

# Economic aspects of nature based flood protection measures in landscape

eac  
ade  
mia

IREAS

IOP

**Jan Macháč**

**Lenka Slavíková**

**Pavel Raška**

**Miroslav Bauer**

Magdeburgský seminář o ochraně vod 2018 | 19 October 2018 | Prague



Europäische Union. Europäischer Fonds für regionale Entwicklung: Investition in Ihre Zukunft / Evropská unie. Evropský fond pro regionální rozvoj: Investice do vaší budoucnosti



Ahoj sousede. Hallo Nachbar.  
Interreg V A / 2014 – 2020



UNIVERZITA J. E. PURKYNĚ V ÚSTÍ NAD LABEM



Institute for Economic  
and Environmental Policy



# Strima II

## 4 Work packages



- WP 1: Reduction of flood damage on residential buildings
- WP 2: Reduction of flood damage on environmental goods and land use
- WP 3: Reduction of flood damage on technical infrastructure
- WP 4: Communication of flood risk



Magdeburgský seminář o ochraně vod 2018 | 19 October 2018 | Prague

# Nature-based solutions

- Alternative (complementary) solution to technical measures
- Provide many co-benefits
- Numerous challenges associated with implementation of measures
  - Low number of implemented measures in the Czech Republic
- Means of support:
  - Subsidies
  - Legislation
  - **Raising awareness about measures (and the significance of such measures)**
  - **Provision of economic argument**
    - (the importance of measure can be translated from hydrological/biological aspects into monetary value, which is understandable for all stakeholders)

Magdeburgský seminář o ochraně vod 2018 | 19 October 2018 | Prague



Europäische Union. Europäischer Fonds für regionale Entwicklung: Investition in Ihre Zukunft / Evropská unie. Evropský fond pro regionální rozvoj: Investice do vaší budoucnosti

