



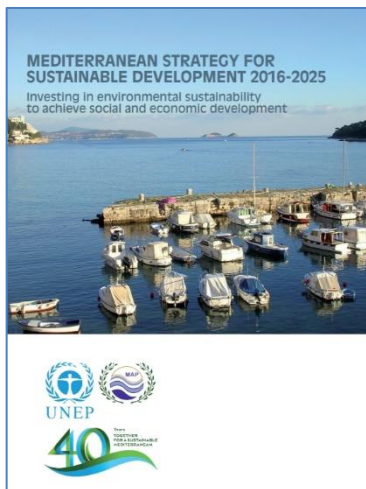
Economic valuation of regulating services (Med-ESCWET project)

Saltpan Initiative
Socio-economic workshop
Cagliari, Italy, 6-9th March 2018

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Plan Bleu

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 (MSSD)

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€)

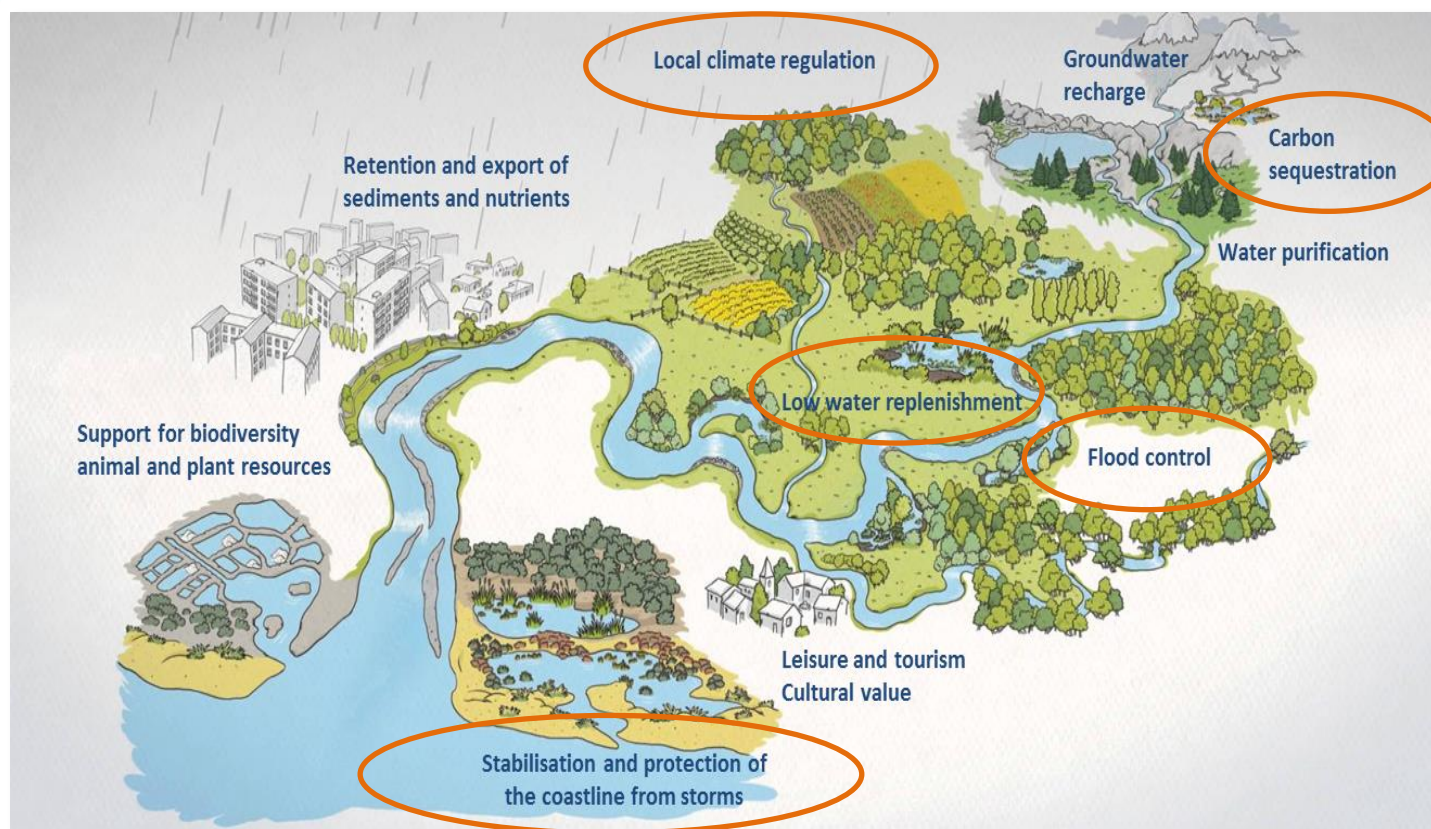


Wetlands and Climate change

- 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!

