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Floodland

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Acceptability of small-scale urban flood protection measures as a complement to large catchment-wide measures

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Floods in the Czech Republic 2002 Photo: ČTK © 2002; Praha.eu © 2002; Oskar Exner © 2002; E15.cz © 2002

Current situation in flood protection in the Czechia

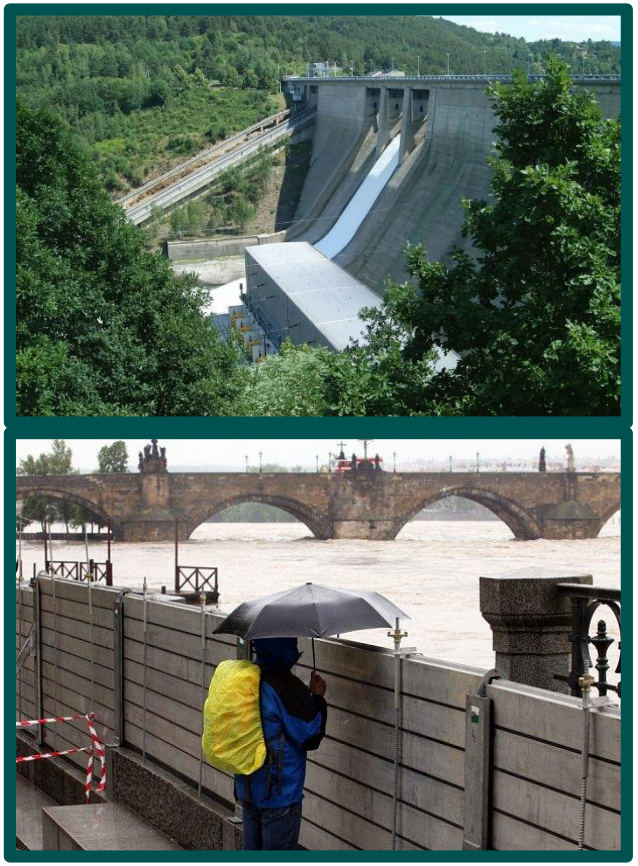
Most common measures:

- large-scale grey infrastructure (dikes)
- small/medium-scale grey infrastructure inside the city (mobile or fixed barriers, safety valves etc)
- … new dam constructions

Nature-based solutions (NBS): Some realizations in the open landscace.

Barriers to implement NBS in cities:

- low awareness of (co-)benefits
- high urban density
- wide range of stakeholders and interest groups
- complicated land ownership
- droughts in recent years → not perceived as significant risk
- political cycle → preference of short term results



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Goals of our research:

- How to **attract stakeholders of a city** for the NBS implementation debate?
- How to **evaluate and communicate (co-) benefits** of NBS?

… case study of **retention lake, wetland and park in Pilsen**

Photo: Eva Brejchová © 2015 | Petr Förchtgott © 2013

Pilsen case study in details:

- the city Pilsen is the 4th largest city in the Czech Republic
- heavily affected areas of floods in 2002 (damages of over EUR 20.8 mil.)
- NBS designed in the **urban floodplains** (total planned extent of 14 ha)
- combination of flood protection with **recreational function**
- only part of designed measures have been realized

4 retention lakes (largest one suitable for bathing) complemented by a park and a wetland

Previously uncared-for green space, finished in 2015

4 lagoons retain 7,500 – 8,300 m^3 of water

Total area of 3.5 ha

Methodology – 3 levels of investigation

LEVEL 1: Stakeholder analysis

- in-depth interviews of representatives of various stakeholders
- analysis of institutional barriers
- **Main goal: to analyse stakeholders views of the problem and barriers, efficiency and feasibility of measures**

LEVEL 2: Cost-benefit analysis

- based on the ecosystem services approach
- costs are set according to project budgets and estimated operating costs
- based on the concept of annualized cost and benefits
- **Main goal: to set the annualized net social benefits to provide economical background for the NBS implementation debate**

Stakeholders
(Stakeholder analysis)

Economics
(Cost-benefit analysis)

