

TAKING  
**COOPERATION**  
FORWARD



EGU2018, Vienna / 10th April 2018



## DRINKING WATER SOURCE PROTECTION AND SPATIAL PLANNING - HOW TO DEAL WITH CONFLICT OF INTERESTS



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Branka Bračič Železnik



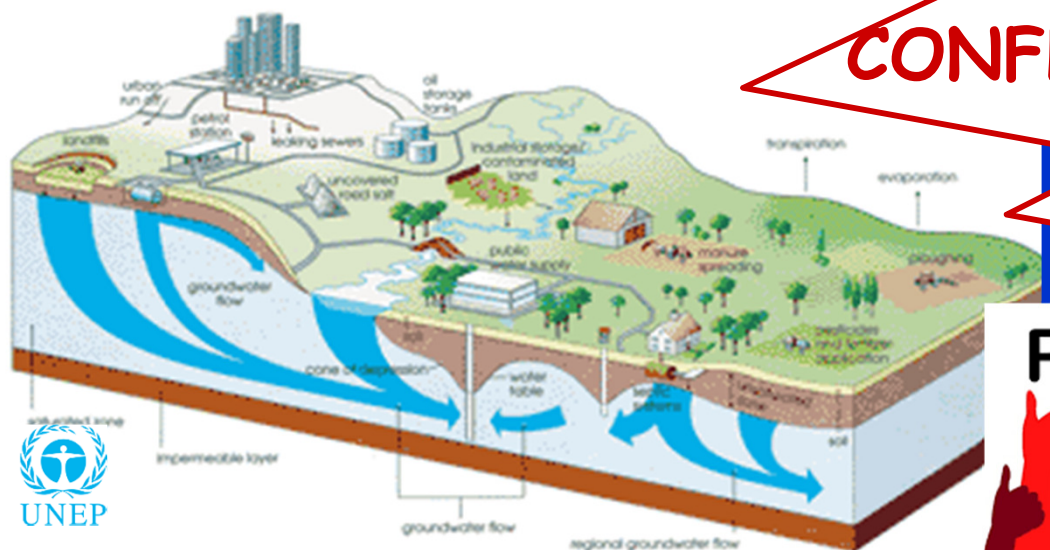
*Public Water Utility of Ljubljana*



*University of Ljubljana*

# DRINKING WATER SOURCE PROTECTION AND SPATIAL PLANNING

## PLANNING and USE OF SPACE



## DRINKING WATER SOURCE

**CONFLICT  
OF INTERESTS**



## → HOW TO REACH



COMMUNITY PARTICIPATION

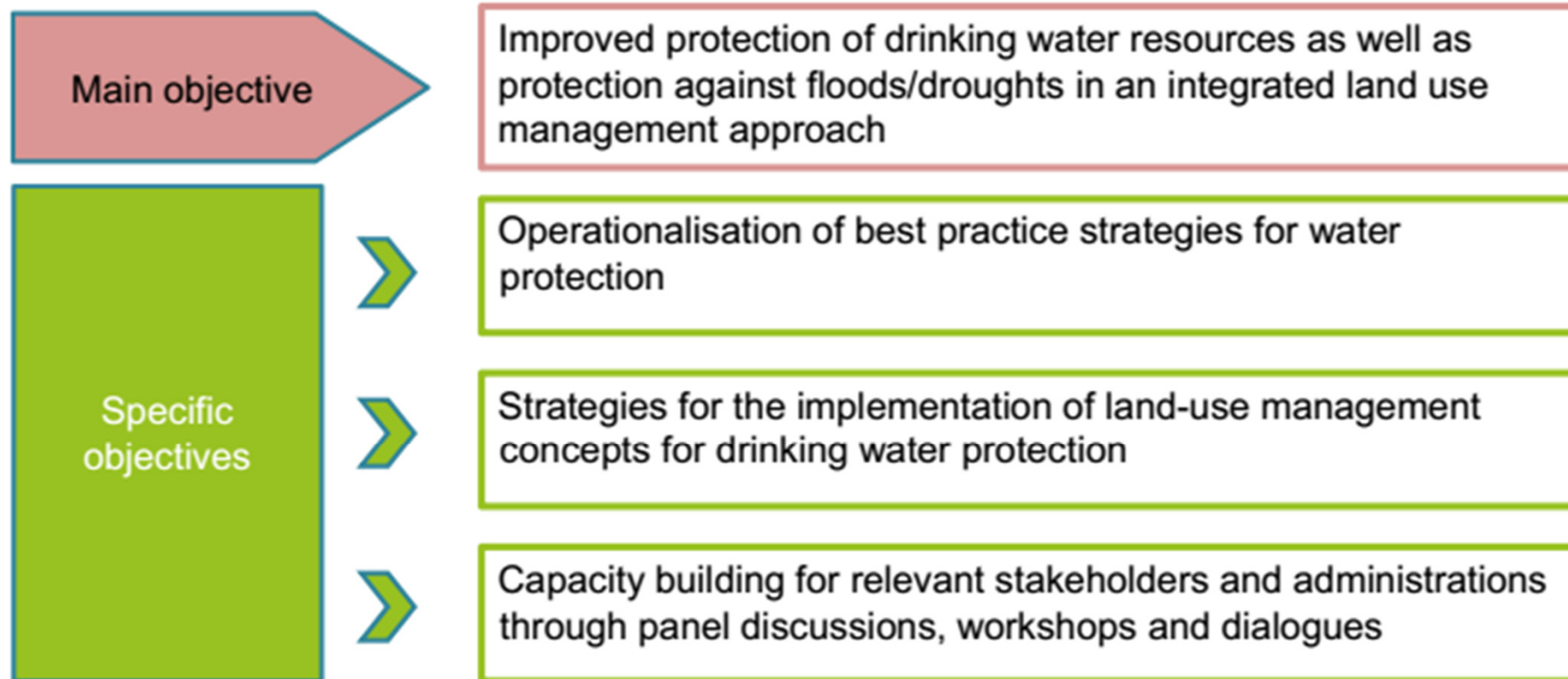
&



of VARIOUS  
STAKEHOLDERS  
IN THE SPACE?

# DRINKING WATER SOURCE PROTECTION AND SPATIAL PLANNING

... SUCH QUESTIONS WE ARE TRYING TO ANSWER WITHIN  
the **PROLINE-CE** project in **Central Europe**  
**Transnational Cooperation Programme)**



# DRINKING WATER SOURCE PROTECTION AND SPATIAL PLANNING

More results at the **PROLINE-CE mid-term conference**

Location: **LJUBLJANA**



Date:

June 2018						
M	T	W	T	F	S	S
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4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

No registration fee!