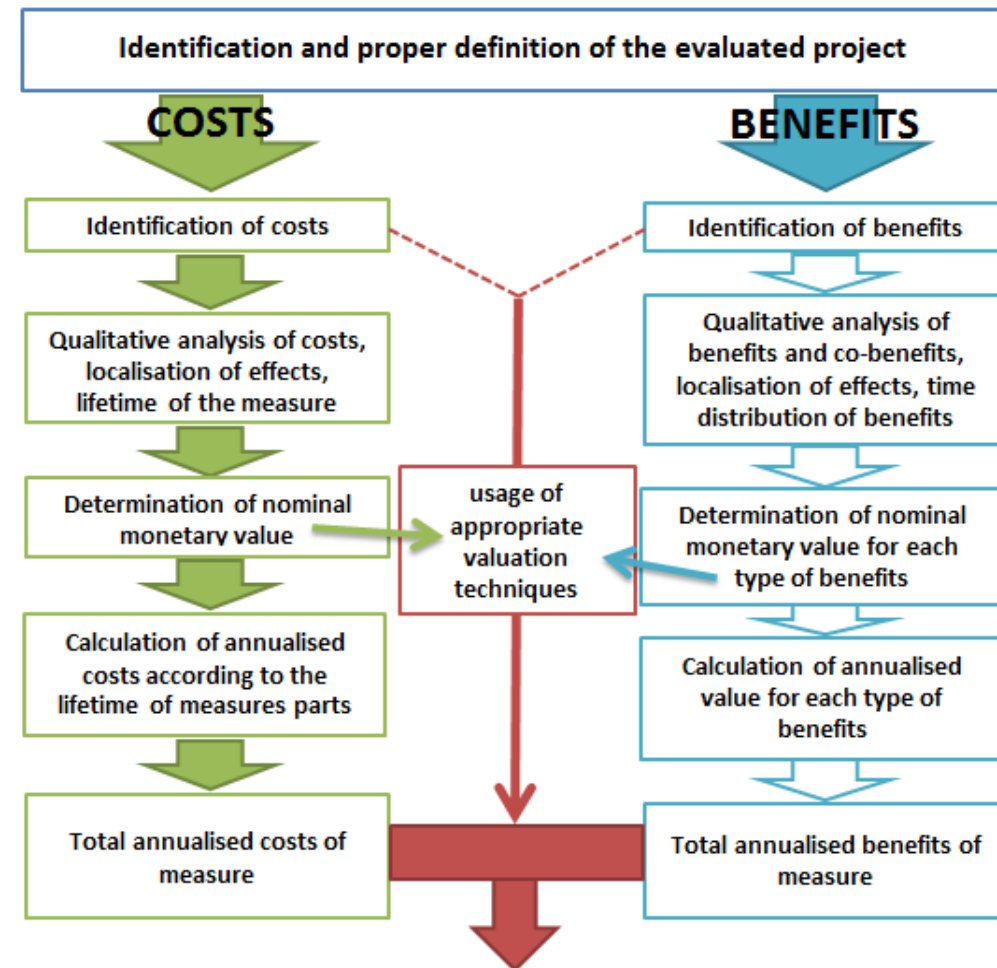


Ahoj sousede. Hallo Nachbar.  
Interreg V A / 2014 – 2020



# Economic assessment

- Based on monetary cost benefit analysis and concept of ecosystem services



- 1) Comparison of costs and benefits
- 2) Taking into account the costs and benefits, which were not quantified
- 3) Sensitive analysis
