

PROLINE-CE

WORKPACKAGE T2

PILOTS: IMPLEMENTATION AND FEEDBACK

O.T2.1 PA CLUSTER 'MOUNTAIN FORESTS AND GRASSLANDS' - IMPLEMENTATION, SHOWCASING BEST MANAGEMENT PRACTICES

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1. Introduction

In the frame of work package T2 optimal forest and grassland management measures focusing on the needs of water supply and protection against flooding are implemented in pilot areas in selected mountainous areas. It is foreseen to initiate negotiations with stakeholders and set up respective contracts with private land owners considering Best Practice Guides. Proofing these rules, special funding conditions of Rural Development Program 14-20 are developed.

Review of main land use conflicts and best management practices (BMPs) for drinking water protection and protection against floods on Pilot Action level is presented in *D.T2.1.2 Transnational case review of best management practices in pilot actions*, which was prepared on the basis of Pilot Actions report. Implementation and testing of BMPs in Pilot Action are described in *D.T2.2.2 Partner-specific Pilot Action documentation report*. Evaluation of actual implementation and thematic interpretation of tested management practices as well as their acceptance among stakeholders and experts is described in *D.T2.3.1 Evaluation reports for each pilot action*.

Table 1: Pilot Actions and Pilot Sites respectively, classified into three clusters according to land uses and geographic scope.

PILOT ACTION CLUSTER 1 (PAC1) Mountain forest and grassland sites	PILOT ACTION CLUSTER 2 (PAC2) Plain agriculture/ grassland/ wetland sites	PILOT ACTION CLUSTER 3 (PAC3) Special sites (riparian strips)
PA1.1 Catchment area of the Vienna Water Supply, AT1 Drinking water source: Karst aquifer	PA2.1 Well field Dravlje valley in Ljubljana, SI Drinking water source: Porous aquifer	PA3.1 Po river basin, IT Drinking water source: Bank filtration
PA1.2 Catchment area of Waidhofen/Ybbs, AT2 Drinking water source: Fractured aquifer	PA2.2 Water reservoir Kozłowa Góra, PL Drinking water source: Surface water	PA3.2 Along Danube Bend, HU2 Drinking water source: Bank filtration
	PA2.3 Tisza catchment area, HU1 Drinking water source: Surface water	
	P2.4 Groundwater protection in karst area, HR 2.4.1 - South Dalmatia: Prud, Klokun and Mandina spring 2.4.2- Imotsko polje springs) Drinking water source: Karst aquifer	
	PA2.5 Neufahrn bei Freising, DE Drinking water source: Porous aquifer	



Pilot actions and pilot sites respectively were classified into three clusters (Table 1) concerning the geographic specification and natural site characteristics (aquifer type) and main land use:

Pilot Action Cluster 1: Mountain forest and grassland sites,

Pilot Action Cluster 2: Plain agriculture/ grassland/ wetland sites and

Pilot Action Cluster 3: Special sites (riparian strips).

1.1. Pilot Action Cluster 1: Mountain forest and grassland sites

In mountain forests and grassland sites best management practices for land use and drinking water management differ from those in plain sites. Therefore, this was selected as separate Pilot Action Cluster. In mountainous areas drinking water sources are mainly originated from groundwater (fractured and karst aquifers).

Into the Pilot Action Cluster 1 (PAC1) two Pilot Actions from Austria were assigned:

- PA1.1: Catchment area of the Vienna Water Supply, and
- PA1.2: Catchment area of Waidhofen/Ybbs.

Both catchment areas constitute drinking water protection zones (DWPZ) for water supply of the related cities Vienna and Waidhofen/Ybbs.

2. Best management practices for drinking water protection and mitigating floods

The Best Management Practices (BMPs) for drinking water protection and mitigating floods were defined for both Pilot Actions (PA) within PAC1. In PA1.1 the thematic focus was given through land use type alpine pastures, in PA1.2 through forestry. In both PA modelling was applied as Best Practice, all time focusing on the impact of specific land-use types on hydrology.

