Mediterranean wetlands: Natural solutions to deal with climate change

XVI World Water Congress

International Water Resources Association (IWRA)

Cancùn, Mexico, 29 May - 3 June 2017

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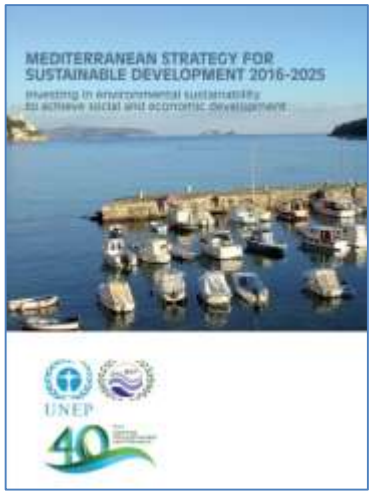
What is the Plan Bleu?

- **A Regional activity centre** attached to the Mediterranean Action Plan (MAP – 1976), first-ever UNEP Regional Seas Programme

- Created 40 years ago as a **systemic and prospective analysis centre in the Mediterranean**



Our missions:

- Observing environment and development to enlighten decision makers
- Shaping possible futures for sustainable development
- Monitoring the implementation of the Mediterranean Strategy for Sustainable Development

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Context: Mediterranean Basin « hot spot » of climate change

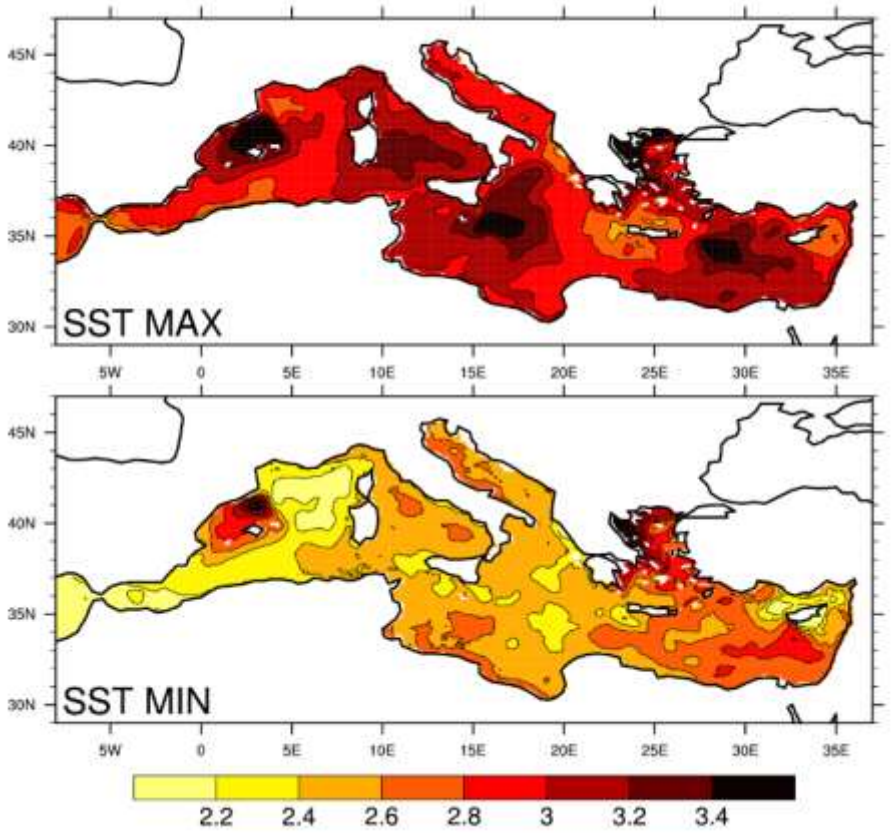
Med climate warmer and dryer in 21st Century

T°↗ from 1.73 to 3.7°C

↘ Yearly precipitations from 5 to 20%

↗ Sea level

Extreme events (drought, flood, storms…) more frequent



Composite of sea surface temperature anomalies maxima (top) and minima (bottom) for the 2070-2099 period (vs. 1961-1990). Unité: °C (Adloff et al., 2015)

