

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: PA2.5 Neufahrn b. Freising

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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 **PA2.5 - Neufahrn bei Freising**.

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

In order to evaluate possible climate change impacts on the recharge area of the water supply in Neufahrn bei Freising, we will assume different climate change scenarios relevant for the considered area. In this context we will review the existing climate change projections existing for Bavaria. We will mainly focus on temperature and precipitation forecasts. Considering the spatial extent of the Neufahrn bei Freising pilot area, we will evaluate the data availability for climate change projections derived from the existing regional and downscaled climate change models in order to integrate those into our hydrological model. Moreover, we will evaluate further possibilities to get climate change data from our project partners from Italy (CMCC, PP13), if the already existing dataset will be considered insufficient.

The consideration of climate change scenarios in hydrological model will allow investigation of possible changes in the dominating hydrological processes. Given the uncertainties related to the climate change projections as well as the uncertainties given by the model assumptions, we will evaluate the impacts of climate change and the (possibly) changing hydrological processes on the water resources management in the pilot area.

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

For the pilot area Neufahrn bei Freising we identified agricultural activities, urban pressure and related management operations as possible sources of pressure for water management operations. Here, agricultural activities represent the main pressure due the large areas covered by arable land and related inputs of fertilizers (e.g nitrate). Moreover, socio-economic changes are rapidly occurring in the pilot area. We identified a decrease in general interest for agricultural activities which is expected to lead to important changes in land use and land management in the next years. Also the urban area is rapidly changing, with the construction of new commercial and residential areas and a change in the industrial activities. Such a dynamic environment represents a challenge for water management when they need to choose the most appropriate land use management practices as well as to adapt their water management operations.

The main conflicts between management and operation of water supply (drinking water protection and management) and flood protection

Generally, conflicts between flood and drinking water protection do not yet exist. However, the Isar river is assumed to exchange a relevant amount of water with the aquifer representing



therefore a potential contamination source. Due to the complexity of the exchange processes between the surface water and the groundwater, the uncertainties related to the groundwater flow direction and hence to the definition of an appropriate groundwater protection considerably increase. Moreover, the waste water treatment plant Gut Marienhof may represent a threat for the well field in case of system failure.

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

In order to ensure a sustainable and reliable supply of freshwater in the future, the following BMP are recommended and planned to be implemented:

- 1.) Implementation of a continuous monitoring program in both, surface water and groundwater. The monitoring should include continuous measurements of water levels in the Isar river and the adjacent aquifer, as well as further physical parameters, such as temperature and electrical conductivity. The monitoring is said to improve the understanding of river-aquifer interactions during low and mean flow, as well as during river floods, so that possible threats for the supplying groundwater wells as well as for the waste water treatment plant can be detected and prevented.
- 2.) With the help of the gathered data, the existing hydrological model for the recharge area of the freshwater supplying wells in Neufahrn will be improved. Moreover, an automatic data transmission procedure should help to automatically update the hydrological model in order to improve the reliability of forecasts made with the model.
- 3.) Integration of the recent land use practices into the hydrological model to enable an early detection of possible threats for the groundwater emerging from anthropogenic sources. In case of socio-economic changes which lead to changes in the land management structures, planned land use scenarios can be tested and evaluated in terms of their impacts on the water quality and quantity.

Both, the monitoring, as well as the model, should help to identify possible threats for the exploited aquifer systems and to evaluate possible scenarios that can help to sustainably ensure the future freshwater supply.

Implementation strategies (stakeholder involvement - local round tables etc.) and testing of BMPs in PA

In the framework of our work in PROLINE-CE, we will further involve stakeholders and organize panel discussions with residents and the authorities. That engagement is expected to help us identifying possible future developments (e.g. agricultural activities, urban expansion, water demand and water treatment etc.) in the area to be able to understand the relationship between land management operations, flood protection and water management. Based on the experiences, knowledge and expectations we gather from the stakeholders, we will evaluate possible scenarios with the help of what we expect to be one of the best BMP: hydrological modelling. In other words, our models will help us to identify the effects future developments



may have on the hydrological system as well as to derive management actions to minimize the trade-offs between land use and water management.

4. Modelling

To study the hydrological system of the Neufahrn bei Freising recharge area we will use the existing model codes of MODFLOW-OWHM (One Water Hydrologic Flow Model) provided by the USGS (United States Geological Survey). The model code offers the possibility to simulate the groundwater flow and transport processes, as well as to simulate potential effects of water management and land use operations on the water resources.

As a graphical user interface, we will use a newly development integration framework called FREEWAT. FREEWAT (FREE and open source tools for WATER resources management). In the course of the H2020 project FREEWAT, the project partners developed a plugin to use MODFLOW-OWHM in the framework of an open source GIS software (QGIS), thus enabling to do the pre- and post-processing of the model as well as to perform spatial analysis retaining the same user interface.

We organized a joint workshop between the FREEWAT project and the PROLINE-CE project from June 29th to June 30th 2017 to train master students, graduate students and researchers and disseminate the outcomes of both projects.

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.