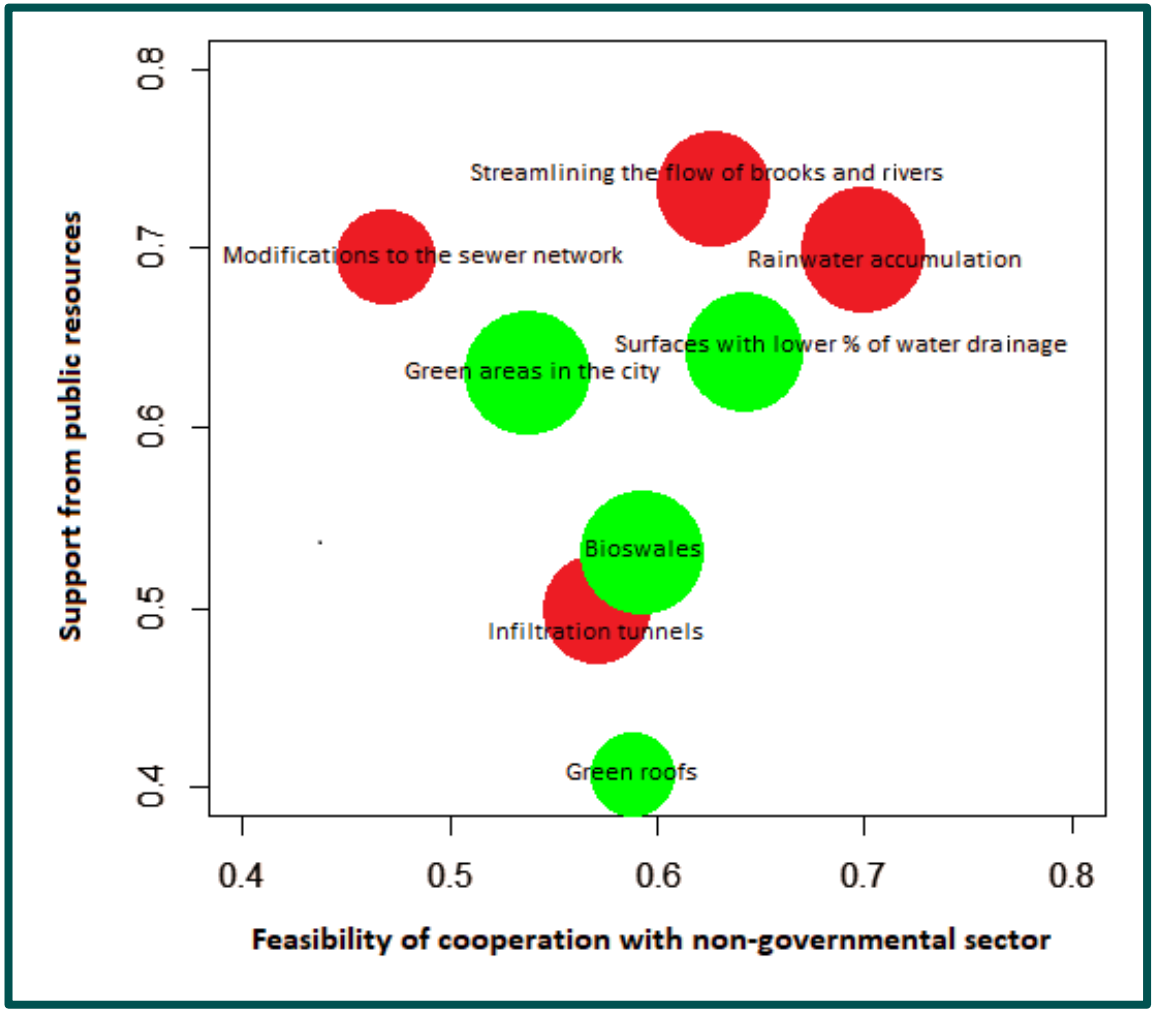
Hydrology
(In our work as given)