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Context: Mediterranean wetlands

«Wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres » (Ramsar Convention, 1971)

Source: OZHM, 2012

~18 millions ha in the Mediterranean
(Tunisia, Montenegro, Serbia, Croatia, France)
=
1-2% of world's wetlands

- Of which 23% artificial wetlands
- 2nd rank in terms of biodiversity
- Panel of ecosystem services provided (contributing to human welfare)

→ Threatened ecosystems in constant decline: Climate change, agriculture, urbanization, tourism, land cover changes…

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Wetlands and Climate change

→ Many studies demonstrate the impact of climate change on ecosystems, including wetlands

→ Conversely, **the role of ecosystems as an adaptation or mitigation tool is still little understood and underestimated** in countries outside the European Union!

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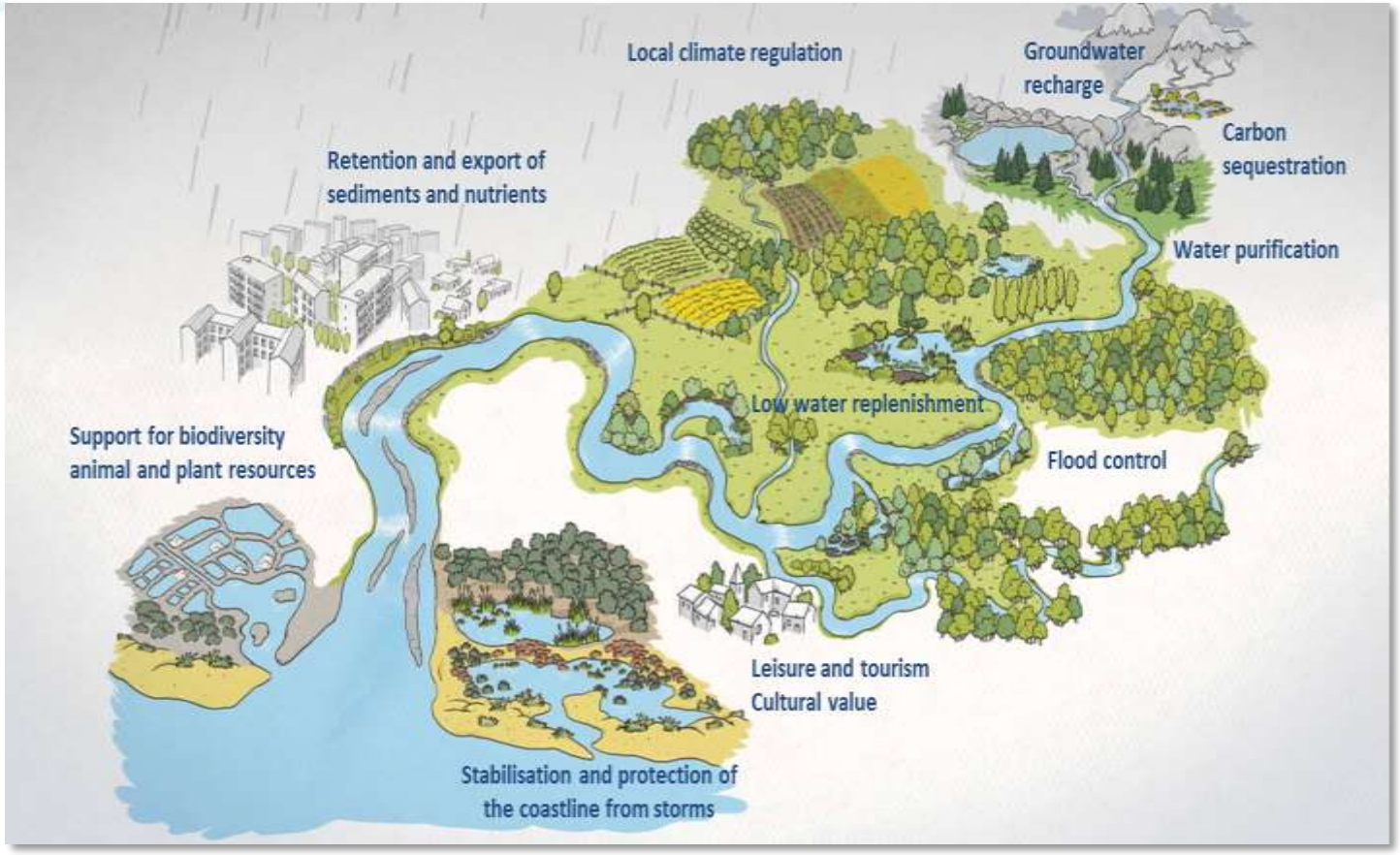
Ecosystem services provided by wetlands