**Kindly invited!**

For programme see: <http://www.interreg-central.eu/Content.Node/PROLINE-CE/INTERREG-MidTermConference-PROLINE-CE-CAMARO-D-final-program.pdf>



# DRINKING WATER SOURCE PROTECTION AND SPATIAL PLANNING

the **PROLINE-CE** project: Efficient **PR**actices **Of** **L**and Use  
Management **I**ntegrating Water Resources Protection and  
**N**on-structural Flood Mitigation **E**xperiences

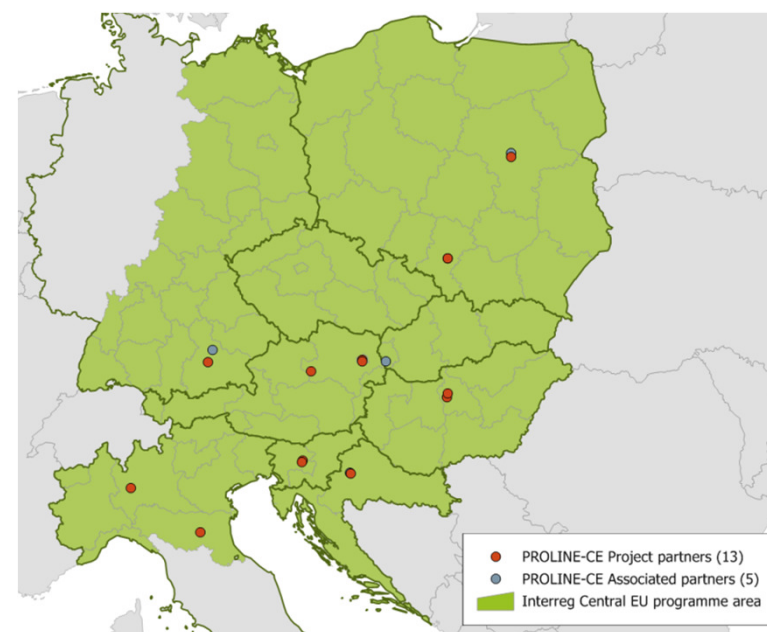
Interreg Central Europe programme 2014-2020

Project duration: July 2016 - June 2019 (3 years)

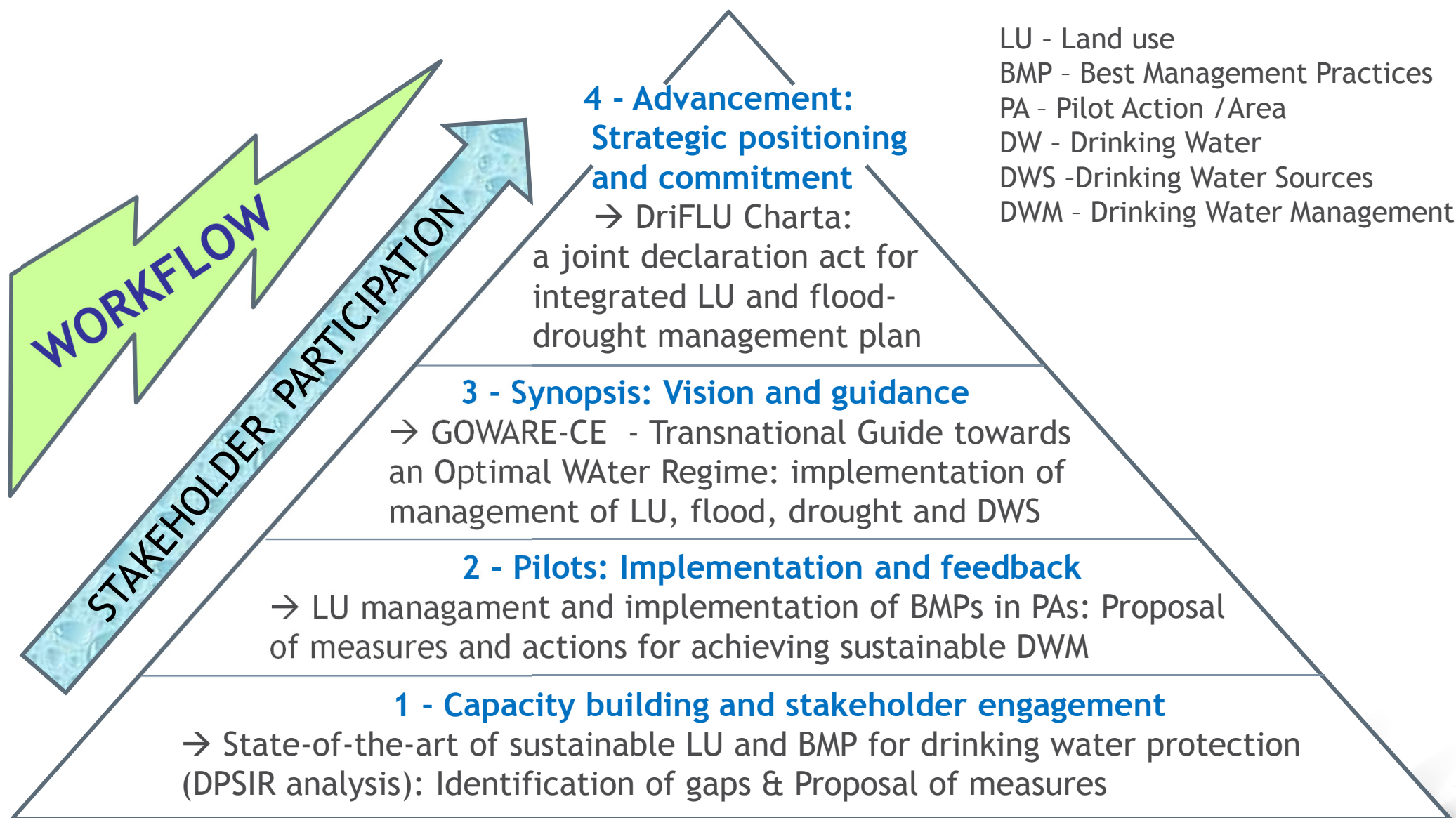
Lead partner: Federal Ministry of  
Sustainability and Tourism

13 project partners from 8 countries (AT,  
DE, HR, HU, IT, PL, SI, SK):