Ecosystem services provided by wetlands

Regulating services related to climate change



« 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

Why an economic valuation?

- ✓ Since ecosystem services are not traded in commercial markets, they are often given too little or no weights in decision-making;
- ✓ Economic valuation is a tool for valuing ecosystems and their services in monetary terms. It quantifies the benefits provided by ecosystems and the impact of ecosystem changes on the wellbeing of people;
- ✓ It creates a common language for policy-makers, business and society;
- ✓ It gives economic arguments for integration of ecosystem services in development planning;
- ✓ Evaluating trade-offs between different ecosystem management options and choosing between competing uses, e.g. land use;
- ✓ It creates a basis for the implementation of natural resource accounting systems, payment systems for environmental services (PES), and mechanisms for effectively compensating damage to ecosystems

Med-ESCWET project: General methodology

1. Selection process of pilot areas
2. Mapping of ecosystem services provided by each pilot site/area
3. Stakeholders' meetings
4. Biophysical assessment
5. Economic valuation
6. Dissemination of results

Selection process of pilot areas

Selection of
pilot areas

- Exchanges with local experts / site managers
- Preparation of questionnaire
- Characterization of 12 combinations « wetland/ ecosystem service » = Scoping study
- Selection of methodology for biophysical and economic assessments for each combination
- **Selection of 4 pilot areas during the 1st Med-ESCWET Steering Committee meeting**

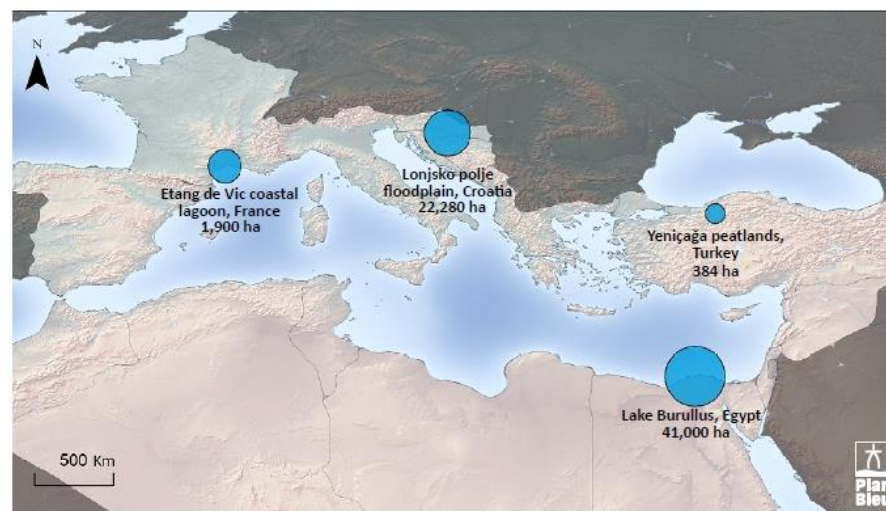
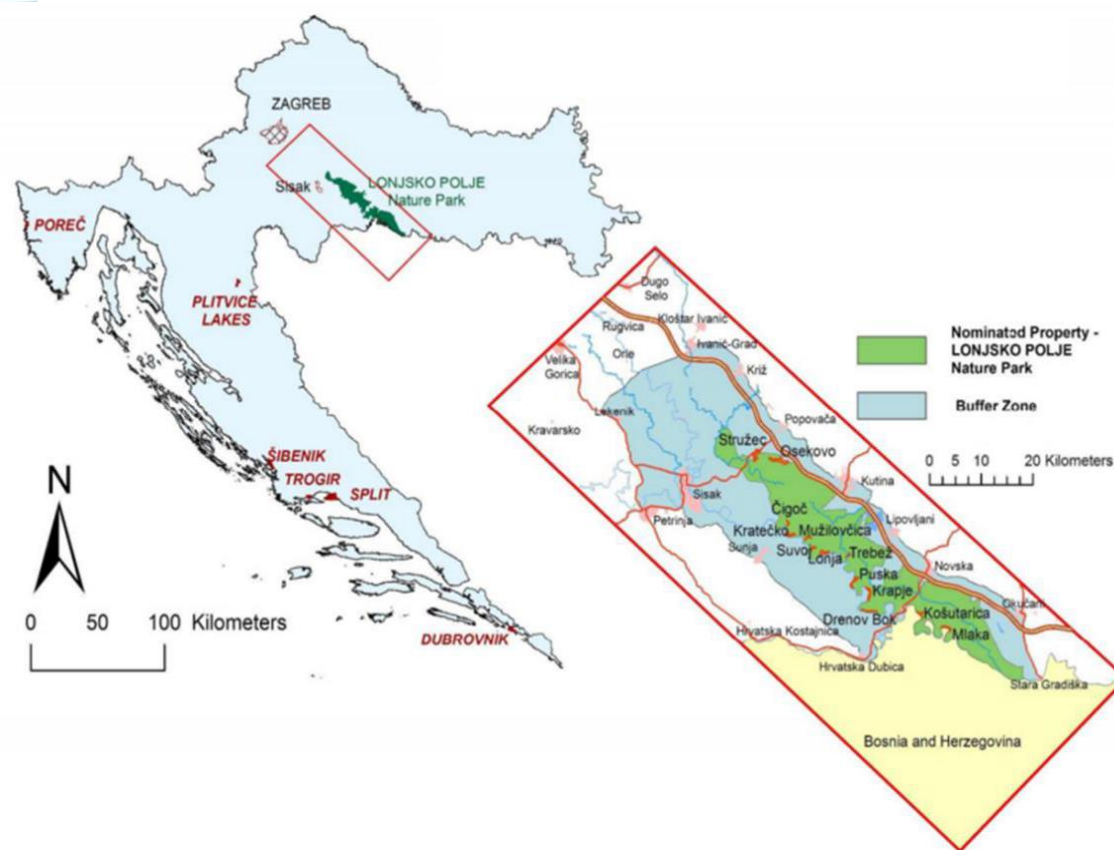