« wherever we live, we all depend on Nature and ecosystem services to access to a decent, safe and healthy living »

Source: adapted from Agency Rhone-Mediterranee Corse

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Regulation services related to Climate Change

- Climate regulating service through **carbon storage** (peatlands, mangroves, marshes, riparian zones, grasslands…)
- Regulating service of **microclimates** through intense evaporation from land and vegetation
- **Protection service against extreme events** (mangroves, lagoons, lakes…)
- **Flood control service** (peatlands, marshes, ponds…)
- **Low water replenishment service** (peatlands, marshes, lakes…) = sponge role

Med-ESCWET project (2013-2016)

➔ « **Economic valuation of ecosystem services provided by wetlands in terms of adaptation to climate change in the Mediterranean** »

Objective: **To promote the integration of the « climatic buffer » role played by wetlands in Mediterranean strategies for climate change adaptation**

- **Coordinator :** Plan Bleu
- **Partners:** Tour du Valat, Nomadeis
- **Budget:** 471,5 K€
- **Financial partners:** Fondation Prince Albert II de Monaco (142 K€)
  Fondation MAVA (276 K€)

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Tour du Valat

nomadéis

MAVA
FONDATION POUR LA NATURE

FONDATION PRINCE ALBERT II DE MONACO

Four Mediterranean wetlands as pilot areas

- **Etang de vic coastal lagoon**
  → Coastal protection service
- **Lonjsko polje floodplain**
  → Flood control service
- **Yeniçağa peatlands**
  → Carbon sequestration service
- **Lake Burullus**
  → Carbon sequestration service

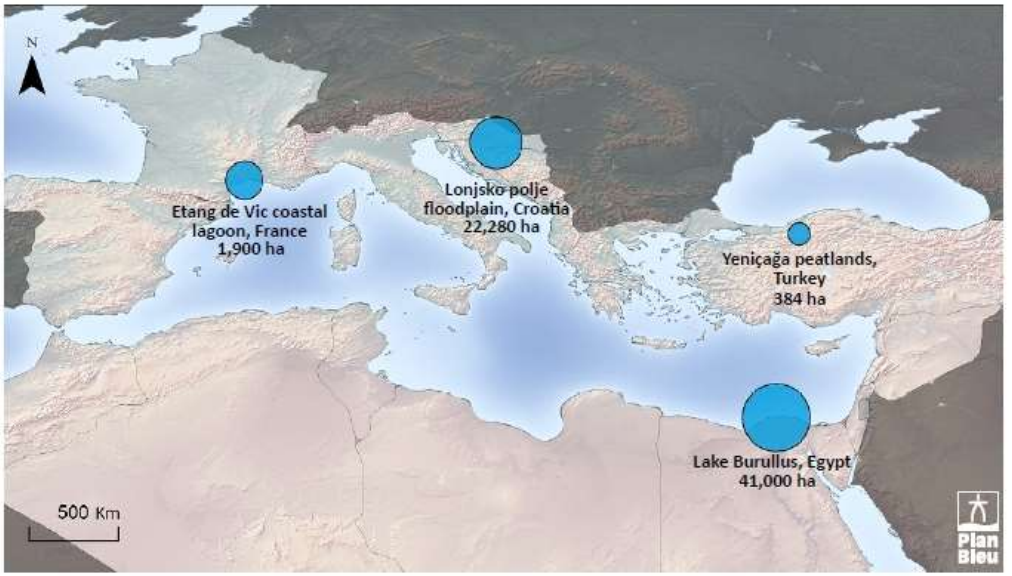

Figure 1. Location and scale of the pilot sites

Local partners

Ms Irma Popovic Dujmovic – WWF Adria
Ms Valerija Hima – Lonjko polje Nature Park

Prof. Kamal Shaltout – Tanta University
Prof. Tarek Galal – Damietta University
Dr Ebrahem Eid – King Khalid University