PA1.1: DWPZ Zeller Staritzen and Hochschwab, Vienna Water

Within PA1.1 the most important BMPs within the DWPZ in the field of pasture management were identified. Those are (A) Placing of water troughs for cattle more frequently, avoiding concentrations of cattle / Concrete basements for the troughs and their surroundings, (B) Fencing of dolines and sinkholes in order to keep cattle in distance from those karstic features and (C) Grazing management for cattle on alpine pastures. The implementation of those crucial BMP's is essential and will be tracked through the staff of Vienna Water.



Another focus was put on BMP (D) Surface flow modelling. This task required a detailed parameter set up process which required encompassing data gathering and analysis. The outcome, the hydrological model KAMPUS of Zeller Staritzen, will contribute to a further understanding of the karstic alpine water protection zone, especially with regard to surface flow dynamics and precipitation infiltration.

PA1.2: DWPZ Waidhofen/Ybbs

The selected most important BMPs in PA1.2 are (A) Avoidance of the clear-cut technique, (B) Establishment of Forest Ecologically Sustainable Wild Ungulate Densities, (C) Limitation of forest road constructions, (D) Tree Species Diversity According to the Natural Forest Community and (E) Fostering of old, huge and vital tree individuals.

Within the context of hydrological modelling the need for (F) Continuous monitoring of relevant hydrological data and hydrological modelling was identified.

For the strategic implementation of the whole BMP package, the set-up process of the GWP (Guideline for securing the Water Protection functionality of the forest ecosystems within the DWPZ) within the municipal council was essential. It will ensure the sustained implementation of the defined BMPs.

Within both Pilot Actions many of the defined BMPs serve for both drinking water protection and flood mitigation.



2.1. Implementation possibilities of selected best management practices

There are many best management practices for drinking water protection and flood protection, which already are existing but often there are problems with actual implementation of these BMPs. Implementation possibilities were assessed for selected BMPs in the particular Pilot Actions of Pilot Action Cluster 1.

In work package T1 BMPs for drinking water protection and flood mitigation were identified. The main goal of work package T2 is testing of BMPs, which are relevant for Pilot Actions. In the first step relevant BMPs were selected (Figure 1). Various activities were performed for the implementation of BMPs (Step 2) and to find out stakeholder's opinion about selected BMPs (Figure 1).