- 4) Determination of results and conclusions

Magdeburgský seminář o ochraně vod 2018 | 19 October 2018 | Praž

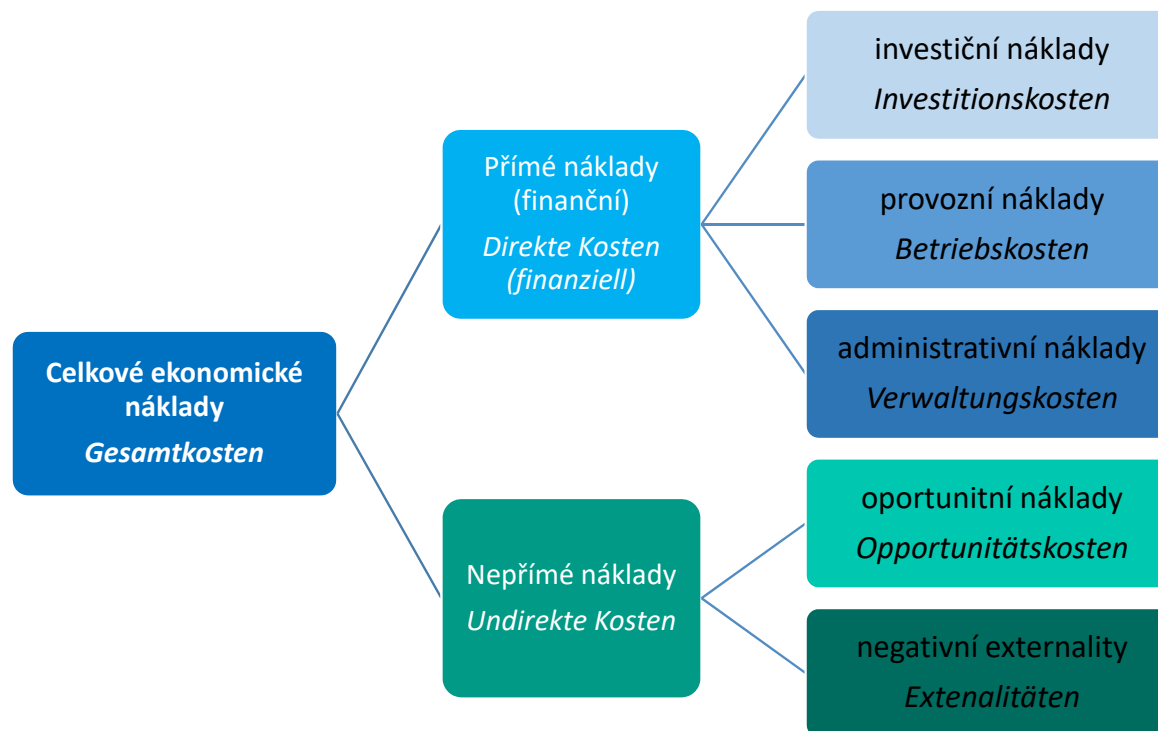


Europäische Union. Europäischer Fonds für regionale Entwicklung: Investition in Ihre Zukunft / Evropská unie. Evropský fond pro regionální rozvoj: Investice do vaší budoucnosti