Figure 1. Location and scale of the pilot sites

Lonjsko polje floodplain → 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*)

Lonsjko polje natural park

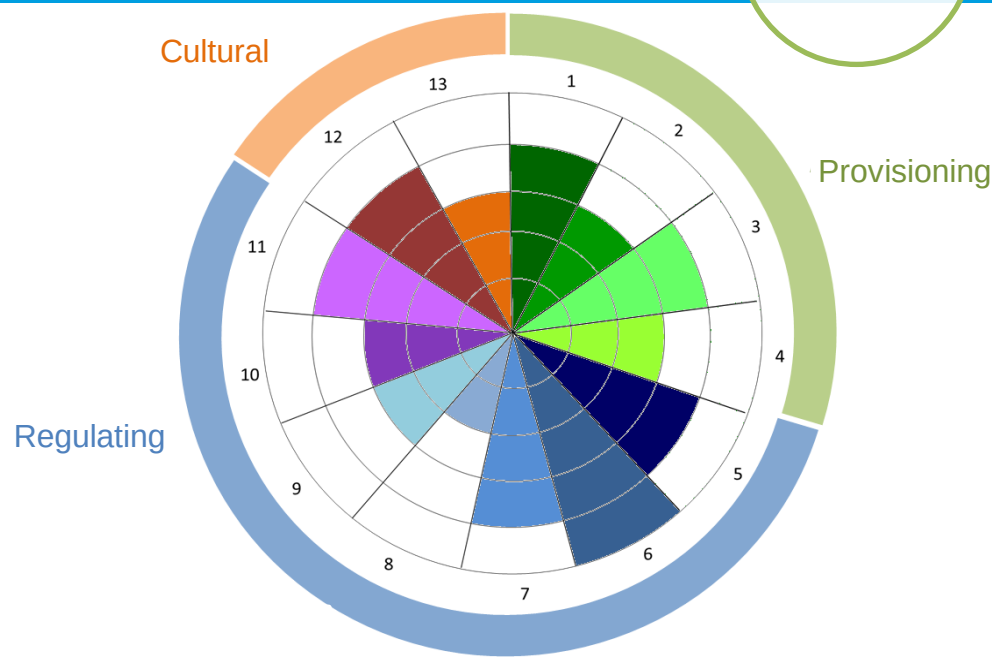


2. « Panel of services » method

Mapping of
ecosystem
services

→ It allows to characterize each site by providing a clear representation of 13 chosen ecosystem services, based on the Millennium Ecosystem Assessment (MEA, 2005) classification.

