

PROLINE-CE

WORKPACKAGE T2, ACTIVITY T2.3

IMPLEMENTATION OF BEST PRACTICES FOR WATER PROTECTION IN PILOT ACTIONS

D.T2.3.1 EVALUATION REPORTS FOR EACH PILOT ACTION

PILOT ACTION: PA2.3 Tisza Catchment area

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1. Introduction

Best management practices (hereinafter BMPs) for drinking water protection and management derived from T1 were reviewed and relevant BMPs were selected for particular pilot action. Implementation status of BMPs was verified in Pilot Actions (T2); in case of lacks identified, possibilities of improvement and implementation were also assessed. Drinking water protection and management and best practices are strategically implemented in the pilot actions, in order to achieve a function-oriented land-use based spatial management for water protection at the operational level. Measures and actions were analysed and proposed concerning mitigation of extremes and achieving a sustainable drinking water level. PROLINE-CE pilot actions reflect the broad range of possible conflicts regarding drinking water protection, such as: forest ecosystem service function; land-use planning conflicts; flooding issues; impact of climate change and land-use changes; demonstration of effectiveness of measures including ecosystem services and economic efficiency.

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*.

Activities within Pilot Action are described in *D.T2.2.2 Partner-specific Pilot Action documentation report*.

The Deliverable *D.T2.3.1 Evaluation reports for each pilot action* presents an evaluation of actual implementation and thematic interpretation of tested management practices as well as their acceptance among stakeholders and experts is carried out for pilot action PA2.3 Tisza Catchment area.

2. Evaluation of BMPs in Pilot Action

2.1. Implementation of BMPs

2.1.1. Livestock farm practices for drainage, management, and utilization of rainwater; usage and storage of manure

- Monitoring the riparian livestock farms between Szolnok and Kisköre - involvement of authorities is necessary in the future
- Data gathering about the manure and rainwater systems for pollution assessment - data gathering, evaluation and results are published in *D.T2.2.2 Partner-Specific Pilot Action Documentations*



2.1.2. Use of manure and pesticides, participation in the Agrarian Environment Program

- Monitoring the land use and usage of pesticides along river Tisza between Szolnok Intake Structures and Kisköre - ongoing
- Involving farmers to the Agrarian Environmental Program, emphasizing the importance of green products, providing information to the farmers about climate change - ongoing

2.1.3. Reduction of flood effects at the surface drinking water resources

- The Szolnok Surface Waterworks operates well during flood events, purification technology is suitable for the treatment of changing water quality - the operating system and the purification technologies must be reviewed in the context of climate change

2.2. Acceptance of BMPs among stakeholders

The 2nd national stakeholder workshop for the PROLINE-CE project was held on May 31st, 2018 in the headquarter of the Middle Tisza District Water Directorate, in Szolnok. The workshop is part of the thematic work package T2: Stakeholder Involvement.

The aim of the workshop was to present the framework, the objectives and goals of the PROLINE-CE project in general, as well as the results achieved so far with a special emphasis on the relationship between the climate change and best management practices for source water protection in PA 2.3 Tisza Catchment area. As organisers we targeted to reach a broad range of stakeholders in order to gain a good insight into the challenges of drinking water resources protection, thus we invited participants from various domains such as water management bodies, ministries, national parks, mayor's offices situated in the pilot area. Although the invitation to the workshop was widely distributed, the participation was narrower than expected in terms of professional diversity, most of the participants came from the water sector.

For the roundtable discussion GAPS were presented, namely

- o the impact of livestock and manure on surface water resources,
- o the impact of agriculture on surface drinking water resources - plant production,
- o operation of surface drinking water facility at flood time,

the question "how climate change could/will worsen the situation" was raised and questions were addressed to the stakeholders about each GAP and how the present stakeholders think they can participate in the project. Everyone agreed that the raised problems are very complex, and that although the situation might seem to be under control at the moment, the climate change could be a serious threat. It was also said that monitoring the water quality of River Tisza is enough, there is no need to monitor its tributaries.



According to the practical experiences of the participating water works, the quality of the applied land use does not affect the safety or sustainability of the drinking water supply, supposed, there are up-to-date water treatment technologies in operation. Applying "good land use practices" less intensive water treatment technologies could be applied, on the other hand water quality deterioration caused by inappropriate land use practices can be dealt with by intensifying the treatment technology.

In case of emergency situations, the surface drinking water intake can be temporarily substituted by less exposed surface water reserves or groundwater wells with free capacity.

2.3. Overview table about implementation of BMPs in Pilot Action and their acceptance among stakeholders

Table 1: GAPS and proposed BMPs with recommendations for implementation in Pilot Action.