Ahoj sousede. Hallo Nachbar. Interreg V A / 2014 – 2020

# Economic assessment - Costs

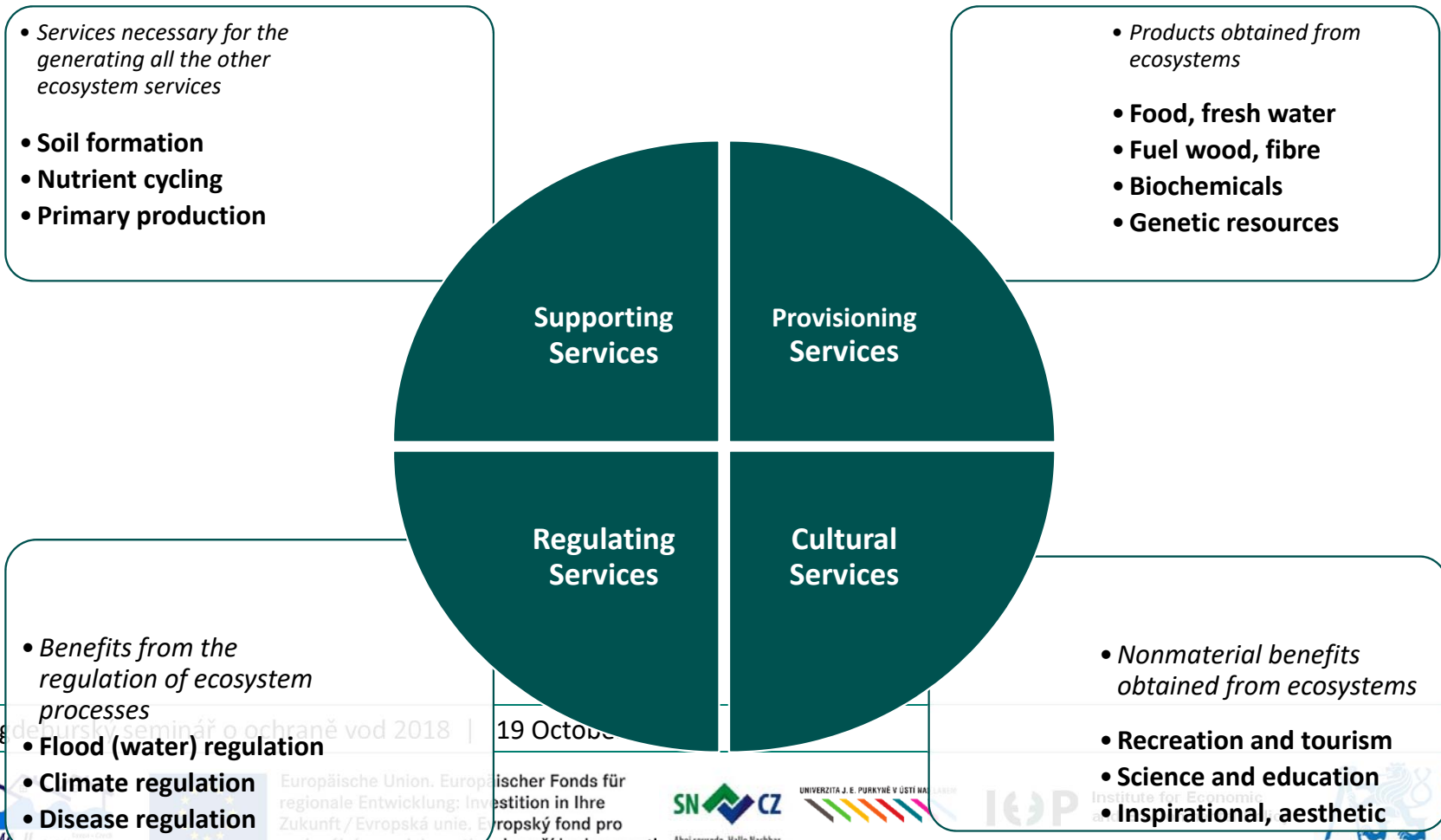


Magdeburský seminář o ochraně vod 2018 | 19 October 2018 | Prague

# Economic assessment - Costs

Measure	Investment costs		Operating costs (OC)		Opportunity costs	
Grassing	all investment costs (especially earthworks and planting grass) excluding the purchase of land and administrative costs.	Slope of the terrain from 0° to 3°: 7,600 CZK/ha	Grass mowing (2-3 times per year)	Slope of the terrain from 0° to 3°: 2,170 CZK/ha	Loss of agricultural land - loss of profits from cultivation.	3,162 CZK/ha
		Slope of the terrain from 3° to 7°: 8,350 CZK/ha		Slope of the terrain from 3° to 7°: 2,400 CZK/ha		
		Slope of the terrain above 7°: 9,870 CZK/ha		Slope of the terrain above 7°: 2,825 CZK/ha		
Agricultural measures – cultivation of crops in strips and its rotation	Either no investment costs or low investment costs associated with the necessity of buying new	x	Higher operating costs associated with planting crops	265 CZK/ha	Loss of profits caused by cultivating crops in strips (the	735 CZK/ha

# Economic assessment - Benefits



Magdeburgský seminář o ochraně vod 2018 | 19 October



• **Climate regulation**  
• **Disease regulation**

Europäische Union. Europäischer Fonds für regionale Entwicklung: Investition in Ihre Zukunft / Evropská unie. Evropský fond pro regionální rozvoj: Investice do vaší budoucnosti



Ahoj sousede. Hallo Nachbar. Interreg VA / 2014 – 2020



Institute for Economic



# Economic assessment - Benefits

Ecosystem services	Wetland	Infiltration -retention ditch	Grassing	Crop cultivati on in strips
Increase in water retention	3	3	3	1
Flood protection function	2	2	1	1
Improving water quality + health impact	2	2	2	1
Soil protection against erosion	0	3	2	2
Regulation of air quality	0	1	2	1
Carbon sequestration	0	1	2	1
Production of biomass	0	2	3	2