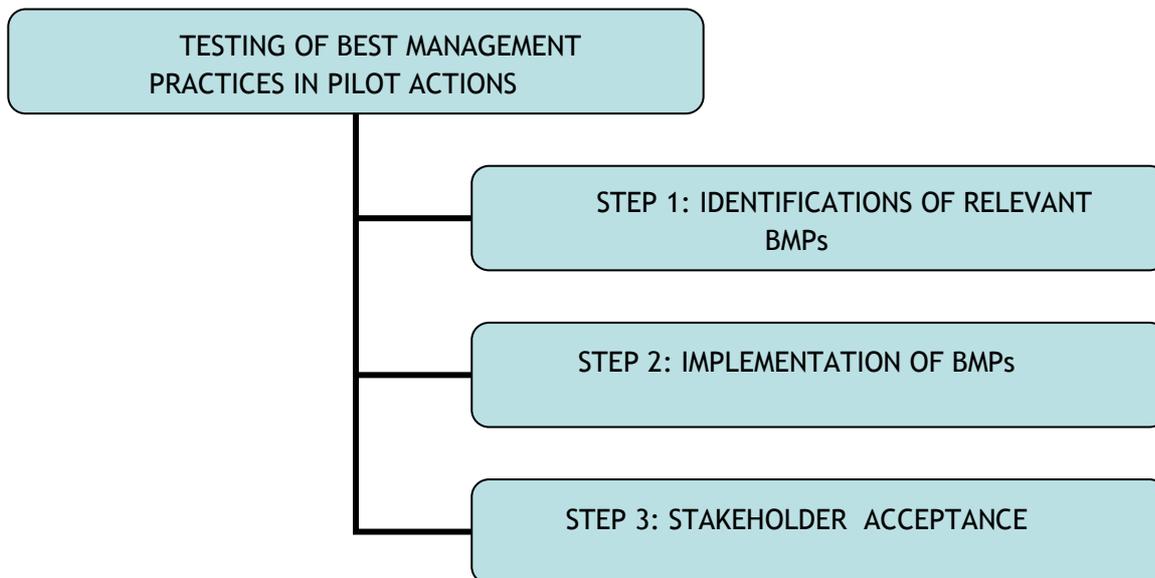


Figure 1: Testing of Best Management Practices (BMPs) in Pilot Actions.

On the Pilot Action level some BMPs were already implemented in the frame of T2 activities. On the other hand, some BMPs are very complex and require system change or even policy change, which are long lasting procedures. Implementation of BMPs may require:

- adaptation of existing land use management practices with the purpose of drinking water protection,
- adaptation of existing flood/drought management practices with relation to drinking water protection,
- adaptation of policy guidelines.



Solutions and recommendations for adaptation of best management practices are presented in Table 2 (Table 2.1 - 2.3).

Furthermore, possibilities of implementation were assessed and implementation strategies (procedures) were determined (Table 3.1 - 3.3).

The implementation of the most important BMPs within PA1.2 will be facilitated through 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. All forest owners who comply with the GWP will receive transfer payments by hectare and year (PES - payments for the provision of ecosystem services).

The fact that GWP was resolved by the city council in May 2018 is due to intensive stakeholder involvement during PROLINE-CE, which encompassed meetings, presentations, discussions and persuasive efforts. In the subsequent tables (Table 3.1 - 3.3) GWP hence is cited several times.

Implementation of best management practices at the local/regional level demands a transdisciplinary and participatory approach with dynamic interaction and feedbacks of stakeholders and experts. Acceptance of best management practices for drinking water protection and flood mitigation among stakeholders and experts is presented in Table 4 (Table 4.1 - 4.3).



Table 2.1: Solutions and recommendations for adaptation of best management practices, forest management, PA 1.2 (STEP 1: Identification of BMPs).

Actual management practice (GAP)	Proposed BMP	Proposed solutions and recommendations			Remaining issues to be solved
		Adaptation of existing land use management practices towards the purpose of drinking water protection	Adaptation of existing flood/drought management practices with regard to drinking water protection	Adaptation of policy guidelines	
Continued application of the clear-cut technique	Avoidance of the clear-cut technique	Application of continuous cover forestry systems and all related BMPs, strategies and measures.	Application of continuous cover forestry systems and all related BMPs, strategies and measures.	Prohibition of clear-cut applications within DWPZ.	The avoidance of the clear-cut technique has to be applied within all DWPZ in Austria, what will be a challenge in many cases.
Unnaturally elevated wild ungulate densities as result of trophy-hunting activities and resulting browsing and bark-stripping damages	Forest Ecologically Sustainable Wild Ungulate Densities	Regulation of the wild ungulate densities to a forest ecologically sustainable level, hence providing vital regeneration dynamics of all tree species.	Regulation of the wild ungulate densities to a forest ecologically sustainable level, hence providing vital regeneration dynamics of all tree species.	Clear compliance to the regional Hunting Acts (provincial legislation) in all Austrian forest areas.	The regional and provincial forest authorities have to be forced to act according to the Provincial Hunting Acts.
Extensive construction of forest roads	Limitation of forest roads	Application of skyline-cranes or other alternative techniques for timber-yield.	Construction of forest roads only exceptionally if necessary for forest stabilisation.	Clear guidelines for forest management within DWPZ	Limitation of forest road constructions within DWPZ will cause resistance of some forest owners.



