the corresponding increase of annual maximum observed water depth (m) at the Pontelagoscuro hydrometric station, located at the catchment outlet

The embankments have been heightened, reinforced and extended upstream, over the past centuries, especially after the major historical floods (1872, 1951, 1994 and 2000), to become dikes with height up to 10 m, that are no longer be significantly heightened



River area changes and urbanisation



Parma, 1945



Parma, 2014

River area changes and urbanisation



Parma, 1945



Parma, 2014
(Flooded area during the event of 2014)



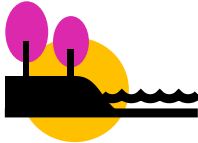
«Piccole Figlie» Hospital

FRMP – Plan measures typologies

Measures to adapt to climate change and win-win



Sediments management
(General Sediment Management Programme)



Vegetation management in the riverbed and floodplain areas



Return of naturalness to watercourses to improve the natural lamination of floods



Relocations
Adjustment of bridges



Monitoring and control of levee vulnerability



Assessment of residual risk in fascia C, flood forecasting, warning and emergency management



Levee relocation

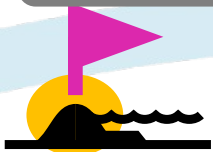


Improvement of the outflow capacity and flood plains by lowering the flood plains



Controlled flooding

Grey measures



Adjustment and completion of levee systems and expansion tanks

Innovative and resilient defense strategies

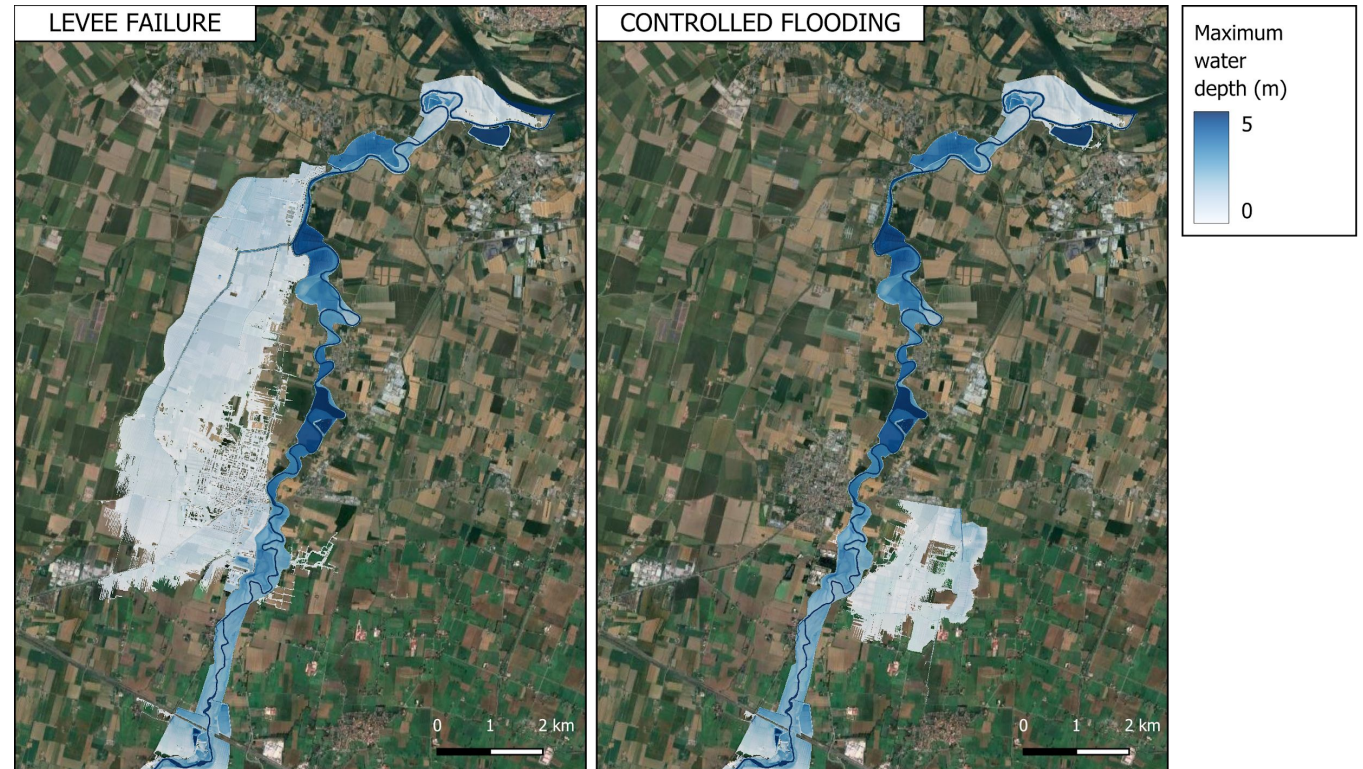


Controlled flooding

Identification of **areas outside the levees** where it is possible to laminate the flood **discharge exceeding the flow capacity in a controlled way**.

Make levees resistant to the controlled overflow to **avoid breaches** and **reduce the flood volume** in the countryside area.

Thanks to the **MOVIDA project**, which provides methods and tools for flood damage assessment, it has been possible to estimate the flood damage for all exposed elements in the event of levee failure and controlled flooding.



Flooded area (km²): **16**

Overflowed volume (Mm³): **8,4**

Damages to residential and agricultural buildings (M€): **25**

N° Inhabitants involved: **8000**

Flooded area (km²): **4,1**

Overflowed volume (Mm³): **1,6**

Damages to residential and agricultural buildings (M€): **0,6**

N° Inhabitants involved: **64**





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Thank you for your attention

<https://www.adbpo.it/>