M

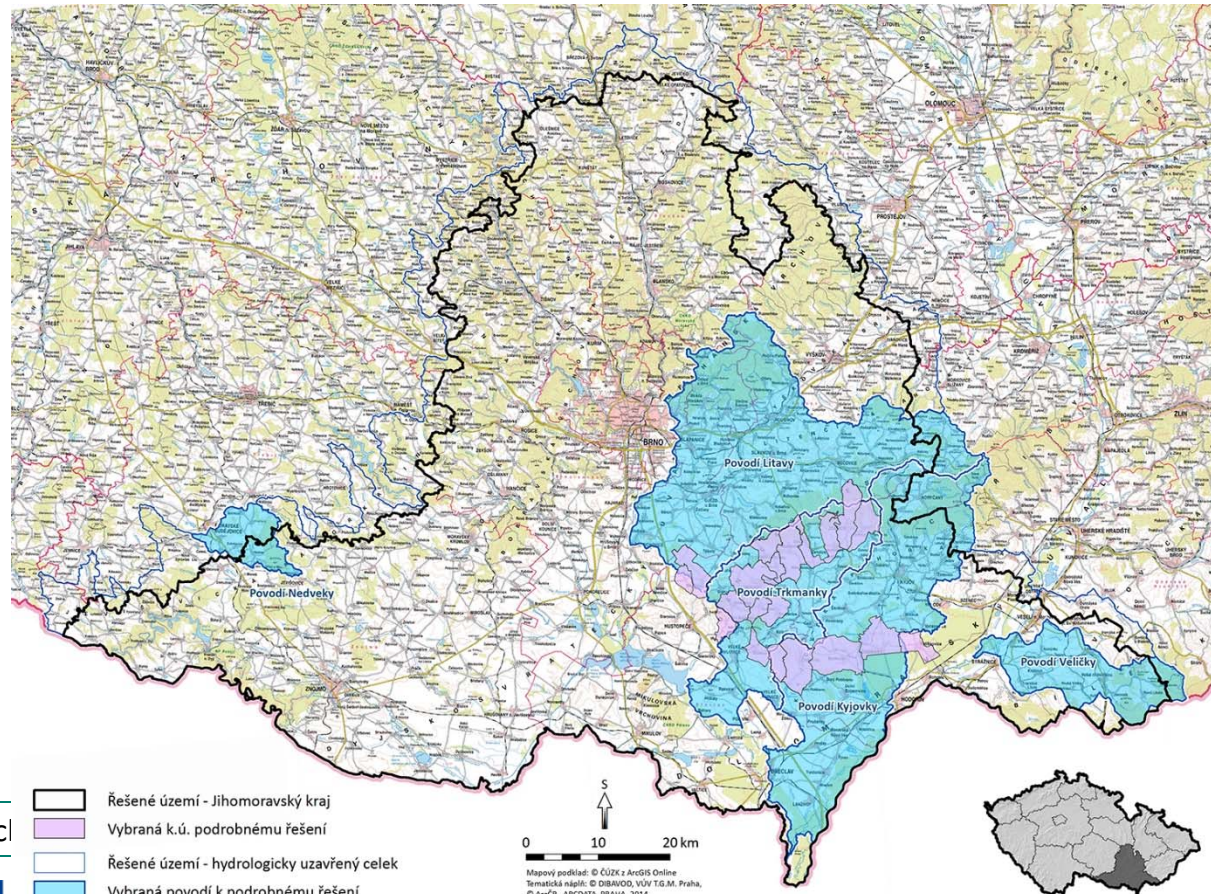
STR

SKÉ  
SOKÉ  
ENÍ  
CHNICKÉ  
RAZE



# Case study: south Moravian Region in the next 20 years

- 36 cadastral territories
- 25,500 ha of arable land
- Modeling impacts in scenarios based on the current situation



Magdeburský seminář o oc...



- Řešené území - Jihomoravský kraj
- Vybraná k.ú. podrobnému řešení
- Řešené území - hydrologicky uzavřený celek
- Vybraná povodí k podrobnému řešení

regionale Entwicklung, Investition in ihre Zukunft / Evropská unie. Evropský fond pro regionální rozvoj: Investice do vaší budoucnosti



Ahoj sousede, Hallo Nachbar. Interreg V A / 2014 – 2020



and Environmental Policy



academia

IREAS

IEP



AdaptaN

# Case study: South Moravian Region in the next 20 years

## Monetized benefits

- Water regulation – cost savings in irrigation
- Regulation of erosion – lower costs of replacement and sediment removal
- Regulation of nutrient cycling – cost savings in nutrient replacement

Magdeburgský seminář o ochraně vod 2018 | 19 October 2018 | Prague



Europäische Union. Europäischer Fonds für regionale Entwicklung: Investition in Ihre Zukunft / Evropská unie. Evropský fond pro regionální rozvoj: Investice do vaší budoucnosti