→ Attribution of levels of values to ecosystem services (ES), traducing the ecosystem potential to provide services depending on its status.



Provisioning		Regulation		Cultural
1. Water resources (groundwater recharge, provision of drinking water, water for irrigation or hydropower station)	2. Fishery and aquaculture products	3. Crop and animal agricultural production	4. Extraction of materials and other agrosources (medicinal resources, construction or burning materials, fibers and resins, leather)	5. Global climate regulation (carbon sequestration)
				6. Local climate regulation
				7. Water purification
				8. Low water replenishment
				9. Flood control
				10. Coastal protection (against erosion and marine submersion)
				11. Maintenance of air quality
				12. Environmental amenities (cultural aspects): traditions, cultural heritage, identity, religious and spiritual values, aesthetics, education and knowledge
				13. Recreation (tourism, sport, recreational hunting and fishing)

Online questionnaire

Mapping of
ecosystem
services

- The current probability of existence of each service was estimated by the attribution of a value (0 to 5) from the participants to each Stakeholders' meeting
- Each final value is a weighted average (by the degree of confidence)

Survey: Assessment of ecosystem services provided by Yeniçaga Lake

In the framework of Med-ESCWET project on "Economic valuation of ecosystem services provided by Mediterranean wetlands", we aim to analyse the likelihood of existence and the intensity of 16 ecosystem services provided by wetlands (e.g. carbone sequestration, water purification).

From your knowledge of Yeniçaga Lake, we ask you to rate each ecosystem service from 0 to 5:

Score 0 = Ecosystem service not provided by Yeniçaga Lake

Score 5 = Ecosystem service provided with great intensity by Yeniçaga Lake

As you may know better some ecosystem services than the others, you can precise if you are confident on your rate or if you are uncertain.

Thank you very much for your participation!
The Med-ESCWET Team

*Obligatoire



Civility *

☐ Mr

☐ Mrs

First Name: *

Last Name: *

Organization: *

Online questionnaire

Mapping of
ecosystem
services

Thank you to assign a rating to each ecosystem service from 1 to 5:

Score 0 = Ecosystem service NOT provided by Yenicaga Lake; Score 5 = Ecosystem service provided with great intensity by Yenicaga Lake

	0 (Not provided)	1	2	3	4	5 (provided with great intensity)
Carbon sequestration	☐	☐	☐	☐	☐	☐
Protection against extreme climate events (flood, drought, storm, tsunami..)	☐	☐	☐	☐	☐	☐
Regulation of local climate	☐	☐	☐	☐	☐	☐
Water purification	☐	☐	☐	☐	☐	☐
Low water level support	☐	☐	☐	☐	☐	☐
Soil acidification control	☐	☐	☐	☐	☐	☐
Erosion control	☐	☐	☐	☐	☐	☐
Flood control	☐	☐	☐	☐	☐	☐
Salinity control	☐	☐	☐	☐	☐	☐
Maintenance of air quality	☐	☐	☐	☐	☐	☐
Provision of water resources	☐	☐	☐	☐	☐	☐
Fishery and aquaculture products	☐	☐	☐	☐	☐	☐
Crop and animal agricultural production	☐	☐	☐	☐	☐	☐
Extraction of materials and other aggroresources	☐	☐	☐	☐	☐	☐
Environmental amenities	☐	☐	☐	☐	☐	☐
Recreation	☐	☐	☐	☐	☐	☐