Mr Hugues Heurtefeux - EID

Ms Ozge Balkiz – Doga Koruma Merkezi
Prof. Dr Fatih Evrendilek – Abant Izzet Baysal University, Bolu

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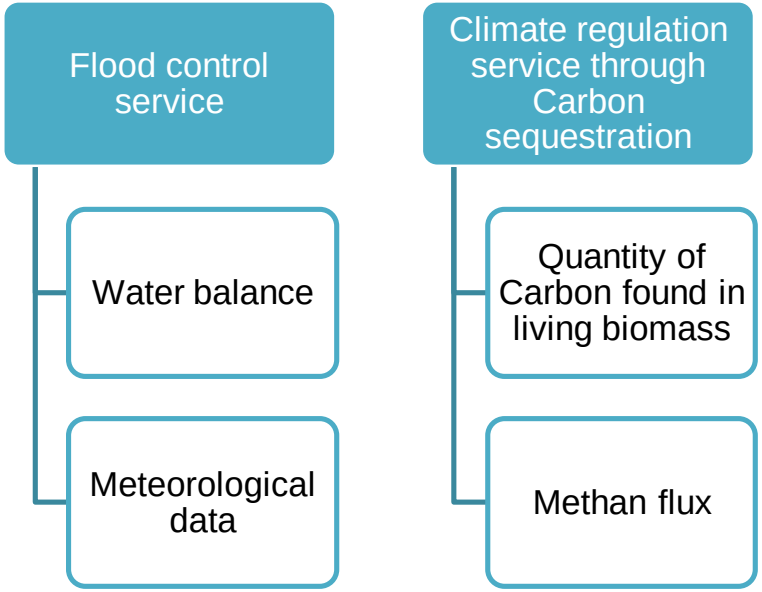
1st step: Biophysical assessment

- **Economic valuation requires a biophysical assessment (= moving from identification to the service quantification)**

⇒ requires collection of data / indicators (ex. water balance)