Ahoj sousede. Hallo Nachbar.  
Interreg V A / 2014 – 2020



UNIVERZITA J. E. PURKYNĚ V ÚSTÍ NAD LABEM

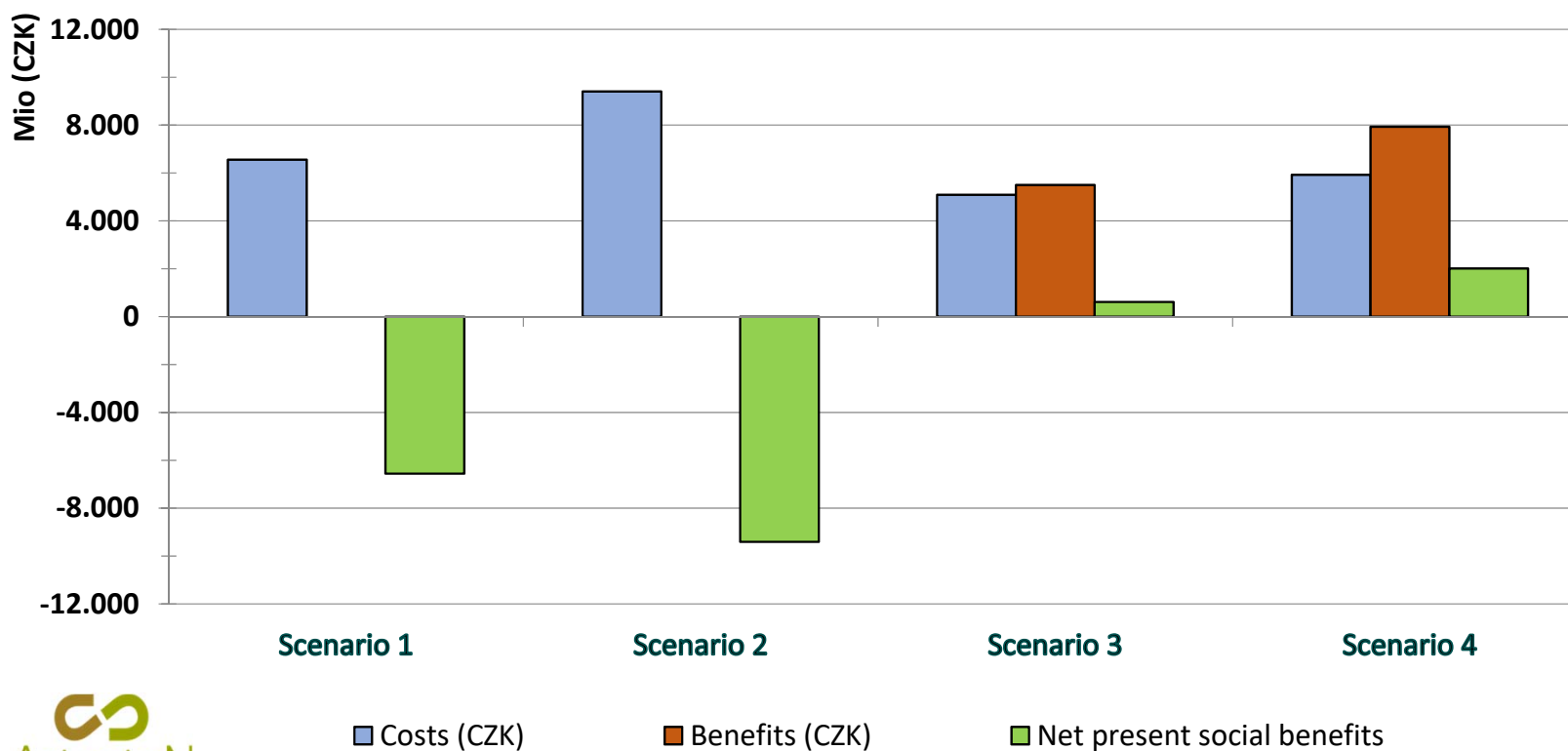


Institute for Economic and Environmental Policy

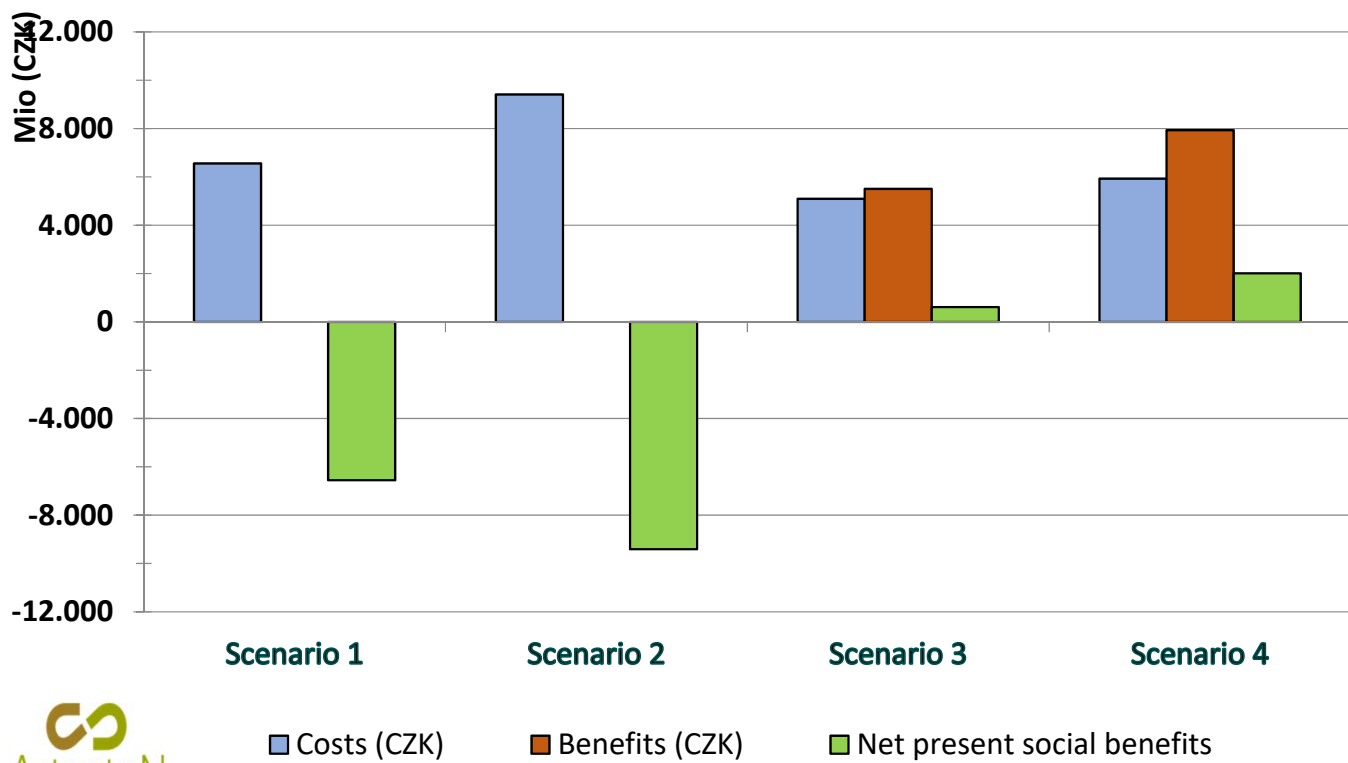


ČESKÉ  
VYSOKÉ  
UČENÍ  
TECHNICKÉ  
V PRAZE

# Case study: south Moravian Region in the next 20 years



# Case study: south Moravian Region in the next 20 years



		Climate change	
		NO	YES
Adaptation	NO	- 6,6 bln	- 9,4 bln
	YES	0,6 bln	2,0 bln



Magdeburský seminář o ochraně vod 2018 | 19 October 2018 | Prague



Europäische Union. Europäischer Fonds für regionale Entwicklung: Investition in Ihre Zukunft / Evropská unie. Evropský fond pro regionální rozvoj: Investice do vaší budoucnosti



# Conclusions

---

- Shift from technical measures to nature-based solutions
- Cost-benefit analysis as an appropriate tool for raising awareness and providing economic argument
- Local conditions have to be taken into account within the valuation/assessment

---