- governmental institutions
- water utilities
- research / educational institutions



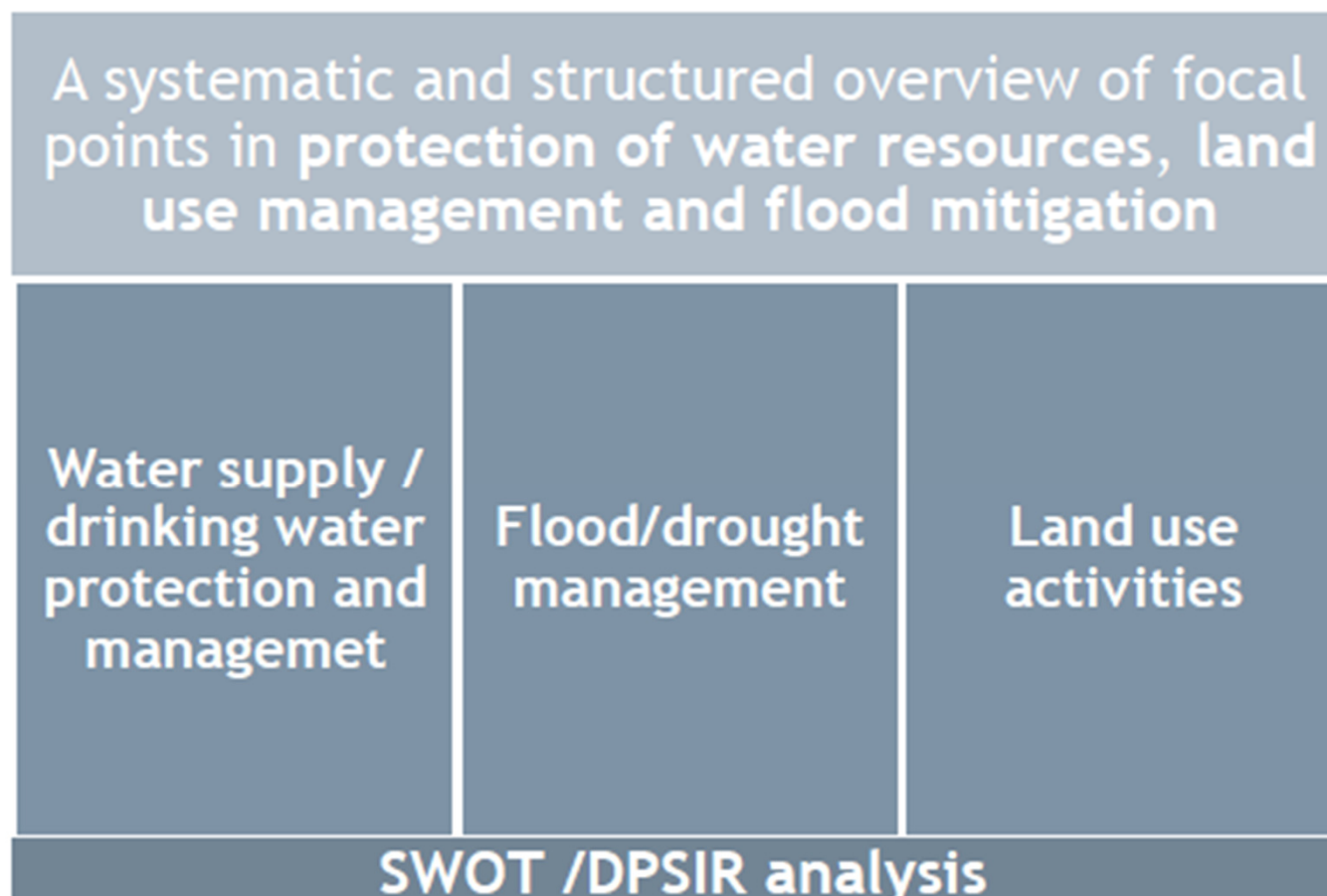
# DRINKING WATER SOURCE PROTECTION AND SPATIAL PLANNING



# DRINKING WATER SOURCE PROTECTION AND SPATIAL PLANNING

## T1 - Capitalisation: Capacity building and stakeholder engagement

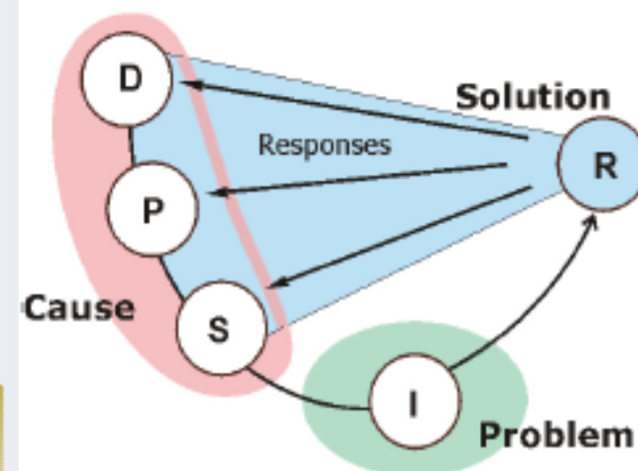
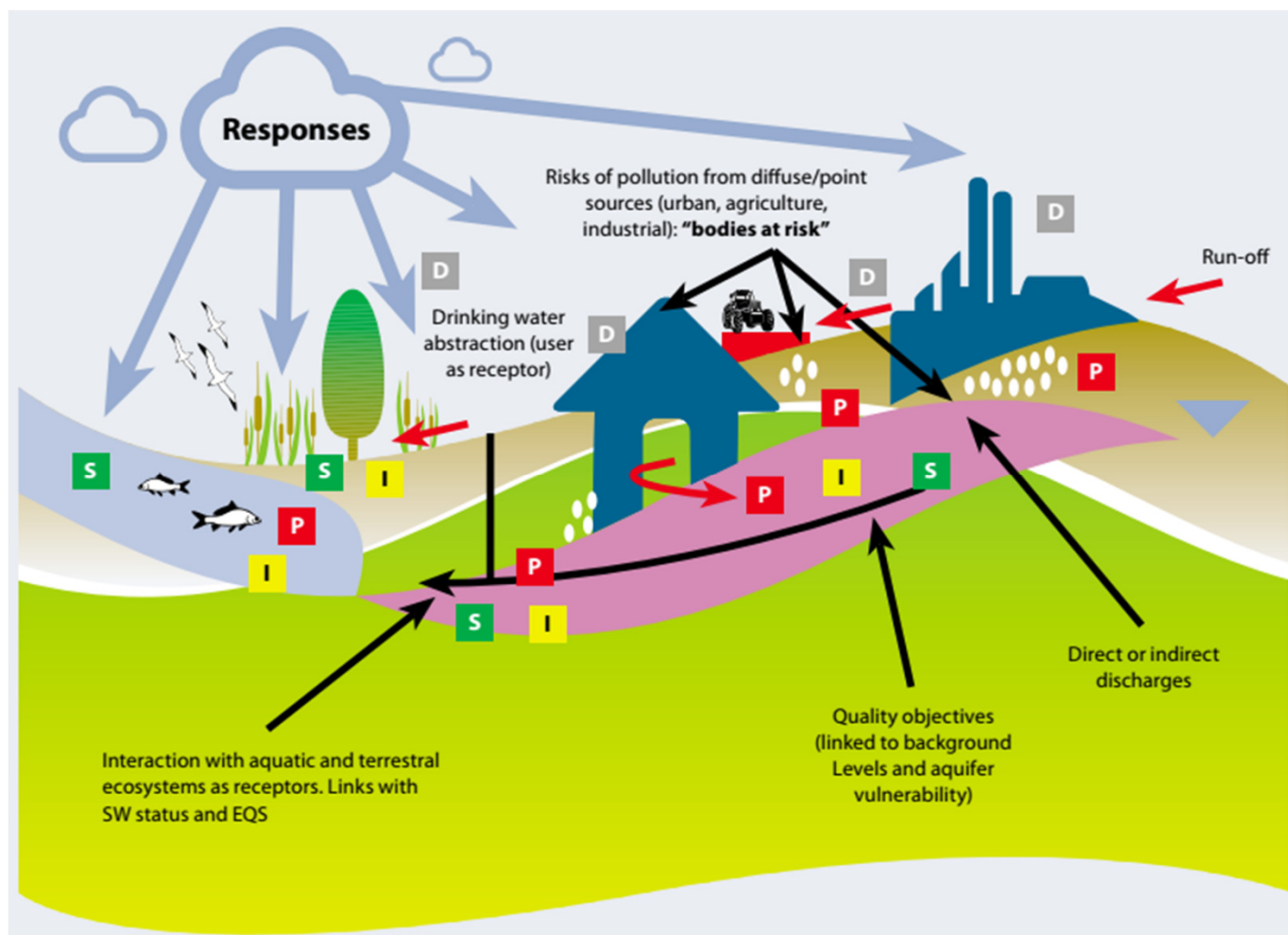
→ State-of-the-art: land use impact on drinking water supply



# DRINKING WATER SOURCE PROTECTION AND SPATIAL PLANNING

## T1 - Capitalisation: Capacity building and stakeholder engagement

→ State-of-the-art: land use impact on drinking water supply (DPSIR analysis)



# DRINKING WATER SOURCE PROTECTION AND SPATIAL PLANNING

## T1 - Capitalisation: Capacity building and stakeholder engagement

→ State-of-the-art: land use impact on drinking water supply (DPSIR analysis)

IMPACT ON WATER RESOURCES QUALITY AND QUANTITY								
AGRICULTURE			FOREST			PASTURES		
Use of fertilisers especially nitrate consumption	Use of pesticides	Inappropriate livestock waste and manure management and use	Clear Cut application	Coniferous monocultures	Removal of deadwood	Plowing up of grassland	Intensive grazing activities	Intensive manure application
KTM 2, 12	KTM 12, 3	KTM 2, 12	KTM 13, 17	KTM 13, 23	KTM 6	KTM 23	KTM 23	KTM 2
URBAN AREAS			INDUSTRIAL AREAS			TRANSPORT		
Lack of sewage systems in some areas / Insufficient dimensioning of sewage systems	Sealed surfaces	Areas without waste water treatment facilities	Industrial waste waters	Old industrial locations	Lack of industrial effluents treatments systems	Road accidental spills	Road traffic	Road and parking cleaning and maintenance
KTM 16, 21	KTM 21	KTM 16, 21	KTM 1, 21	KTM 4	KTM 15, 21	KTM 21	KTM 21	KTM 21



# DRINKING WATER SOURCE PROTECTION AND SPATIAL PLANNING

## T1 - Capitalisation: Capacity building and stakeholder engagement

→ State-of-the-art: land use impact on drinking water supply (DPSIR analysis)

