PROLINE-CE

WORKPACKAGE T2, ACTIVITY T2.1

SET-UP OF PILOT-SPECIFIC MANAGEMENT PRACTICES

D.T2.1.5 SET-UP REPORT ABOUT ADAPTATION OF THE TRANSNATIONAL CONCEPT TO PILOT ACTION LEVEL

PILOT ACTION: PA2.1 Well field Dravlje valley in Ljubljana

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1. Introduction

The Deliverable DT2.1.5 "Set-up report about adaptation of the transnational concept to pilot action level" presents scheme for implementation of transnational concept, developed in T1, on the level of Pilot Action ***PA2.1 Well field Dravlje valley in Ljubljana***.

GAPs and best management practices (hereinafter BMPs) on national level are presented in *D.T1.1.1 - Country report about the implementation of sustainable land use in drinking water recharge areas* and *D.T1.2.1 - Country-specific best management practice report*. Transnational concept is presented in two main T1 deliverables:

- *D.T1.1.2 Transnational Synthesis status quo report*, where strengths and deficiencies regarding land use and water management in drinking water recharge areas are presented on regional and national level and enhanced with EU level;

and

- *D.T1.2.2 Transnational best management practice report*, a synthesis of BMPs is presented on regional and national level and enhanced with EU level. This report provides also a structure for sustainable land use regarding drinking water supply issues.

National and transnational reports regarding sustainable land use in drinking water recharge areas and BMPs were the basis for interactive workshop discussion at national stakeholder meetings (D.T1.3.2 and O.T1.1), performed in each country (Pilot Action area). Outcomes of the national stakeholder meeting set guidelines for further work in Pilot Action. On the other hand, outcomes from national workshops were gathered in transnational report *D.T1.3.3 Lessons learnt at the national stakeholder workshops*, which includes also derivation of measure groups in relation to land use types management and proposal of mitigation of the water-related natural risks.

BMPs and measures for drinking water protection and management, which are derived from T1, will be reviewed and tested in Pilot Actions.

Review of main land use conflicts and BMPs on Pilot Action level has already been done in Pilot Action BMPs reports, which were a basis for *D.T2.1.2 Transnational case review of best management practices in pilot actions*.

Description of natural characteristics of Pilot Site is presented in *D.T.1.4 Descriptive documentation of pilot actions and related issues*.

The goal of this deliverable is to set-up activities in particular Pilot Action. In this report a scheme for activities in Pilot Action is presented.

2. Climate Change

For Hydraulical/hydrological and hydrogeological modelling of climate change scenarios daily precipitation and temperature data with bias correction will be applied.

For PA 2.1 climate change data will be provided by the Slovenian Environment Agency, which elaborated climate change scenarios, based two emission scenarios: RCP4.5 and RCP8.5. They selected Regional Climate Models, which the most properly describe Slovenian climate (see Table 1).

Table 1: List of models used in the analysis for the global model (GCM) and regional model (RCM)

gcm	rcm
CNRM-CERFACS-CNRM-CM5	CLMcom-CCLM4
MPI-M-MPI-ESM-LR	CLMcom-CCLM4
ICHEC-EC-EARTH	DMI-HIRHAM5
IPSL-IPSL-CM5A-MR	IPSL-INERIS
MOHC-HadGEM2-ES	KNMI-RACMO22E
MPI-M-MPI-ESM-LR	SMHI-RCA4

Climate and climate change issues in Pilot Actions will be described in detail and discussed in the deliverable *D.T2.3.3 - PA reports about climate change issues in pilots*.

3. Implementation of best management practices

The main conflicts between management and operation of water supply (drinking water protection and management) and land use (LU) management

LU1 Around half of the grassland is within drinking water protection zones (DWPZ), where ploughing of permanent grassland is prohibited. From harvesting period in autumn until 1st March it is forbidden to use mineral fertilizers containing nitrogen and in similar period starting one month later it is forbidden to use manure and slurry. There is no control over the purchased and applied quantity of fertilizers. The major problem is application of manure in the period, when it is not allowed.

LU2 Similar limitations for use of fertilizers apply also to agriculture, which covers around 10% of the PA area and all is inside the DWPZ III (wider area with the moderate protection regime). On such areas it is forbidden to fertilize without a fertilization plan, which must contain information on the type and amount of mineral or organic fertilizer used for each crop. There is a lack of inspection and supervision.

LU3 Often manure and slurry storage are not large enough to store manure and slurry for at least six months and can contain more than 170 kg/ha of nitrogen. Storage facility sealing are often permeable and slurry is leaking into the soil. Lack of inspection.

LU4 Sewage system and individual small wastewater treatment plants (WWTP) are present in the PA area, but some septic tanks, which are very likely leaking, can still be found.

LU5 Controlled discharge of meteoric water with treatment is arranged on motorway, but the western part of Ljubljana's ring road, which has the most dense traffic, runs through the entire PA area, therefore it has to be checked. On the other hand, discharge of meteoric water from side roads do not exist. There is also threat of excessive use of solvents in winter and application of fertilizers on the road green areas.