Magdeburgský seminář o ochraně vod 2018 | 19 October 2018 | Prague



Europäische Union. Europäischer Fonds für regionale Entwicklung: Investition in Ihre Zukunft / Evropská unie. Evropský fond pro regionální rozvoj: Investice do vaší budoucnosti



Ahoj sousede. Hallo Nachbar.  
Interreg V A / 2014 – 2020



UNIVERZITA J. E. PURKYNĚ V ÚSTÍ NAD LABEM



Institute for Economic and Environmental Policy



ČESKÉ  
VYSOKÉ  
UČENÍ  
TECHNICKÉ  
V PRAZE

---

# Thank you for your attention!

---

Jan Macháč – [machac@e-academia.eu](mailto:machac@e-academia.eu)

---

Magdeburský seminář o ochraně vod 2018 | 19 October 2018 | Prague

---



Europäische Union. Europäischer Fonds für regionale Entwicklung: Investition in Ihre Zukunft / Evropská unie. Evropský fond pro regionální rozvoj: Investice do vaší budoucnosti



Ahoj sousede, Hallo Nachbar.  
Interreg V A / 2014-2020



UNIVERZITA J. E. PURKYNĚ V ÚSTÍ NAD LABEM



Institute for Economic  
and Environmental Policy



ČESKÉ  
VYSOKÉ  
UČENÍ  
TECHNICKÉ  
V PRAZE