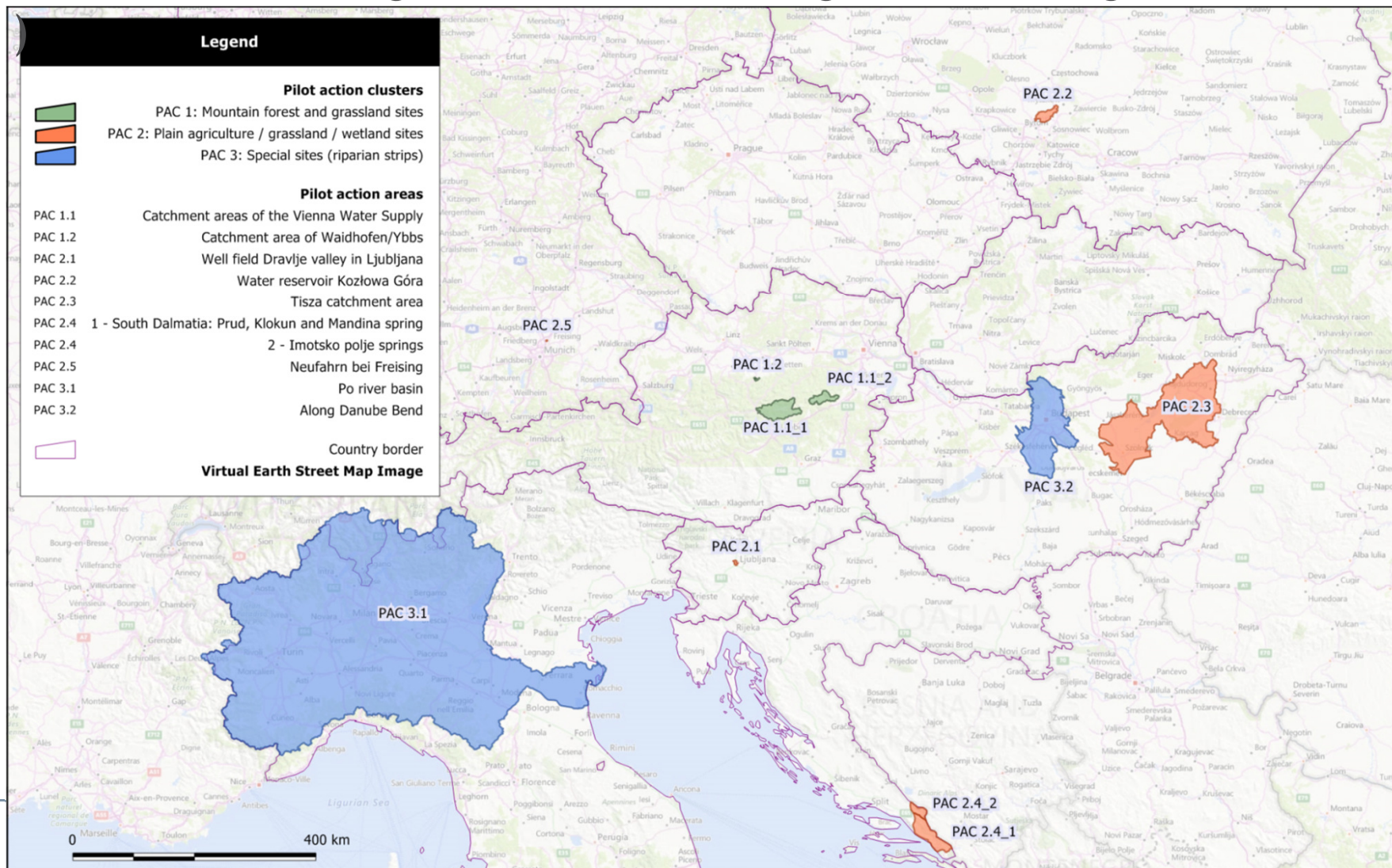
IMPACT ON FLOODS AND DROUGHTS								
AGRICULTURE			FOREST			PASTURES		
Conventional soil tillage	Understanding of role of drainage in agriculture	Land use change	Uncorrect forest management	Forest fires	Extreme meteorological events in forests	Intensive use of heavy machinery on grassland	Intensive grazing activities	Plowing up of grassland
KTM 23, 24	KTM 12, 23	KTM 4, 6	KTM 13, 17	KTM 17	KTM 8, 17, 23	KTM 23	KTM 23	KTM 23
URBAN AREAS			INDUSTRIAL AREAS			TRANSPORT		
Insufficient dimensioning of sewer systems	Urban development in flood prone areas	Sealed surfaces	Expansion of industrial areas	Existing industrial areas in flood prone zones	Water consumption	Development of transport infrastructure	Transport infrastructure crossing watercourses	
KTM 1, 16	KTM 6, 7, 23, 24	KTM 23, 24	KTM 6, 7, 23	KTM 23	KTM 13	KTM 13, 15, 21	KTM 31	



# DRINKING WATER SOURCE PROTECTION AND SPATIAL PLANNING

## T2 - Pilots: Implementation and feedback

→ Land use management and implementation of best practices in pilot areas for achieving sustainable drinking water management



## SLOVENIAN CASE STUDY: DRAVLJE VALLEY PILOT ACTION → ISSUES:

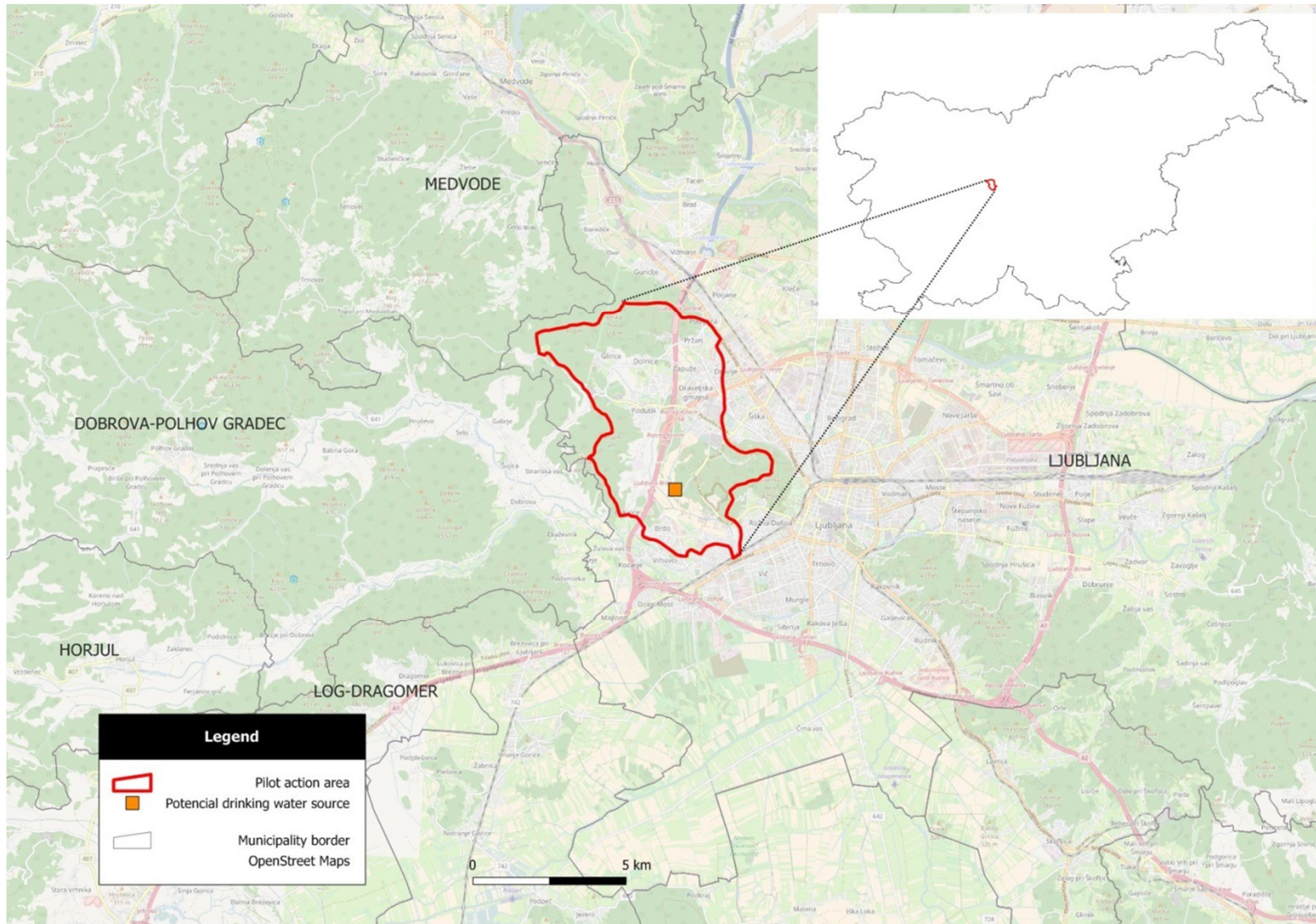
- ❑ planned new (reserve) well field for Ljubljana drinking water supply: well field Dravlje
- ❑ land use pressures and conflicts: settlement, highway, large open spaces adjacent to a Natural Park of hilly area
- ❑ flood area with not properly regulated surface waters coming from hinterland: much of these waters are conducted to the urban sewage system, which in high waters cannot receive so much water;
- ❑ more frequent flood discharges in the future due to climate change