<p>Creation of conifer plantations, even within deciduous forest communities</p>	<p>Tree Species Diversity According to the Natural Forest Community</p>	<p>Man-made plantations with non-natural tree species should be transformed gradually to stands dominated by native species. In Austria the project-DWPZ are represented through the Forest Hydrotope Map, defining the optimal tree species set for each forest site.</p>	<p>Man-made plantations with non-natural tree species should be transformed gradually to stands dominated by native species. In Austria the project-DWPZ are represented through the Forest Hydrotope Map, defining the optimal tree species set for each forest site.</p>	<p>The guidelines for DWPZ should define the creation of natural and stable forest stands with native tree species as necessary management practice.</p>	<p>For DWPZ outside the PROLINE-CE project space it will be a challenge to establish the optimal native tree species set for each forest site.</p>
<p>Cutting of old, huge and vital tree individuals</p>	<p>Foster old, huge and vital tree individuals</p>	<p>Old, huge and vital trees provide a substantial contribution to forest stand stability. Hence, they have to be selected and protected, so that they can provide their services as long as possible.</p>	<p>Old, huge and vital trees provide a substantial contribution to forest stand stability. Hence, they have to be selected and protected, so that they can provide their services as long as possible.</p>	<p>Forest Policy in Austria should develop more awareness towards the need to protect old growth forests and tree species.</p>	<p>The protection of old growth trees and forests in Austria is in general lacking, it has to be improved.</p>



Table 2.2: Solutions and recommendations for adaptation of best management practices, hydrological modelling, (STEP 1: Identification of BMPs).

Actual management practice (GAP)	Proposed BMP	Proposed solutions and recommendations			Remaining issues to be solved
		Adaptation of existing land use management practices towards the purpose of drinking water protection	Adaptation of existing flood/drought management practices with regard to drinking water protection	Adaptation of policy guidelines	
Dolomite quarries are causing a decrease in groundwater recharge	Continuous monitoring of relevant hydrological data and hydrological modelling	Using hydrological modelling to continuously evaluate the changes of spring discharge due to extending of quarry areas in the pilot area helps to support future decision-making.	Using hydrological modelling to continuously evaluate the changes of spring discharge due to extending of quarry areas in the pilot area helps to support future decision-making.	No policy guidelines have to be adapted for this BMP.	Monitoring has to be continued over time.
Infiltration and surface flow affecting spring quality are not known	Surface flow - spring dynamic Zeller Staritzen	Through applying a rainfall/run-off model based on observed and defined processes as well as measured and mapped parameters the surface run-off and infiltration will be determined.	Through applying a rainfall/run-off model based on observed and defined processes as well as measured and mapped parameters the surface run-off and infiltration will be determined - relevant also for flood/drought protection.	No policy guidelines have to be adapted for this BMP.	Modelling should be extended to other areas of the karstic DWPZ.



Table 2.3: Solutions and recommendations for adaptation of best management practices, alpine pasture management (STEP 1: Identification of BMPs).

Actual management practice (GAP)	Proposed BMP	Proposed solutions and recommendations			Remaining issues to be solved
		Adaptation of existing land use management practices towards the purpose of drinking water protection	Adaptation of existing flood/drought management practices with regard to drinking water protection	Adaptation of policy guidelines	
Erosion processes around water troughs for cattle due to open soils without vegetation cover, as well as washing out faeces	Placing of water troughs for cattle more frequently, avoiding concentrations of cattle / Concrete basements for the troughs and their surroundings	In order to avoid the creation of erosion dynamics and concentrations of faeces, more troughs should be provided and distributed strategically over the whole alpine pasture. Construction of concrete basements for the troughs as erosion prevention.	In order to avoid the creation of erosion dynamics, more troughs should be provided and distributed strategically over the whole alpine pasture. Construction of concrete basements for the troughs as erosion prevention.	No policy guidelines have to be adapted for this BMP.	Water trough spacing, and construction of concrete basements could be difficult on some alpine pastures.
Grazing of cattle in or close to dolines and sinkholes	Fencing of dolines and sinkholes in order to keep cattle in distance from those karstic features	At active pastures the karstic features dolines and sinkholes have to be fenced out in order to minimize the risk of source water contamination with faeces stemming from cattle or other grazing livestock.	No relevance for flood/drought management.	No policy guidelines have to be adapted for this BMP	Fences around dolines and sinkholes have to be maintained continuously for providing sustained functionality.
Unwanted grazing	Grazing	Grazing management	Grazing management	No policy guidelines have to	The challenge of this BMP is the



