

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: PA1.2 Waidhofen/Ybbs

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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 the 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 services functionality; 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 and is carried out for pilot action PA1.2 Waidhofen/Ybbs.



2. Evaluation of BMPs in Pilot Action 1.2

2.1. Implementation of BMPs

The implementation of BMP's 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 BMP's for the watershed. As the implementation process in forest management needs time, GWP sets the foundation for a sustainable BMP application.

GWP was formulated in German language and encompasses all relevant BMP's for the DWPZ (drinking water protection zone) in PA1.2 Waidhofen/Ybbs. The overall purpose is the sustainable improvement of drinking water supply security.

Hence GWP defines the most relevant BMP's for reaching this purpose and additionally the related implementation strategy, which is a PES scheme (payments for the provision of ecosystem services scheme). Forest owners whose forest management measures conform to the GWP receive transfer payments on a yearly base, calculated per hectare forest land. The municipality (the water works of Waidhofen/Ybbs) formulates contracts with the forest owners, which are based on GWP.

GWP passed the municipal council of the city, which forms the basic condition to implement PES schemes for forest owners within the DWPZ, hence also for the sustainable application of BMP's. Several knowledge transfer meetings and persuasive efforts were necessary to convince the members of the municipal council from the urgency of an integral drinking source water protection strategy, which is given with GWP. The resolution of GWP can be seen as milestone for drinking water supply security in PA1.2. Through this fact all further steps towards a sustainable implementation of BMP's become possible.



Best Management Practices

Following BMP's were selected out of the PROLINE-CE catalogue as the most relevant ones for the DWPZ in PA1.2:

(1) Avoidance of the clear-cut technique (BP MF1)

- + This BMP can be regarded as the most crucial one for the guarantee of drinking water supply security within PA1.2. Its implementation will be facilitated through the application of GWP. PES will only be possible if this BMP is applied.
- + Further steps for BMP implementation are continued persuasive efforts with all forest owners within the DWPZ for securing the end of clear-cut applications. All those activities will be carried out during the whole PROLINE-CE project duration but will have to be continued after project lifetime.

(2) Forest Ecologically Sustainable Wild Ungulate Densities (BP MF9)

- + This BMP forms the basic condition for the potential execution of any silvicultural management measures within the DWPZ. Its implementation will be facilitated through the application of GWP. PES will only be possible if this BMP is applied.
- + The regional Hunting Act of Lower Austria (Niederösterreich) defines the frame for wild ungulate management. Forest owners and hunters have to comply with all related paragraphs. This will have to be facilitated through persuasive efforts and public relations work as involved stakeholders actually have to be forced to comply with all related paragraphs (an Austrian specific situation).

(3) Limitation of forest roads (BP MF20)

- + The implementation of this BMP will be facilitated through GWP, as PES again will only be possible if forest owners conform to this general forest management rule.
- + As the DWPZ of PA1.2 is legally decreed since 20th of June 2018, all forest road projects require an authorization according to the Austrian Federal Water Act. This situation will make it far more difficult to construct forest roads within PA1.2.
- + There will be a specific rate of PES available if forest owners focus on skyline-crane techniques to yield timber and avoid the further construction of forest roads.



(4) Tree Species Diversity According to the Natural Forest Community (BP MF7)

+ To establish the tree species diversity according to the natural forest community, which is defined within PA1.2 through the site-specific Forest Hydrotope Model (FoHyM - Koeck and Hochbichler 2012), will make the forest ecosystems far more stable and resilient, also under climate change conditions. The establishment of the forest hydrotope type specific tree species diversity will be facilitated through GWP and related PES schemes.

+ The efforts to establish the tree species diversity according to FoHyM will have to be sustained over many decades in order to improve forest ecosystem stability and resilience, as this has to cover the whole forest area of PA1.2.

(5) Foster old, huge and vital tree individuals (BP MF11)

+ The strategic advancement of old, huge and vital tree individuals will again be supported through GWP and related PES schemes. Despite this fact persuasive efforts and trainings for forest owners will be necessary in order to achieve the implementation of this BMP on a sustainable level. Those will be executed first during project duration but will have to be continued after 2019.

(6) Continuous monitoring of relevant, hydrological data and hydrological modelling

+ The spaces used for dolomite mining should not be increased, since this probably leads to a decrease in the mean spring discharge in the Kerschbaum spring. To show the effect of the dolomite quarries, continuous monitoring of relevant hydrological data and hydrological modelling were applied (Bittner et al. 2018).



2.2. Acceptance of BMPs among stakeholders

The acceptance of BMP's among stakeholders has to be seen nuanced. Most of the small forest owners show an open position towards the proposed BMP catalogue of PROLINE-CE. They see the proposed "Guideline for securing the Water Protection functionality of the forest ecosystems within the DWPZ" (GWP) which defines all relevant BMP's for the watershed as valuable alternative to normal timber-yield forestry and are looking forward to receiving PES (payments for ecosystem services provision) transfer payments.

Other forest owners do not show any interest to change their management routines. They seem to be rich enough to be independent from any transfer payments for any given forest management adaptation.

These points of view were tested in the course of bilateral meetings with forest owners within PA1.2.

