PROLINE-CE

WORKPACKAGE T2

PILOTS: IMPLEMENTATION AND FEEDBACK

SUMMARY OF ACTIVITIES PERFORMED IN THE PILOT ACTIONS

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Activities in PA

PA1.1: Catchment area of the Vienna Water

In PROLINE-CE, Vienna Water aims to enlarge an already developed model (KAMPUS) for surface run-off, erosion and infiltration dynamics. We suppose that all addressed dynamics exert considerable pressures on the karstic groundwater resources. Vienna Water also combines this model with other outputs and results (snow model, climate model and measuring stations) from former – also partly EU-funded – projects. The validation of this model will be tested by model outputs compared to hydrological measurements at springs during strong precipitation events.

The main pilot activities are situated in the area of "Zeller Staritzen and Central Hochschwab".

In the field of alpine pastures (mountain grasslands) Vienna Water aims to communicate and implement Best Management Practices which support drinking water supply security.

The most crucial BMPs in the field of alpine pastures were elaborated and defined as guidelines for the farmer's staff working in the mountainous areas. In the course of information transfer meetings and workshops with farmers, alpine pasture related authorities and water works staff, the thematic field of BMP on alpine pastures was opened and discussed. The information transfer activities can be regarded as crucial for the thematic field and persuasive efforts are integrated in order to ensure application of the BMPs.

PA1.2: Catchment area of Waidhofen/Ybbs

Within the drinking water protection area (DWPA) it is necessary to convince the private and federal forest owners about the requirements of drinking water protection in relation to forestry. This is necessary as the overall purpose of drinking water protection in the field of forestry is new for the private and federal forest owners. Hence also the Best Practice Catalogue is new or unknown for them and as a result of this situation the activities focus on knowledge transfer to forest owners in the course of individual round table discussions about the requirements of drinking water protection within forested DWPA.

Incentive payments (payments for ecosystem services) from the water supplier should motivate the stakeholders to apply Best Practices. The Best Practice catalogue of the project was written in short comprehensible style and translated into German language in order to be a potential tool for the stakeholders. The implementation of BMPs in PA1.2 Waidhofen/Ybbs was strategically planned through the elaboration of the "Guideline for securing the Water Protection functionality of the forest ecosystems

within the DWPZ" (GWP) which defines all relevant BMPs for the watershed. As the implementation process in forest management needs time, GWP sets the foundation for a sustainable BMP application. GWP was resolved through the city council of Waidhofen/Ybbs and has now normative character.

As part of the testing/demonstrating character of the PA, stakeholders will be invited to visit specific sites of the DWPA where results of already fulfilled or outstanding management activities will be showcased and discussed.

PA2.1: Well field Dravlje valley in Ljubljana, Slovenia

Inventory of possible polluters in the urban recharge area of potential well field Dravlje was made with assessment of their impact on drinking water source and elaboration of measures and best management practices for protection of drinking water source. Strong involvement of stakeholders for implementation of best management practices with several national meetings with particular stakeholder (one-to-one) and regular interactive workshops with local stakeholders.

Distributed hydrological surface runoff model was established with full hydraulic propagation functions for surface waters, with evaluation of new flood measures (retention reservoir built in 2017) and climate change scenarios. Also, simulations of the groundwater pumping effects in the recharge area of planned well field Koseze were made, taking into account the impact of climate change. Several different pumping scenarios were modelled according to climate change and recharge conditions.

PA2.2: Water reservoir Kozłowa Góra, Poland

In June 2017 multiscale monitoring of the water resources was set up to investigate and assess water resources, sources of pollution and possible hazards. Based on the results mathematical models of hydrology and ecology of the Kozłowa Góra reservoir was established. Simulations run allowed to assess a.o. an impact of land use and water management to water quality and quantity and its ecology. A proposal for DWPZ was prepared and is being implemented. The proposal includes a.o. limitation in land use, wastewater management and fishery.

The most important BMP is reaching the society and raise the awareness. In a situation where the guidelines, policies exist and are not enforced raising awareness among society, especially small, local ones is crucial to implement.

PA2.3: Tisza catchment area, Hungary

Data evaluation and comparisons highlighted that current practices in livestock farming, plant production and flood mitigation are good enough to keep the raw surface water in an overall good quality. Data on chemical parameters (NO_3^-, NH_4-N, COD_{Mn}, NO_2^- and pH) measured at Szolnok *(Szolnok Waterworks)* were evaluated and showed very few momentary contamination events from the last six years. Although on most of the livestock farms open manure storages are still in use, the runoff coefficient is so small on

the pilot area that the water originating from in situ precipitation is negligible. Overall low annual precipitation, high temperature and radiation contribute to the fact that contaminated rainwater rather evaporates back to the atmosphere or infiltrates into the soil. Water quality did not deteriorate considerably during the serious flooding in 2013 either.