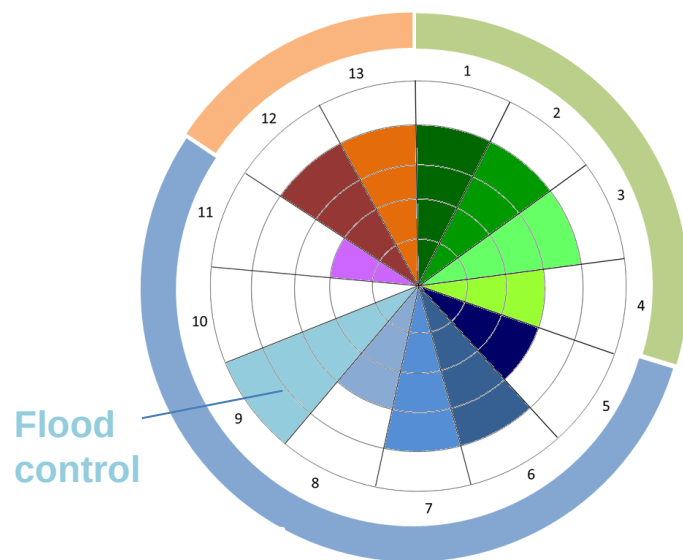
Thank you to precise if you are confident or not in your rating:

	I am confident in my rate	I am uncertain
Carbon sequestration	☐	☐
Protection against extreme climate events (flood, drought, storm, tsunami..)	☐	☐
Regulation of local climate	☐	☐
Water purification	☐	☐
Low water level support	☐	☐
Soil acidification control	☐	☐
Erosion control	☐	☐
Flood control	☐	☐
Salinity control	☐	☐
Maintenance of air quality	☐	☐
Provision of water resources	☐	☐
Fishery and aquaculture products	☐	☐
Crop and animal agricultural production	☐	☐
Extraction of materials and other aggroresources	☐	☐
Environmental amenities	☐	☐
Recreation	☐	☐

Panel of ES / Case of Lonjsko polje

Mapping of
ecosystem
services

- Strong potential for provisioning, regulating and cultural services.
- Particularly important for **flood control** (large natural floodplain) and environmental **amenities** (traditional & heritage aspects).
- Landscape dominated by forest, contributing to carbon sequestration, maintenance of air quality, water purification, forestry (particularly for oak)..

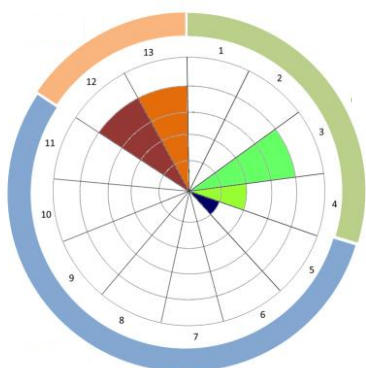


Provisioning	Regulation	Cultural
1. Water resources (groundwater recharge, provision of drinking water, water for irrigation or hydropower station) 2. Fishery and aquaculture products 3. Crop and animal agricultural production 4. Extraction of materials and other agrosources (medicinal resources, construction or burning materials, fibers and resins, leather)	5. Global climate regulation (carbon sequestration) 6. Local climate regulation 7. Water purification 8. Low water replenishment 9. Flood control 10. Coastal protection (against erosion and marine submersion) 11. Maintenance of air quality	12. Environmental amenities (cultural aspects): traditions, cultural heritage, identity, religious and spiritual values, aesthetics, education and knowledge 13. Recreation (tourism, sport, recreational hunting and fishing)