patterns of cattle	management for cattle on alpine pastures	requires strategic planning, the placing of fences and the punctual change of the grazing cattle from one to the next fenced part of the alpine pasture. It helps to avoid erosion processes.	requires strategic planning, the placing of fences and the punctual change of the grazing cattle from one to the next fenced part of the alpine pasture. It helps to avoid erosion processes.	be adapted for this BMP.	necessity of a strategic planning process which requires detailed knowledge about the pasture quality on the alpine pasture and the consequent implementation through the strategic placing and spacing of fences. To achieve this, training of the alpine staff and persuasive efforts will be necessary.
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Table 3.1: Implementation possibilities of best management practices for drinking water protection and flood mitigation with implementation strategies (procedures), forest management, PA 1.2 (STEP 2: Implementation of BMPs).

Actual management practice (GAP)	Proposed BMP	Implementation of best management practices for drinking water protection and flood mitigation		
		Possibility of implementation	Proposal of procedure for implementation	other
Continued application of the clear-cut technique	Avoidance of the clear-cut technique	Application of the GWP, hence facilitation of BMP implementation.	Setting up of the contract with the forest owners according to GWP, facilitated BMP application.	---
Unnaturally elevated wild ungulate densities as result of trophy-hunting activities and resulting browsing and bark-stripping damages	Forest Ecologically Sustainable Wild Ungulate Densities	Application of the Hunting Law (Provincial Hunting Act of Lower Austria).	Information campaigns in local media (newspapers, radio or TV), persuasive efforts with regard to the implementation of ecological hunting practices.	In severe cases persecution of a trial in the specific court.
Extensive construction of forest roads	Limitation of forest roads	Application of the GWP, hence facilitation of BMP implementation.	Setting up of the contract with the forest owners according to GWP, facilitated BMP application.	---
Creation of conifer plantations, even within deciduous forest communities	Tree Species Diversity According to the Natural Forest Community	Application of the GWP, hence facilitation of BMP implementation.	Setting up of the contract with the forest owners according to GWP, facilitated BMP application.	---



Cutting of old, huge and vital tree individuals	Foster old, huge and vital tree individuals	Application of the GWP, hence facilitation of BMP implementation.	Setting up of the contract with the forest owners according to GWP, facilitated BMP application.	---
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Table 3.2: Implementation possibilities of best management practices for drinking water protection and flood mitigation with implementation strategies (procedures), hydrological modelling, PA 1.1 & PA 1.2 (STEP 2: Implementation of BMPs).

Actual management practice (GAP)	Proposed BMP	Implementation of best management practices for drinking water protection and flood mitigation		
		Possibility of implementation	Proposal of procedure for implementation	other
Dolomite quarries are causing a decrease in groundwater recharge	Continuous monitoring of relevant hydrological data and hydrological modelling	Implementation of Hydrological Modelling and Monitoring through the water works: Decision of the Municipality.	Sustained implementation of Hydrological Monitoring, cooperation with experts.	Analysis of modelling, application of management routines based on Modelling outcomes.
Infiltration and surface flow affecting spring quality are not known	Surface flow - spring dynamic Zeller Staritzen	Report about the modelling outcomes of the hydrological model KAMPUS.	Presentation of the hydrological model KAMPUS applied within the pilot action “Zeller Staritzen” and its relevance for drinking water supply.	Analysis of modelling, application of management routines based on Modelling outcomes.