The highest score of acceptance was reached in the case of stakeholders who represent the municipality of Waidhofen/Ybbs, namely the water works and the infrastructure committee of the municipal council of the city. Those stakeholders were convinced from the need to improve the drinking water supply security and voted finally for GWP. This step can be seen as milestone towards an improved water protection policy within PA1.2.



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

The implementation of BMP's within PA1.2 is a continuous process, which has been started already in the course of the CC-WaterS project (FoHyM elaboration, Koeck and Hochbichler 2012). As forest ecosystems evolve over long time periods and also forest management needs rather long time for any changes, the implementation of PROLINE-CE BMP's has to be seen under these frame conditions.

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

Actual management practice (GAP)		Continued application of the clear-cut technique	Unnaturally elevated wild ungulate densities as result of trophy-hunting activities and resulting browsing and bark-stripping damages
Proposed BMP		Avoidance of the clear-cut technique (BP MF1)	Forest Ecologically Sustainable Wild Ungulate Densities (BP MF9)
Proposed solutions and recommendations	adaptation of existing land use management practices	As alternative small gap-cuts can be applied for the creation of forest stand regeneration dynamics.	Hunting should follow the purpose of balancing the wild ungulate densities.
	Adaptation of existing flood/drought management practices	The BMP is also relevant for flood/drought management practices.	The BMP is also relevant for flood/drought management practices.
	Adaptation of policy guidelines	The avoidance of the clear-cut technique (BP MF1) should be implemented in an Austrian federal guideline for forested DWPZ.	The execution of the regional province-based laws for hunting should be the central agenda of federal and province policy in Austria.
IMPLEMENTATION		No	No
In case of NO:	<ul style="list-style-type: none"> possibility of implementation 	The possibility of implementation will emerge through the application of the "Guideline for securing the Water Protection functionality of the forest ecosystems within the DWPZ" (GWP) which defines all relevant BMP's for the	Its implementation will be facilitated through the application of GWP. PES will only be possible if this BMP is applied. Further the execution of the regional province-based laws for hunting should facilitate the implementation



		watershed. Schemes of PES (payments for Ecosystem Services) will become possible through it, with the function of motivation for all forest owners to apply BMP's.	of this BMP.
	<ul style="list-style-type: none"> proposal of procedure for implementation 	Set up of PES contracts with each forest owner within PA1.2 through the municipal department of the city of Waidhofen/Ybbs (water works).	Set up of PES contracts with each forest owner within PA1.2 through the municipal department of the city of Waidhofen/Ybbs (water works). Execution of the provincial hunting laws through insisting communication processes (city of Waidhofen/Ybbs, water works, project communication strategy).
	<ul style="list-style-type: none"> other (please, specify) 	Continued persuasive efforts with all forest owners within the DWPZ for securing the end of clear-cut applications.	Public relations work in the course of the project.
ACCEPTANCE AMONG STAKEHOLDERS AND EXPERTS			
	<ul style="list-style-type: none"> possibility of implementation 	The stakeholders (most of the forest owners, forest experts, water works) see the implementation of BP MF1 as realistic alternative.	The stakeholders (most of the forest owners, forest experts, water works) see the implementation of BP MF9 as realistic alternative.
	<ul style="list-style-type: none"> proposal of procedure for implementation 	Signing of the PES contract between each forest owner of PA1.2 and the local water works.	Signing of the PES contract between each forest owner of PA1.2 and the local water works.
	<ul style="list-style-type: none"> other (please, specify) 	Persuasive efforts with forest owners who refuse to sign the PES contract.	Focus on the execution of the provincial hunting laws through insisting communication processes (city of Waidhofen/Ybbs, water works, project communication strategy).
Actual management practice (GAP)		Extensive construction of forest roads	Creation of conifer plantations, even within deciduous forest communities (forest



			hydrotopes)
Proposed BMP		Limitation of forest roads (BP MF20)	Tree Species Diversity According to the Natural Forest Community (BP MF7)
Proposed solutions and recommendations	adaptation of existing land use management practices	Instead of forest roads, skyline-cranes should be used for timber-yield within DWPZ.	Fitting tree species according to the forest hydrotone type (FoHyM) should be planted and the natural regeneration process should be successful for all natural tree species of a given forest site.
	Adaptation of existing flood/drought management practices	This measure is also in line with flood mitigation concepts.	This measure is also in line with climate change adaptation strategies and supports the overall forest ecosystem stability. It enhances the protection functionality of the forest ecosystems, also for flood/drought issues.
	Adaptation of policy guidelines	Forest roads should not be enhanced anymore within DWPZ instead they should be limited by law at such locations.	The Austrian Federal Forest Act should support the establishment of forest stands which are in line with the natural forest community.
IMPLEMENTATION		No	No
In case of NO:	<ul style="list-style-type: none"> possibility of implementation 	Its implementation will be facilitated through the application of GWP. PES will only be possible if this BMP is applied. Additionally, the fact that the DWPA of PA1.2 is legally decreed since June 2018 will make it more difficult to construct forest roads.	Its implementation will be facilitated through the application of GWP. PES will only be possible if this BMP is applied.
	<ul style="list-style-type: none"> proposal of procedure for implementation 	Signing of the PES contract between each forest owner of PA1.2 and the local water works.	Signing of the PES contract between each forest owner of PA1.2 and the local water works.
	<ul style="list-style-type: none"> other (please, specify) 	More difficult approval procedures for forest road projects within PA1.2, water works will have the status of a	Persuasive efforts with forest owners.