LU6 In Dravlje valley pilot action area there are some industries, which present threat to environment and waters: Kemofarmacija d.d. with distribution of medications, cosmetics and medical devices and Trgograd d.o.o., asphalt plant. Both have internal control of waste and exhausts, but there is no control of activities impacting on environment and waters.

Application of BMPs to solve these conflicts for the purpose of assuring safe drinking water supply

LU1&LU2. Fertilizer and manure application on meadows and fields in the DWPZs: regular inspections and supervision in order to prevent violations; control of the purchased and used quantity of fertilizers and manure.

LU3. The inspections and supervision should also control the manure and slurry storage which must be large enough to storage manure and slurry for at least six months and must contain up to 170 kg/ha of nitrogen according to the fertilization plan and storage sealing, quantities, etc.

LU4. Inventory and control of septic tanks. The sewage network is regularly supervised by Ljubljana public water utility because a leaking network may cause environmental pollution (VOKA, 2017).

LU5. Inventory and efficiency assessment of collection and treatment of discharge of meteoric water from roads. Controlled discharge of meteoric water from roads with treatment is required particularly in the recharge area of planned Koseze Waterworks.

LU6. Inventory of possible threats of the industry in the recharge area of planned Koseze Waterworks.

The main conflicts between drinking water protection and management and flood management

FP1. Surface waters coming from hinterland are not properly regulated with defined flood routing mechanism. In the urbanized areas, most of these waters are being discharged to mixed urban sewage system in the pilot action area with limited retention capacity. Negative consequences are: (1) overflow from mixed sanitary sewerage (SSO), (2) depletion of water

resources (surface waters, groundwater), (3) reduced concentration time, (4) potential transport of pollutants.

FP2. Possible conflicts between flood risk protection measures and drinking water protection.

Application of BMPs to solve these conflicts for the purpose of assuring safe drinking water supply

FP1. Establishing hydrological and hydraulic model of hinterland waters for the estimation of water quantities for proper design of surface water discharge. This is related to the protection of vulnerable components of water sources and water supply system.

FP2. In order to reduce the flood risk of the area near Glinščica in the area of Rožna dolina, the construction of a dry retention reservoir "Brdnikova" in Ljubljana has started in the spring of 2017. Dry retention reservoir "Brdnikova" that is currently under construction - will additionally activate additional retention volume on the pilot case watershed and significantly reduce flood hazard in urbanized zones downstream.

LU7. The land use measures identified as pressures (and their release mechanisms) in Glinščica catchment will be evaluated relative to the potential of the pollutants hydraulic transport mechanisms that might occur during the flood events.

Implementation strategies (stakeholder involvement – local round tables etc.)

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

Testing of BMPs

BMPs will be tested with stakeholders involvement (several particular stakeholder dialogues) and modelling.

4. Modelling

Hydrological/hydraulical model

For the addressed zone of Glinščica watershed a new, integrated hydrological and hydraulic model is under development with following features:

- Topological background: LIDAR DTM (min 5 reference points per m^2), already available from national LIDAR DTM database (as per 2014).
- 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.
- Scenarios which will be subject of modelling:

  (1) **Current status** – basis for the calibration of the model based upon the events of 2010 and 2014. Observed flood hazard in the zone of water source.

  (2) **Status after** the construction of the "Brdnikova" retention reservoir with 451.600 m3 of effective retention volume, covering area of 42,3 ha, potential impact of the retention reservoir on water source.

  (3) **Impact of climate change scenarios** on the operation of the Brdnikova reservoir and potential impact on water source.

Based upon the modelling results mitigation measures will be proposed for the improved protection of potential drinking water source.

Hydrogeological modelling

Simulations of the groundwater pumping effects in the recharge area of planned Koseze Waterworks were performed. The modelling area is gravel sandy aquifer of Ljubljana field aquifer and northern part of Ljubljana moor aquifer. The model was calibrated at low and high groundwater level.

Different quantities of pumping (240 l/s, 320 l/s and 400 l/s) from the four planned wells were taken into consideration. Simulations confirmed possibility of pumping during the dry season in the Koseze Waterworks with pumped water quantity of 400 l/s.

On the basis of the results of the numerical model, boundaries of the catchment area were assessed with accounting of 10-days groundwater inflow into the wells. Moreover, a proposal of detailed studies of the potential water source was elaborated.

Furthermore, it is planned to assess the impact of climate change and to model pumping scenarios according to changed climate and recharge conditions.

5. Conclusions

In this report a scheme for Pilot Action activities, which will be performed in Pilot area, is presented.

Description of performance of pilot activities and first outlining of foreseeable solutions will be described more in detail in D.T2.2.4. - Partner-specific interim pilot action progress report. This preliminary report will be discussed and presented during TM4 and Project First Review in April 2018 (D.M.2.5).

Outcomes from the management actions examined in Pilot Actions, description of conducted activities and identified solutions for case-specific adaptations of management concepts will be described in D.T2.2.2. - Partner-specific pilot action documentation. In this report, also gaps between the revised best management practices and actual management practice will be outlined.