PA2.4: Groundwater protection in karst area, Croatia

In situ measurements of physical-chemical parameters and sampling of spring, surface and rain waters, located in the area of explored karst fields and its catchment areas, will be carried out in monthly intervals. Physical-chemical and isotopic laboratory analyses of samples will enable assessing of land use impact on water quality.
Hydrological modelling of possible impacts of climate change on water resources will be carried out based on the established correlations between the precipitation and the air temperature during the historical period and their correlative discharges, for climate scenarios for the future (by 2050). Hydrological model will provide scenarios of average annual discharges and assessment of possible water shortages in terms of expected climatic conditions in the future.
In order to familiarize stakeholders, especially those in the pilot area, and locals with the results of this research, we will organize a workshop for stakeholders and inform local population through media and brochures.

PA2.5: Neufahrn bei Freising, Germany

In PROLINE-CE, a hydrological model was developed for the recharge area of the well field in Neufahrn bei Fresing. The model was set up using the One-Water Hydrologic Flow Model framework (OWHM), comprising several modules to simulate different hydrological processes in the area. The model integrates the current land use operations performed in Neufahrn, including different crops with different multi-annual crop rotations. This enables to simulate the impact of land use changes on the water quantity available for water extraction from the shallow wells in Neufahrn.

Using the present time series of nitrate from mandatory water quality analysis, we detected a general trend towards lower nitrate concentrations in the shallow aquifer. This points towards more sustainable application of fertilizers and more sound land use practices. This information will help future applications of transport models which can easily be coupled to the existing groundwater flow model.

Generally, we figured out that groundwater modelling and a more distributed monitoring of hydrochemical data with a higher temporal resolution is a timely challenge to continuously observe the relation between land use practices and groundwater properties.

During our 2nd stakeholder workshop, we informed people in Neufahrn about our activities and outcomes to familiarize them with our identified BMPs and inform them about activities planned in the future.

PA3.1: Po River Basin

The activities carried out in PA3.1 mainly concern the drinking water protection in terms of water-quantity and flood risk mitigation.

The main gaps identified in PA3.1 account for the overexploitation of water resources, especially during drought events, and for the potential impacts of floods on drinking water resources, which are currently not fully considered in the integrated water management strategies. Furthermore, in PA3.1 strong attention is given to the evaluation of the potential impacts of climate change, which will directly and indirectly affect the drinking water supply.

In order to cope with these issues, suitable BMPs for the protection and management of drinking water have been selected and implemented. Specifically, in order to improve the flood forecast and water managing during droughts, respectively employed in FEWS and the DEWS systems, hydrological and hydraulic models have been configured and implemented at the basin scale.

Furthermore, current climate characterization and future variations in weather patterns have been evaluated by means of an integrated modelling chain that allows quantifying the impacts of climate change and land-use change, with a specific attention on their relation with freshwater ecosystem services.
Stakeholders have been the main actors in all phases of BMPs testing. They welcomed basic principles and methodologies for flood/drought operational management and for climate change simulation and projections. Meeting events highlighted that stakeholders involved in management of water shortage crisis should be not only professionals but also communities and non-experts.

PA3.2: Along Danube bend

In the Danube area, groundwater is particularly vulnerable to contamination induced by agricultural production, pollution by not adequate sewage systems or during floods. For this reason, activities proposed for PA3.2 concern the implementation of BMPs that are aimed at solving issues related to groundwater quality damage and its protection.

The issues associated to agriculture primarily affect bank-filtered water sources while poor quality water from urban areas arrive in water bodies after not adequate treatments. Furthermore, water quality is potentially affected by flood events because of river waters may reach the extraction structures and surface water can enter the wells.

In this context, selected BMPs account for the water quality monitoring, both in agricultural and in urban areas, the implementation of proper land-use practices and the construction of sewage systems and devices for wastewater treatment.

Activities are also focused on the evaluation of the BMPs effectiveness by clarifying the decrease in the groundwater chemical pollution due to the changes in agricultural

activities and examining the increase in groundwater quality as consequence of the improvement of sewerage services and network connection.

In order to gain a good insight into the challenges of drinking water resources protection and in further developing of best land-use practices, stakeholders from various domains (Universities, scientific institutes, water management bodies, ministries, national parks, and NGOs concerned with environment and water protection) have been invited to participate in national meeting and workshops.