→ harmonized land use and water resources management is a prerequisite for quality of life and drinking water in this area



# SLOVENIAN CASE STUDY (PA 2.1)

## PA 2.1 - WELL FIELD DRAVLJE VALLEY IN LJUBLJANA



# SLOVENIAN CASE STUDY (PA 2.1)

## GAPs & BMPs

### Forest

#### Advantages:

- fertilization is not allowed due to DWPZ
- due to urban forest no clear cuts or timber productions are present

#### Challenges:

- dominance of tourism over forest protection

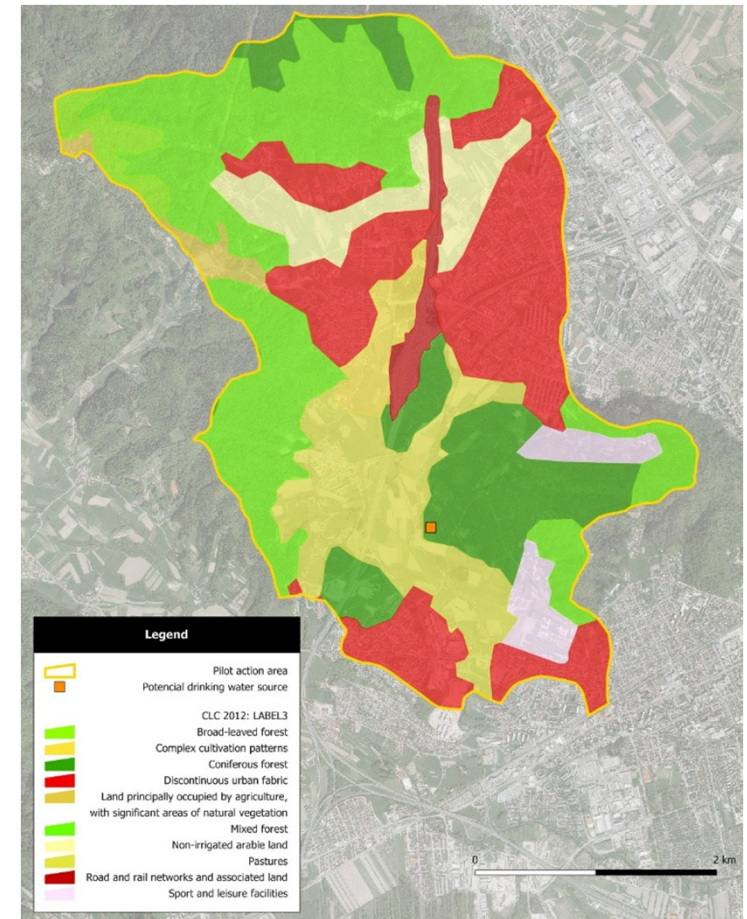
### Grassland

#### Advantages:

- enhancing and preserving drinking water sources

#### Challenges:

- diminishing applications of fertilizers in the period, when it is not allowed
- establishing control over the purchased and used quantity of fertilizers



# SLOVENIAN CASE STUDY (PA 2.1)

## GAPs & BMPs

### Agriculture

#### Advantages:

- regular inspections and supervision carried out by the Inspectorate of the RS for Agriculture, Forestry, Food and the Environment for farmers in the sustainable agriculture programme
- subsidies for limitations for use of fertilizers and pesticides in DWPZ1

#### Challenges:

- establishing control on use of fertilizers in the time ban
- establishing control of the purchased and used quantity of fertilizers
- establishing control of storages of manure and slurry (sealing, quantities, etc.)

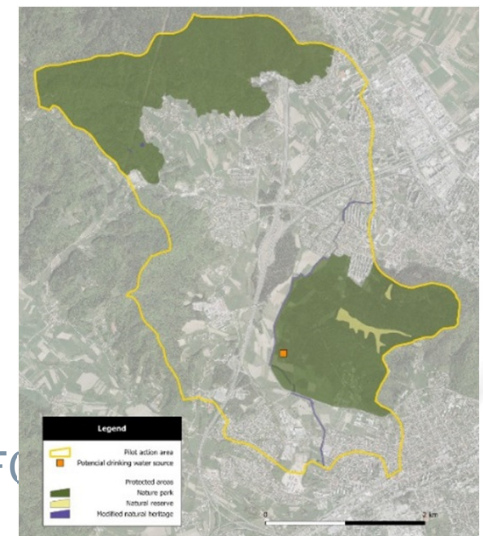
### Protected areas

#### Advantages:

- limited activities in nature parks for the protection of nature

#### Challenges:

- inspection of activities in nature parks



# SLOVENIAN CASE STUDY (PA 2.1)

## GAPs & BMPs

### Urban areas (settlements)

#### Advantages:

- existing local sewage system

#### Challenges:

- establishing of control of local sewage condition
- establishing of control of septic tanks (quantities, cleaning etc.)