⇒ crucial step, determining factor for robustness of economic valuation

⇒ Availability of data guided the selection of pilot areas



- **Important role of local partner(s) for the collection of data**

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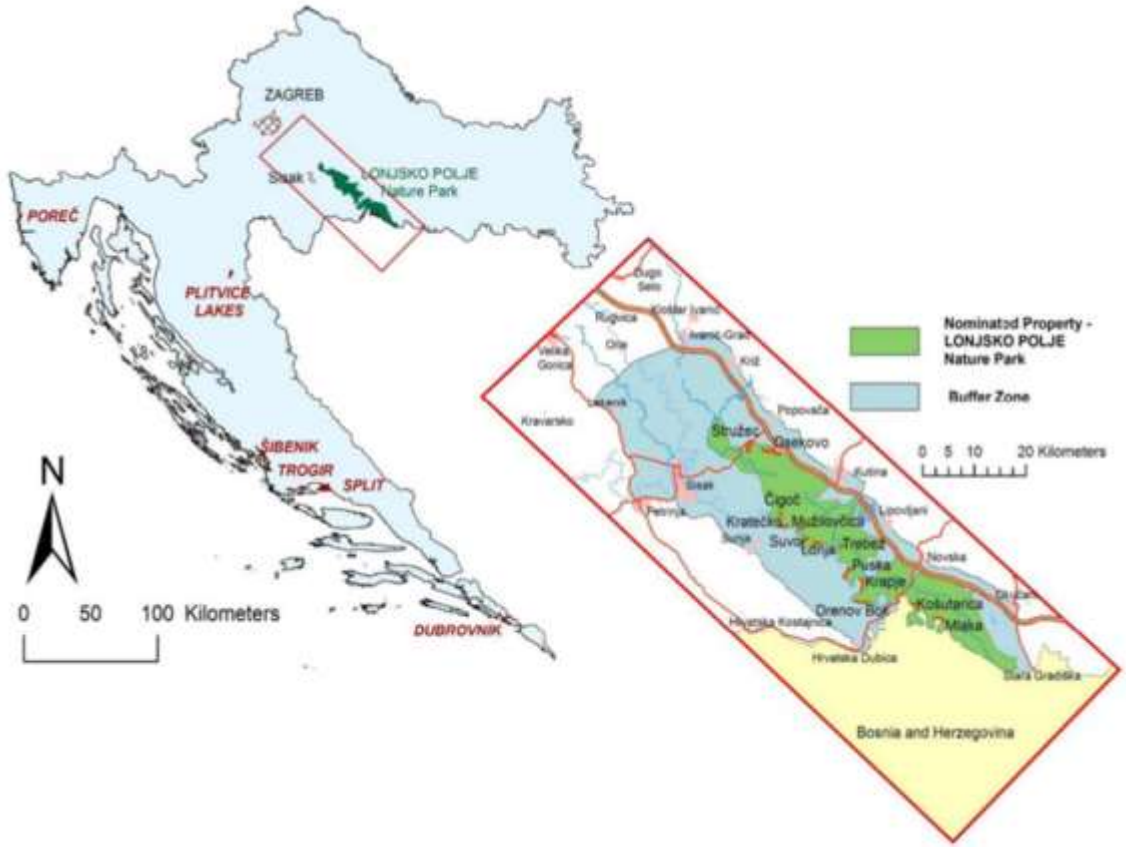
2nd Step: Economic valuation

→ Aim to assess the value of one or several services or of an entire ecosystem to better inform decision-making. There are 3 major types of methodologies:

- **Stated preference method**
  - Direct assessment → Contingent valuation, Group assessment
  - Indirect assessment → Joint analysis
- **Revealed preference method**
  - Direct assessment → Market price
  - Indirect assessment → Avoided costs, replacement costs…
- **Benefits transfer method**

Lonjsko polje floodlain → Flood control service



- Lonjsko Polje Nature Park : **51000 ha**
- One of the rare preserved complex wetlands in Europe, in which the natural floodplain areas are used for floodwater retention
- **Highly representative example of an extensive river flooded area**
- Several extreme floods each year; **episodes increasingly severe and frequent** (*Croatian Waters*)

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Lonsjko polje natural park

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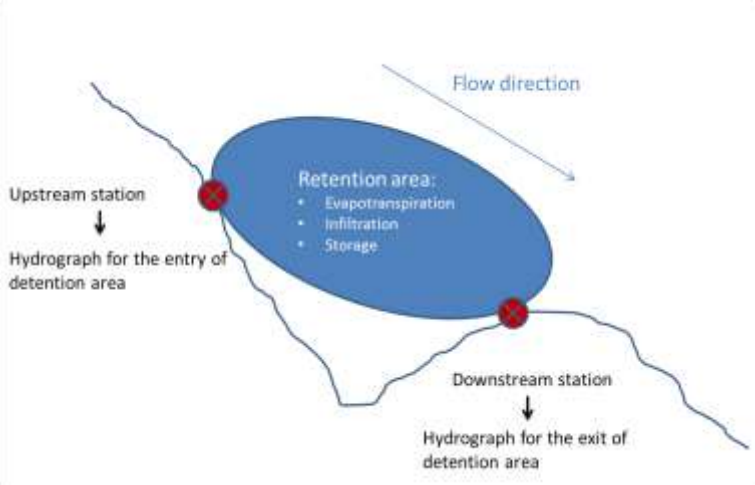
Lonjsko polje floodplain
→ Valuation of Flood control service

Biohysical assessment:

- Determination of the real volume of retention areas (existing databases, local measurement stations…) ⇒ ~1 billion m^3
- Assessment of the effect of a retention area on river flow: approach based on the measured discharge values during a representative centennial flood in the Sava river basin (Sept. 2010) ⇒ Volume of water retained : 1.430 billion m^3



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Lonjsko polje floodplain
→ Valuation of Flood control service

Economic valuation: Replacement cost method used

- Identification of infrastructures needed to provide a service equivalent to natural flood reduction (in terms of water storage)
  → Choice of 4 reservoirs / each capacity: 250 million m^3
- Transfer of unit costs depending on data availability (example of Hany Tiszasüly flood level reducing reservoir in Hungary / Danube river Basin)
- Extrapolation of unit costs to the scale of infrastructure required
- Conversion to monetary costs relevant in the Croatian context through Purchasing Power Parity (PPP, World Bank data)

Source: Ministry of Interior of Hungary

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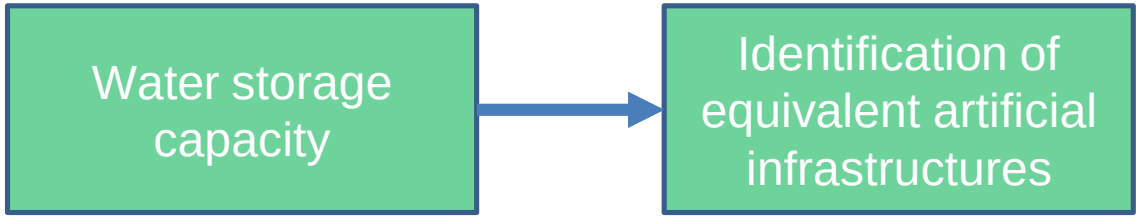
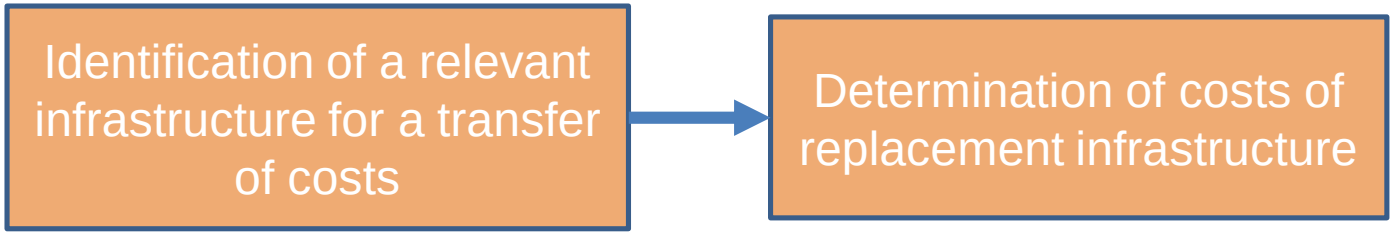
Lonjsko polje floodplain
→ Valuation of Flood control service

Biophysical assessment



Economic valuation



⇒ **The overall economic cost (construction + maintenance over 100 years) of replacing the ecosystem service by artificial infrastructure = 1.5 billion Euros**

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Limitations of the exercise

→ *Biophysical assessment:*

- The basin of LP is already managed in case of floods (in order to cap the flood peak and to channel waters through the least damageable path/reservoir) through real time interventions on artificial infrastructures

- Hence hydrographic data reflect a **combination of natural service and human action**

→ *Economic valuation:*

- The **replacement cost method** used for this valuation is known to **identify higher costs** than other methods such as the cost avoided method

- The transfer of costs implies an **intrinsic uncertainty** on the relevance of the data

- The **choice of the discount rate** has huge implications on the overall result; however there is no academic consensus on a single value

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Conclusion

- Relevance of conserving large, well-connected floodplains in a coherent manner across borders, in order to ensure flood protection for local populations
- Necessity of contextualizing of any local biophysical and economic valuations
- Importance of the human factor

Wetlands can offer an effective alternative at a lower cost, which should be taken more into account in adaptative management policies.

Conservation and restoration of wetlands are actions to increase resilience to climate change !

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Thank you for your attention !

Contact: cdubreuil@planbleu.org

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