Table 3.3: Implementation possibilities of best management practices for drinking water protection and flood mitigation with implementation strategies (procedures), alpine pasture management, PA 1.1 (STEP 2: Implementation of BMPs).

Actual management practice (GAP)	Proposed BMP	Implementation of best management practices for drinking water protection and flood mitigation		
		Possibility of implementation	Proposal of procedure for implementation	other
Erosion processes around water troughs for cattle due to open soils without vegetation cover, as well as washing out faeces	Placing of water troughs for cattle more frequently, avoiding concentrations of cattle / Concrete basements for the troughs and their surroundings	Persuasive efforts with regard to the alpine pasture staff. Contracts with the alpine pasture staff.	After information campaigns for the own staff and the alpine pasture staff, the set-up of specific contracts can be carried out.	---
Grazing of cattle in or close to dolines and sinkholes	Fencing of dolines and sinkholes in order to keep cattle in distance from those karstic features	Persuasive efforts with regard to the alpine pasture staff. Contracts with the alpine pasture staff.	After information campaigns for the own staff and the alpine pasture staff, the set-up of specific contracts can be carried out.	---
Unwanted grazing patterns of cattle	Grazing management for cattle on alpine pastures	Persuasive efforts with regard to the alpine pasture staff. Contracts with the alpine pasture staff.	After information campaigns for the own staff and the alpine pasture staff, the set-up of specific contracts can be carried out.	---



Table 4.1: Acceptance of best management practices for drinking water protection and flood mitigation among stakeholders and experts, forest management, PA1.2 (STEP 3: Stakeholder acceptance).

Actual management practice (GAP)	Proposed BMP	Acceptance of BMPs among stakeholders and experts		
		Possibility of implementation	Proposal of procedure for implementation	other
Continued application of the clear-cut technique	Avoidance of the clear-cut technique	The acceptance of this BMP among stakeholders and experts is already given, what is due to information campaigns and persuasive efforts during the project pilot activities.	Application and execution of the GWP.	If forest owners do not comply with GWP, persuasive efforts have to be carried out in order to convince them from contracting.
Unnaturally elevated wild ungulate densities as result of trophy-hunting activities and resulting browsing and bark-stripping damages	Forest Ecologically Sustainable Wild Ungulate Densities	The acceptance of this BMP is still rather low among most of the stakeholders. The provincial Hunting Act will have to be stressed in some cases.	Some forest owners like the Austrian Federal Forests could act as example for all other stakeholders, as they have already the implementation of this BMP on their agenda.	Utilisation of interdependencies between forest owners, like the example of single forest enterprises. Stressing of the Hunting Act. Information campaigns for the general public in order to create a sphere of awareness for this relevant issue. Forcing of the regional and local forest authorities through public awareness to conform with law.
Extensive construction of	Limitation of forest roads	The acceptance of this BMP is still rather low	Application and execution of the GWP. The specific situation for this	Further information of forest owners, that the application of



forest roads		among most of the stakeholders and experts.	BMP will have to be stressed specifically during the contracting process.	technical alternatives will result in higher PES.
Creation of conifer plantations, even within deciduous forest communities	Tree Species Diversity According to the Natural Forest Community	Forest owners have a higher understanding regarding this BMP, facilitated through the latest weather conditions.	Application and execution of the GWP. The fitting tree species were spatially explicitly defined through the Forest Hydrotope Model.	The implementation of tree species diversity based on native tree species still will need persuasive efforts, as Austrian foresters cling to the primacy of Norway spruce and recently also of Douglas fir.
Cutting of old, huge and vital tree individuals	Foster old, huge and vital tree individuals	Some stakeholders (forest owners) actually tend to cut all huge trees of forest stands. The understanding regarding this BMP will still need the application of persuasive efforts.	Application and execution of the GWP.	Persuasive efforts with regard to all forest owners and stakeholders who still did not sign the GWP contract.