LEVEL 3: Hydrological analysis

- **Main goal: to analyse the hydrological effect of measures**

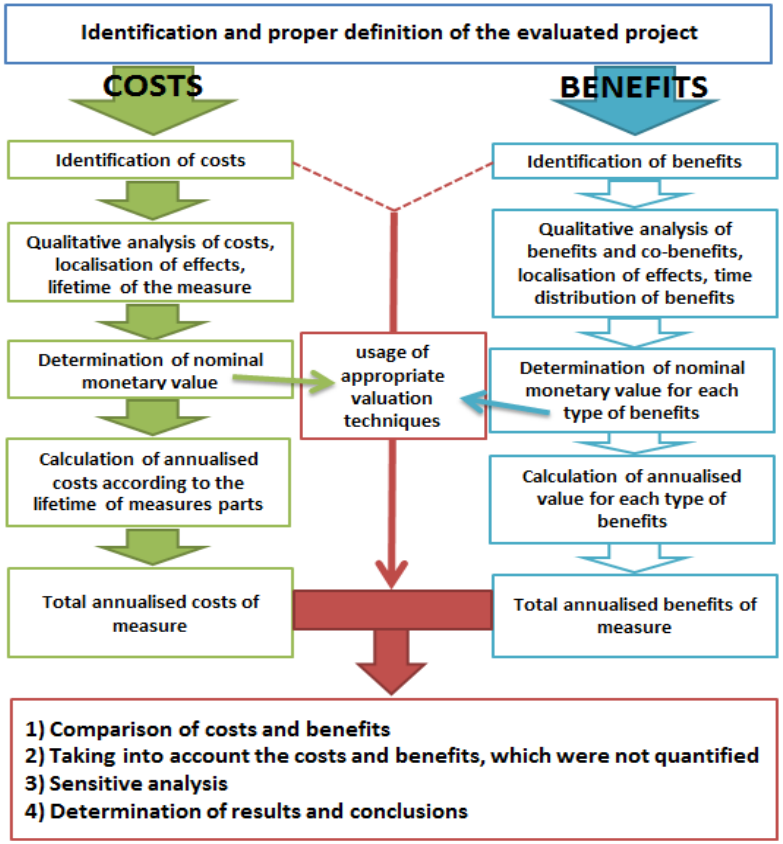
Results – Stakeholder analysis

- Flood problem perceived as significant
- Different measures (see graph) evaluated according to:
  - Effectiveness (size of the circle)
  - Feasibility to be realized from public resources (vertical axis)
  - Feasibility to be realized in cooperation with the support of other stakeholders (horizontal axis)



Results - Cost-benefit analysis

Type of benefits	Level of benefits	Type of benefits	Level of benefits
Reducing water volume at WWTP	U	CO2 reduction	U
Lowering risk of flooding	$	Erosion reduction	$
Supplying surface water and groundwater	$	Real estate value	U
Improving water quality	$	Recreational benefits	$
Regulation of micro-climate /city's heat island	U	Increase in aesthetic value	$
Noise reduction	U	Biomass production	U
Energy savings	U	Crop production (urban agriculture)	U
Air quality improvement	$	Habitat creation	$



Legend: U Full provision | U Limited provision | U Not provided | $ Benefits valuated in monetary units

Results – **Cost-benefit analysis**

The **comparison of costs and benefits**:

i. the total social benefits exceed the investment and operational costs
ii. from a purely economic point of view, the implementation of the NBS makes sense,
iii. Benefits do not include all provided ecosystem services – they could have been larger,
iv. Costs do not include opportunity cost.

	Yearly (annualized) costs (EUR)	Yearly (annualized) benefits (EUR)	Benefits-costs ratio
Retention lake and park	59,484	1,529,293	25.7

Conclusions

- for decision-makers, **quantification of benefits** may represent the crucial argument for action,
- monetary quantification should be **complemented by qualitative analysis** (e.g. stakeholder analysis)

  $\Rightarrow$ better to address cultural and social perspectives of society representatives and reveal institutional failures and barriers that lead to the mismanagement of flood protection measures in cities
- small-scale urban NBSs by themselves are not panacea for the flood damage reduction, **but:**
  - they could effectively complement other types of measures
  - it could bring significant co-benefits into urban spaces

References:

Valuation metaanalysis:

EFTEC, 2010. Valuing Environmental Impacts: Practical Guidelines for the Use of Value Transfer in Policy and Project Appraisal Case Study 3 – Valuing Environmental Benefits of a Flood Risk Management Scheme. Report for Defra. London, 2010. 23 pp. [online], dostupné na: <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/182376/vt-guidelines.pdf>

Thank you for your attention!

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COST Action LAND4FLOOD:
Natural Flood Retention on Private Land

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