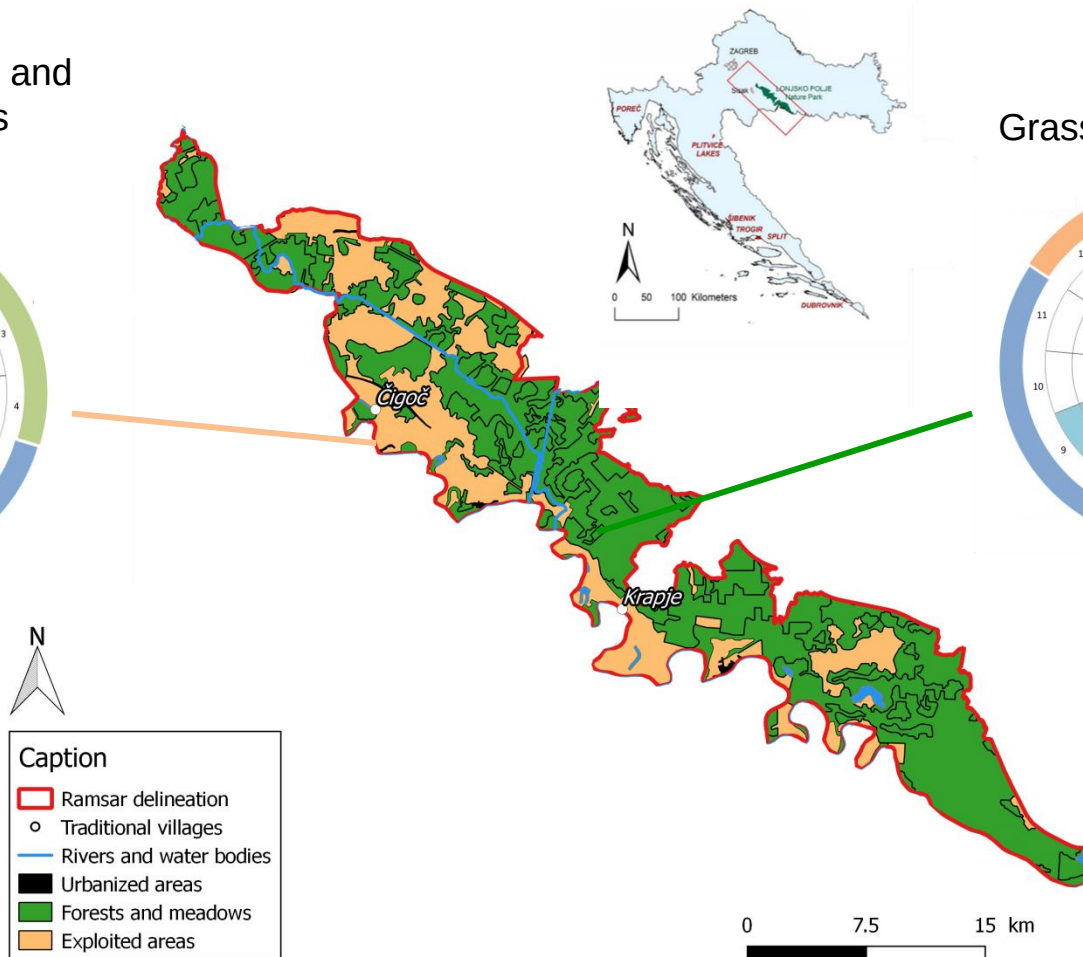
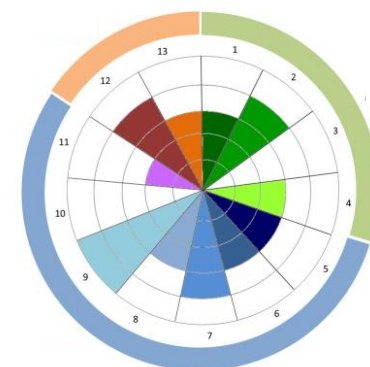
Spatialization of ES / Case of Lonjsko polje

Mapping of ecosystem services

Traditional villages and exploited areas



Grasslands and forest



Map : Plan Bleu 2016, data source: Sava LIFE project (2009)

4. Biophysical assessment

Biophysical
assessment

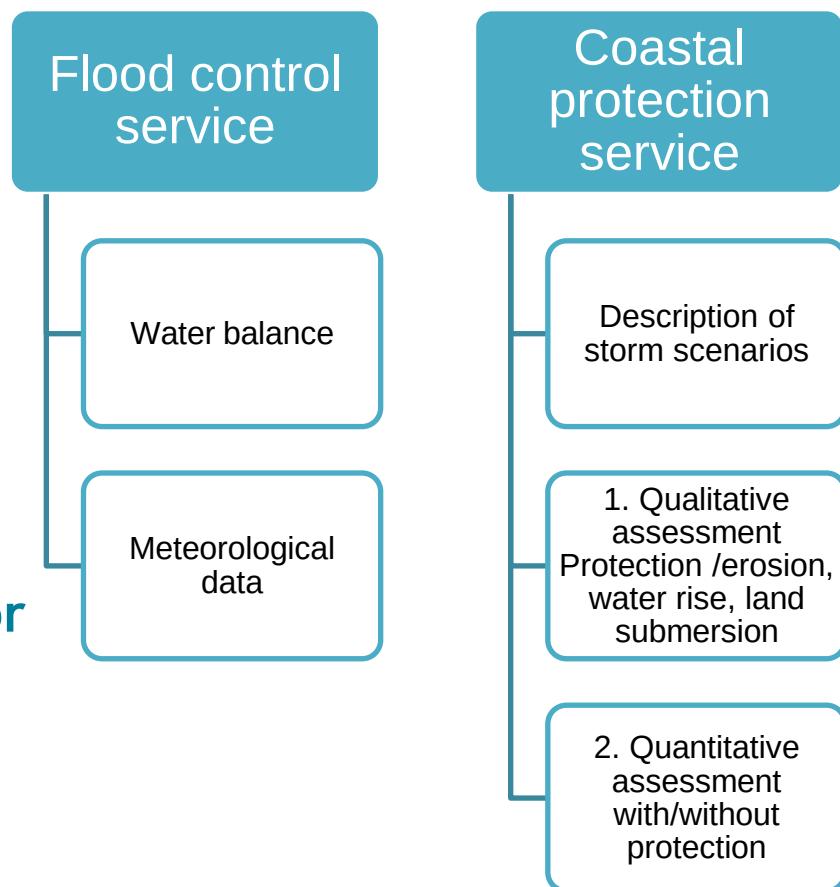
- Economic valuation requires a biophysical assessment
(= moving from identification to the service quantification)