Actual management practice (GAP)		Improper manure storage	Improper or excessive use of pesticides and manure on plant production fields.
Proposed BMP		Frequently monitoring livestock farms (authorities), providing information to the farmers about the environmental disadvantages of improper manure storage and about climate change.	Involving farmers to the Agrarian Environmental Program, emphasizing the importance of green products, providing information to the farmers about climate change.
Proposed solutions and recommendations	adaptation of existing land use management practices	Closed manure storage facilities, managing and collecting rainwater (better drainage systems on livestock farms).	Ploughing parallel to the watercourse, usage of green products
	Adaptation of existing flood/drought management practices	collecting rainwater could be advantageous in drought periods	Not relevant
	Adaptation of policy guidelines	guidelines for farmers about manure storage	Not relevant
IMPLEMENTATION		NO	NO
In case of NO:	<ul style="list-style-type: none"> possibility of implementation 	Possible It depends on the relevant authorities who could inspect the operation of livestock farms (do authorities have enough capacity for the	Possible If farmers could be convinced that the Agrarian Environmental Program is beneficial for them, the implementation has a good



		regular inspection?)	possibility to be realized. To convince the farmers brochures have to be prepared or local events have to be organized to inform them about the consequences of improper use of pesticides and the benefit of participating in Agrarian Environmental Program.
	<ul style="list-style-type: none"> proposal of procedure for implementation 	Authorities should be informed about GAP, as well as the imminence of climate change, so they can make the first step towards a regular monitoring/ inspection	Informative meetings for farmers about the Agrarian Environmental Program and climate change
	<ul style="list-style-type: none"> other (please, specify) 	Not relevant	Not relevant
ACCEPTANCE AMONG STAKEHOLDERS AND EXPERTS			
	<ul style="list-style-type: none"> possibility of implementation 	-	-
	<ul style="list-style-type: none"> proposal of procedure for implementation 	-	-
	<ul style="list-style-type: none"> other (please, specify) 	Experts from water sector agreed that the raised problems are very complex, and that although the situation might seem to be under control at the moment, the climate change could be a serious threat. It is also a common opinion that monitoring the water quality of River Tisza is enough, there is no need to monitor its tributaries.	Experts from water sector agreed that the raised problems are very complex, and that although the situation might seem to be under control at the moment, the climate change could be a serious threat. It is also a common opinion that monitoring the water quality of River Tisza is enough, there is no need to monitor its tributaries.



Actual management practice (GAP)		Increased contamination of surface drinking water resources during flood events
Proposed BMP		reducing flood effects on surface drinking water resources
Proposed solutions and recommendations	adaptation of existing land use management practices	Not highly relevant on the pilot area, although the change of agricultural practices on riparian areas could be advantageous (riparian forest)
	Adaptation of existing flood/drought management practices	Current flood management practices are good, but preparation for extreme flood events caused by CC seems to be necessary
	Adaptation of policy guidelines	Guidelines for agricultural practices in riparian areas
IMPLEMENTATION		Partly yes
In case of NO:	<ul style="list-style-type: none"> • possibility of implementation 	-
	<ul style="list-style-type: none"> • proposal of procedure for implementation 	-
	other (please, specify)	The Szolnok Surface Waterworks operates well during flood events, purification technology is suitable for the treatment of changing water quality - the operating system and the purification technologies must be reviewed in the context of climate change



3. Conclusions

Proposed best management practices have not yet been implemented. In pilot actions we reviewed those BMPs and current practices and - as an overall result it - came out 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^- , $\text{NH}_4\text{-N}$, COD_{Mn} , NO_2^- and pH) measured at Szolnok 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 few 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.

The above shows that the situation is satisfying at the moment. The problem lies in climate change and how it is going to affect the efficiency of the current practices. For instance, open manure storages may not pose a big threat in the current climate conditions, but an extremely intensive rainfall could possibly trigger a surface runoff, even on a flatter land, which could contaminate the nearby watercourses. As it was mentioned by BRUNETTI et al. (2001) and BATES et al. (2008) (and many more) for countries in the temperate zone, climate change will decrease the number of rainy days but increase the average volume of each rainfall event.

Current practices should be evaluated in context of future climate conditions.

4. References

- BATES, B.C., KUNDZEWICZ, Z.W., WU, S., PALUTIKOF, J.P. (2008): Climate change and water. Geneva: Technical paper of the Intergovernmental Panel on Climate change. IPCC Secretariat.
- BRUNETTI, M., MAUGERI, M., NANNI, T. (2004): Changes in total precipitation rainy days and extreme events in northeastern Italy. *Int J Climatol.* 21:861-71.