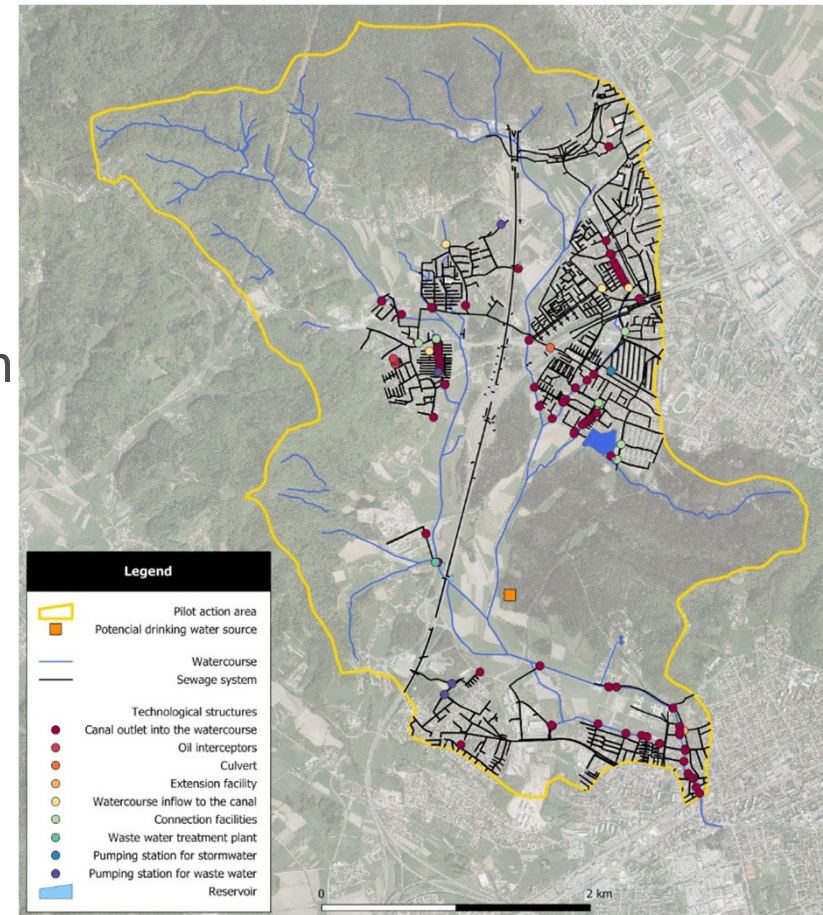
### Industrial areas

#### Advantage:

- internal control of waste and exhausts

#### Challenge:

- establishing of control of activities impacting on environment and waters



Type of connection	No. of people	No. of households
Sewage system	20494	3250
Individual WWTP	84	23
Septic tank	1676	478
Total	22256	3751



# SLOVENIAN CASE STUDY (PA 2.1)

## GAPs & BMPs

### Transport units

#### Advantages:

- arranged road rainwater discharge on motorway and some main roads

#### Challenges:

- to prevent excessive use of solvents in winter
- to prevent application of fertilizers on the roadsides
- to collect and to control road rainwater discharge, particularly in the area of planned Koseze Waterworks

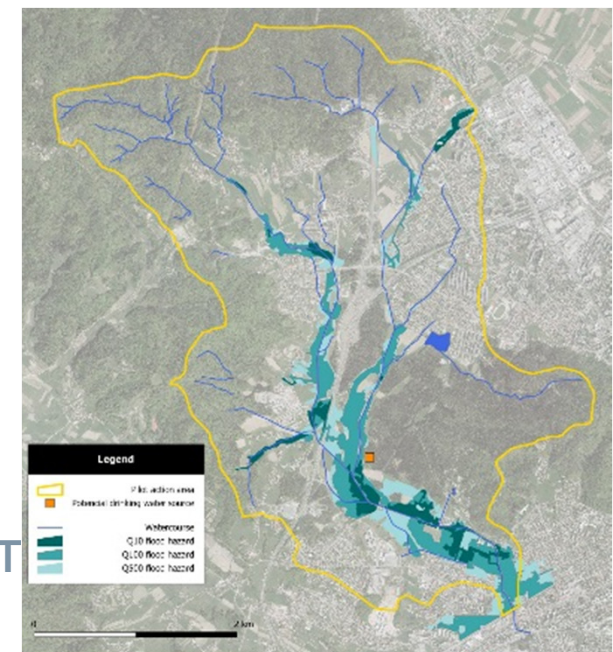
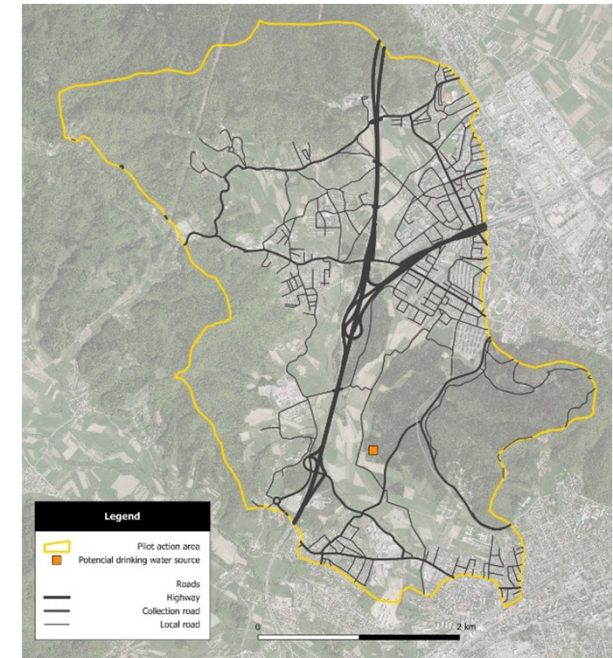
### Flood management

#### Advantages:

- flood protection area with measures and limitations

#### Challenges:

- monitoring of flood events and permanent validation of flood hazard maps



# SLOVENIAN CASE STUDY (PA 2.1)

## ONGOING ACTIVITIES



→ Hydrological/hydraulical and hydrogeological modelling of climate change scenarios daily precipitation and temperature data.



→ Hydrological model of hinterland waters for estimation of water quantities for proper design of surface water discharge.



→ Survey of condition of manure and slurry storages and its sealings at the local farms & fertilizers and manure application



→ Organizing regular interactive workshops with local stakeholders and informing local population through public events, media and brochures.