⇒ 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



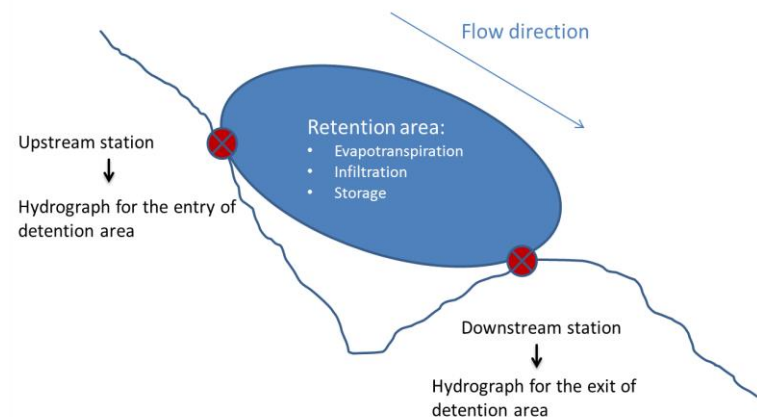
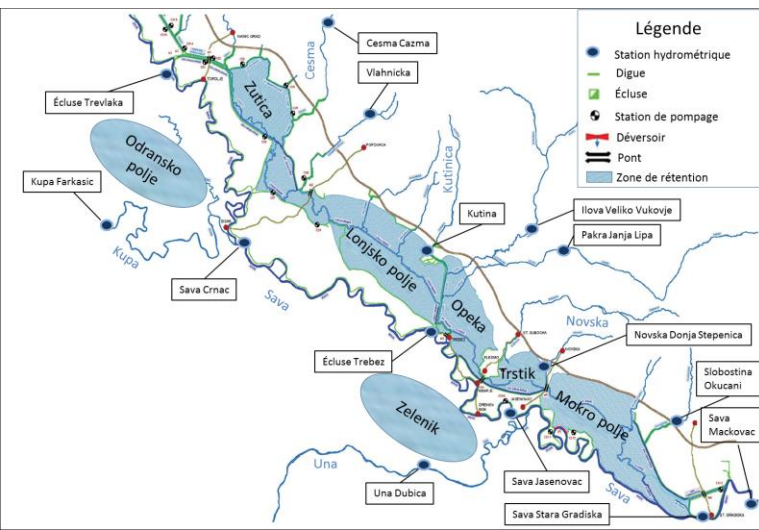
Lonjsko polje floodplain

→ Valuation of Flood control service

Biophysical
assessment

Biohysical assessment:

- Determination of the real volume of retention areas (existing databases, local measurement stations...) $\Rightarrow \sim 1$ 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) $\Rightarrow$ Volume of water retained : 1.430 billion m^3

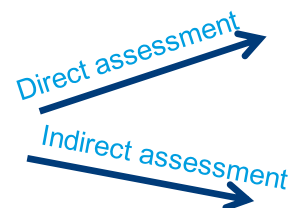


5. Economic valuation

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:

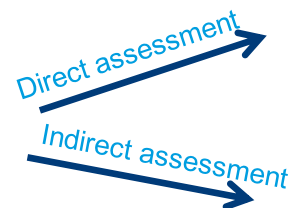
➤ **Stated preference method**



Contingent valuation
Group assessment

Joint analysis

➤ **Revealed preference method**



Market price

Avoided costs,
replacement costs...