		party in related processes.	
ACCEPTANCE AMONG STAKEHOLDERS AND EXPERTS			
	<ul style="list-style-type: none"> possibility of implementation 	The stakeholders (most of the forest owners, forest experts, water works) see the implementation of BP MF20 as realistic alternative.	The stakeholders (most of the forest owners, forest experts, water works) see the implementation of BP MF7 as realistic alternative.
	<ul style="list-style-type: none"> proposal of procedure for implementation 	Signing of the PES contract between each forest owner of PA1.2 and the local water works. Execution of the specific law for the DWPZ in PA1.2.	Signing of the PES contract between each forest owner of PA1.2 and the local water works.
	<ul style="list-style-type: none"> other (please, specify) 	Persuasive efforts with forest owners who refuse to sign the PES contract.	Persuasive efforts with forest owners who refuse to sign the PES contract.

Actual management practice (GAP)		Cutting of old, huge and vital tree individuals	Dolomite quarries are causing a decrease in groundwater recharge
Proposed BMP		Foster old, huge and vital tree individuals (BP MF11)	Continuous monitoring of relevant, hydrological data and hydrological modelling
Proposed solutions and recommendations	adaptation of existing land use management practices	To strengthen forest, stand stability through keeping old huge and stable tree individuals on-site would improve the overall water protection functionality of the ecosystem and also the diversity of the gene-pool.	The spaces used for dolomite mining should not be increased, since this probably leads to decreased mean spring discharge in the Kerschbaum spring.
	Adaptation of existing flood/drought management practices	This measure also supports flood mitigation.	This measure also supports flood and drought management
	Adaptation of policy guidelines	Enhanced awareness about old-growth trees and forests would be of importance.	Quarries in DWPZ should not be allowed - regulation on DWPZ has to be changed or newly implemented
IMPLEMENTATION		No	YES
In case of NO:	<ul style="list-style-type: none"> possibility of 	Its implementation will be	---



	implementation	facilitated through the application of GWP. PES will only be possible if this BMP is applied.	
	<ul style="list-style-type: none"> proposal of procedure for implementation 	Signing of the PES contract between each forest owner of PA1.2 and the local water works.	---
	<ul style="list-style-type: none"> other (please, specify) 	Persuasive efforts with forest owners who refuse to sign the PES contract.	---
ACCEPTANCE AMONG STAKEHOLDERS AND EXPERTS			
	<ul style="list-style-type: none"> possibility of implementation 	The stakeholders (most of the forest owners, forest experts, water works) see the implementation of BP MF11 as realistic alternative.	The stakeholder, water works of Waidhofen/Ybbs has already implemented the continuous monitoring of relevant, hydrological data and hydrological modelling.
	<ul style="list-style-type: none"> proposal of procedure for implementation 	Signing of the PES contract between each forest owner of PA1.2 and the local water works. Execution of regional specific conservation laws for the protection of huge tree individuals.	The procedure for the implementation was carried out with TUM staff.
	<ul style="list-style-type: none"> other (please, specify) 	Persuasive efforts with forest owners who refuse to sign the PES contract.	---



3. Conclusions

The implementation of BMP's 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 BMP's for the watershed. As the implementation process in forest management needs time, GWP sets the foundation for a sustainable BMP application.

GWP was formulated in German language and encompasses all relevant BMP's for the DWPZ (drinking water protection zone) in PA1.2 Waidhofen/Ybbs. The overall purpose is the sustainable improvement of drinking water supply security.

GWP passed the municipal council of the city of Waidhofen/Ybbs, hence it will form the basic condition for the application of PES (payments for ecosystem service provision) schemes. Therefore, the implementation of Best Practices will be facilitated in future through this strategic procedure.

The current situation can be seen as relevant success for the PROLINE-CE project activities within Pilot Action 1.2. Due to the fact that the Best Management Practices in the field of forestry will have to be applied in a sustainable way, the strategy to apply PES schemes for the forest owners within the DWPZ of PA1.2 can be rated as adequate solution.

All relevant BMP's were evaluated, analysed and described regarding their implementation level. Given the situation that GWP has passed the municipal council in May 2018 the implementation of the whole set of BMP's can be seen in the starting phase.

The implementation of the BMP "Continuous monitoring of relevant, hydrological data and hydrological modelling was already done through the instrumentation of springs and water courses. The analysis of the data and its interpretation will be a continuous task. Hydrological modelling was also part of the works.

The BMPs for forestry need more time for implementation, as they involve the collaboration of all forest owners.

4. References

- Bittner, D., Sheikhy Narany, T., Kohl, B., Disse, M., Chiogna G. (2018). Modeling the hydrological impacts of land use change in a dolomite-dominated karst system. *Journal of Hydrology*.
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