### Hydrogeological modelling

- Detailed studies of the potential water source
- Studies of area's boundaries with 10-days groundwater inflow into the wells
- Groundwater pumping effects simulations of the recharge area of planned Koseze Waterworks
- Different quantities of pumping (240 l/s, 320 l/s and 400 l/s)
- Calibration at low and high groundwater level



# SLOVENIAN CASE STUDY (PA 2.1)

## ONGOING ACTIVITIES

### Hydrological /hydraulic modelling

- Integrated hydrological and hydraulic model
- Topological background: LIDAR DTM (min 5 reference points per m<sup>2</sup>),
- Runoff data - CORINE land cover and national actual land use spatial database with reference values (CN) developed on the basis of specific land use
- Hydrological modelling approach: distributed hydrological surface runoff model with full hydraulic propagation functions.
- Hydraulic modelling approach: full 2D model (explicit modelling scheme)
- Calibration framework: precipitation events of 2010 and 2014
- Different scenarios: current status and status after the construction of retention reservoir



# SLOVENIAN CASE STUDY (PA 2.1)

## ONGOING ACTIVITIES

### Climate change scenarios

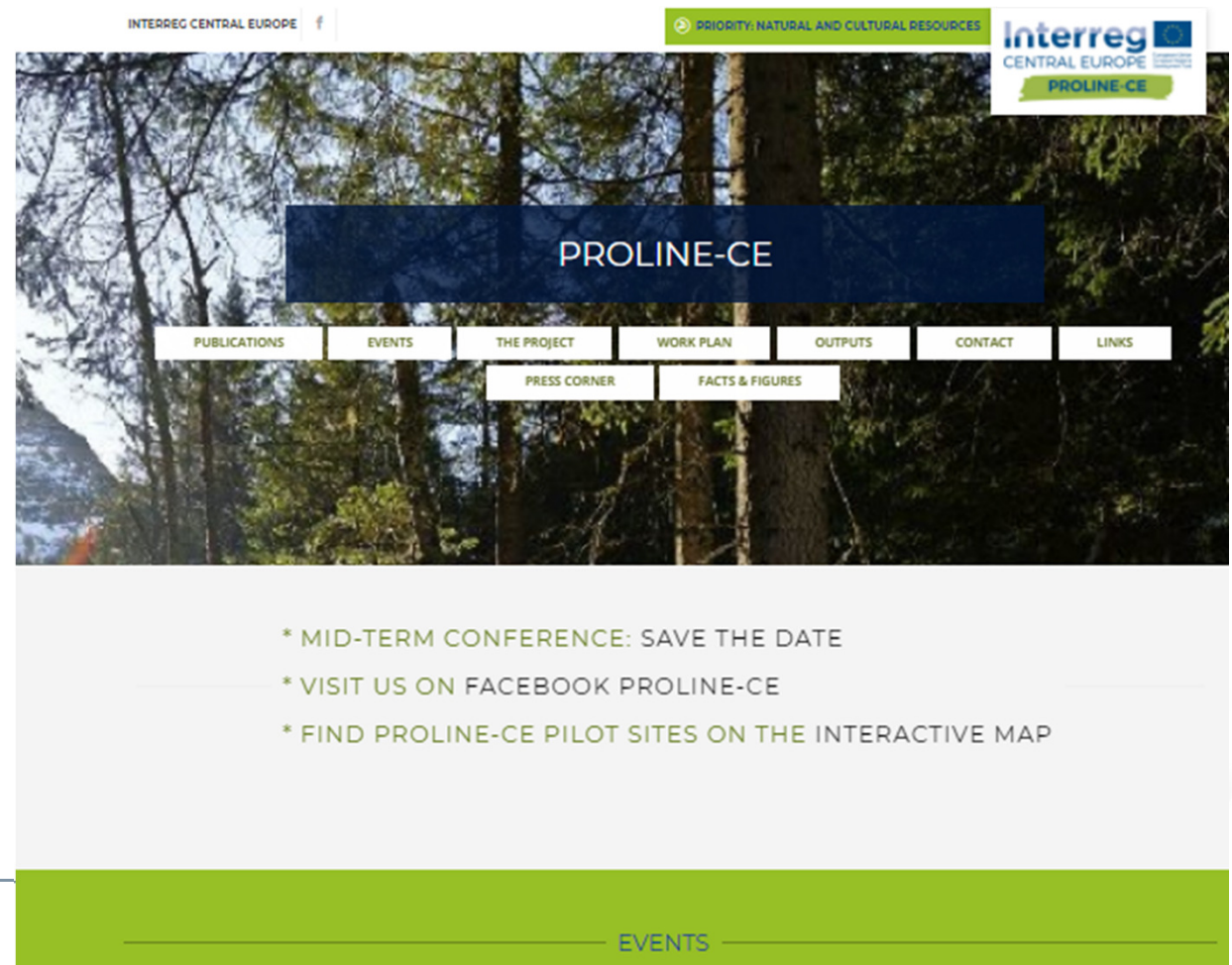
- Impact of climate change scenarios based on the operation of the dry reservoir for flood protection and potential impact on water source.
- To model pumping scenarios according to changed climate and recharge conditions.



# RESULTS



For results check regularly the PROLINE-CE project web site:  
<http://www.interreg-central.eu/proline-ce>



# RESULTS



The screenshot shows the PROLINE-CE Shared Platform website. The header includes the Interreg Central Europe and PROLINE-CE logos. The navigation bar has links for Home, Land use and water management practices, Pilot actions, Legislation, and About. The main content area is titled 'PA 2.3'. Below this, a breadcrumb trail shows 'PROLINE-CE shared platform > Pilot actions > Map of pilot action sites > PA 2.3'. The section is titled 'PA 2.3 – Tisza catchment area'. The text describes the pilot area's location in East Hungary, its borders, and its characteristics as a plain with low altitude and small average relative relief. It also mentions two waterworks. Below the text is a map of the Tisza catchment area in Hungary, showing various pilot areas (PA 2.1, PA 2.2, PA 2.3) and water resources. A legend identifies symbols for bank filtered drinking water resources, located waterworks, drinking water resources, background areas, and pilot areas. The map is titled 'Tisza catchment area'.

PA 2.3 – Tisza catchment area

The pilot area is located in East Hungary, on the Middle Tisza area of the Hungarian Plain (Alföld). Borders of the pilot area are the borders of direct catchment areas. The area is a plain, with a very low altitude above sea level (avg. 85 – 150m) and a small average relative relief, i.e. 2 m/km<sup>2</sup> on most parts. On the Pilot Area two waterworks are located where drinking water abstraction is from surface water.

Reports:

Deliverables T2.1.2 can be found here: [Transnational report about best management practices and annex 4: Best management practices in PA 2.3.](#)

Deliverable T2.1.4 can be found here: [Descriptive documentation about PA 2.3.](#)

Deliverable T2.1.5 can be found here: [Set-up report about adaptation of the transnational concept to PA 2.3.](#)

More results on  
the PROLINE-CE  
interactive  
shared web  
platform:  
[http://proline-  
ce.fgg.uni-lj.si/](http://proline-ce.fgg.uni-lj.si/)



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