➤ **Benefits transfer method**

Lonjsko polje floodplain

→ Valuation of Flood control service

Economic
valuation

Economic valuation: Replacement cost method used

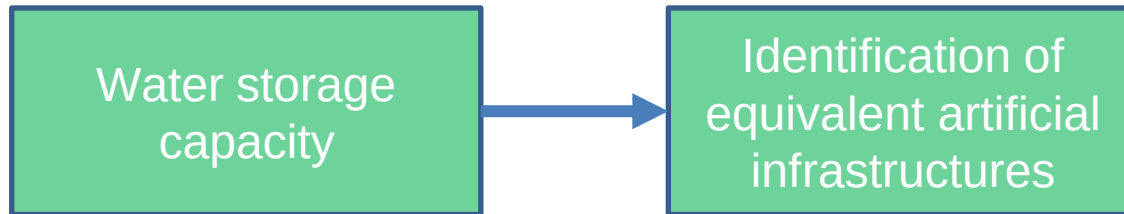
- Identification of infrastructures needed to provide a service equivalent to natural flood reduction (in terms of water storage)
→ Choice of 4 reservoirs / each capacity: 250 million m³
- Transfer of unit costs depending on data availability (example of Hany Tizzasüly flood level reducing reservoir 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)



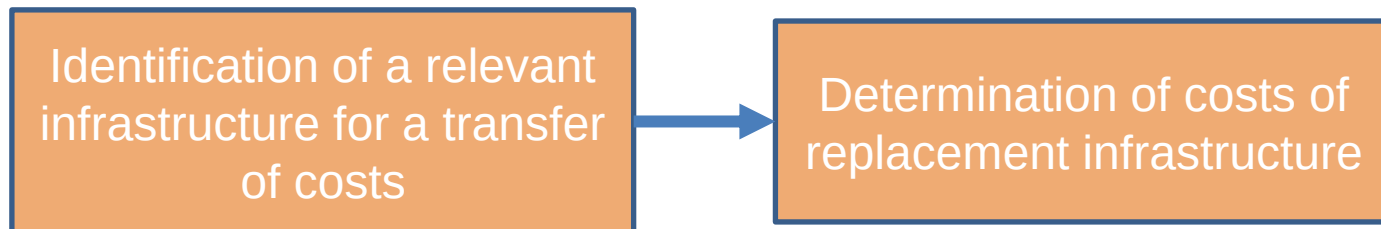
Lonjsko polje floodplain

→ 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

Conclusion

- ⇒ **Relevance of conserving large, well-connected floodplains** in a coherent manner across borders, in order **to ensure flood protection** for local populations
- The Lonjsko Polje floodplains provide a flood protection service, which currently requires human management of the retention potential in the natural areas. The site absorbs excess water when the Sava and its tributaries are in flood, protecting the downstream populations from potentially large-scale damage
 - The best solution for adapting to and mitigating the consequences of extreme weather events is probably a **combination of an ecosystem-based approach and a man-made technological approach**.

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 !

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

Challenges faced



- Project ambitious with tight time constraints $\Rightarrow$ impossible to produce new field data and difficulty to involve researchers
- Lot of difficulty to identify one expert in hydro(bio)logy for each pilot area selected
- Most of experts are academics with an overloaded agenda (missions abroad...)
- Political context in the Mediterranean Region (legislative elections in Turkey, safety issues in Egypt...) $\Rightarrow$ some meetings have been postponed, a field visit cancelled
- Lack of updated data & difficult access to data in some pilot areas (e.g. lack of cooperation between national agencies)
- Difficult to isolate the role of each wetland within the ecosystem it is part of, as a whole

Added value of Med-ESCWET project

- **First study** on ecosystem services related to climate change in the Mediterranean region!
 - Few economic valuation studies of ecosystem services provided by wetlands in the Mediterranean (especially in SEMCs) (OZHM, 2012)
 - Unprecedented exercise which has generated some useful and pertinent lessons in terms of methodology and observations, above and beyond the numerical results
 - This economic valuation of ecosystem services should facilitate decision-making process in activity planning;
- ➔ **Raised the importance of Mediterranean wetlands both in terms of adaptation and mitigation to climate change**

Thank you for your attention !

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www.planbleu.org