Table 4.2: Acceptance of best management practices for drinking water protection and flood mitigation among stakeholders and experts, hydrological modelling, PA 1.1 & PA 1.2 (STEP 3: Stakeholder acceptance).

Actual management practice (GAP)	Proposed BMP	Acceptance of BMPs among stakeholders and experts		
		Possibility of implementation	Proposal of procedure for implementation	other
Dolomite quarries are causing a decrease in groundwater recharge	Continuous monitoring of relevant hydrological data and hydrological modelling	The main stakeholder, the water works of Waidhofen/Ybbs, are convinced from the necessity of this BMP and hence ensure its application.	The main tasks were already fulfilled during project life-time. The monitoring task will have to be sustained in future.	---
Infiltration and surface flow affecting spring quality are not known	Surface flow - spring dynamic Zeller Staritzen	The main stakeholder, Vienna Water, is convinced from the necessity of this BMP and hence ensures its application in the course of the project.	The surface flow - spring dynamic modelling will be finalized during the project duration period.	---



Table 4.3: Acceptance of best management practices for drinking water protection and flood mitigation among stakeholders and experts, alpine pasture management, PA 1.1 (STEP 3: Stakeholder acceptance).

Actual management practice (GAP)	Proposed BMP	Acceptance of BMPs among stakeholders and experts		
		Possibility of implementation	Proposal of procedure for implementation	other
Erosion processes around water troughs for cattle due to open soils without vegetation cover, as well as washing out faeces	Placing of water troughs for cattle more frequently, avoiding concentrations of cattle / Concrete basements for the troughs and their surroundings	This BMP is accepted among stakeholders and experts. An adequate water supply for livestock together with fixed trough sites is seen as relevant from all stakeholders.	The implementation of this BMP could be hindered through lacking water resources in karstic terrain or lacking monetary resources for construction works. The latter obstacle could be overcome through contracts with alpine pasture staff.	---
Grazing of cattle in or close to dolines and sinkholes	Fencing of dolines and sinkholes in order to keep cattle in distance from those karstic features	Fences around dolines and sinkholes are potentially accepted through stakeholders, if those are informed accordingly. Hence persuasive efforts will have to be stressed.	Accurate maps with doline and sinkholes on the pasture areas improve the decision process where fencing is necessary. Knowledge transfer and discussion process with the stakeholders (alpine pasture staff).	---
Unwanted grazing patterns of cattle	Grazing management for cattle on alpine pastures	Grazing management is the BMP which actually will face the lowest degree of acceptance among stakeholders, as	Persuasive efforts in the course of information meetings with alpine pasture staff. The alpine pasture staff has to be convinced that both overgrazing and under-grazing is bad	---



		<p>they will show resistance against changing their management habits. This BMP requires a high level of expertise and willingness to change.</p>	<p>for the economic output of the alpine pasture and that grazing management is the adequate solution for this situation. Also, the positive side-effects on water protection and flood prevention should become aware.</p>	
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3. Conclusions

Within the Pilot Action Cluster 1 (PAC 1) focused on forest management (Pilot Action - PA1.2) and alpine pasture management (Pilot Action - PA1.1) in mountainous areas it was possible to showcase the implementation of several Best Management Practices (BMPs). The drinking water protection zone (DWPZ) of the city of Vienna, which forms PA1.1 is the most important in Austria, as the drinking water supply of the capital Vienna for 1.8 million people is driven from it. The DWPZ of the city of Waidhofen/Ybbs which forms PA1.2 is the source for drinking water for 40,000 people and for a huge dairy factory. Both cities have already a long-lasting tradition in the field of engagement for drinking water protection and contribute their expertise in the course of several Interreg projects.

It has to be highlighted that the process of BMP implementation is ongoing and that in most of the cases efforts will have to be continuous and have to last far beyond project lifetime. In Work package 2 it was possible in both Pilot Actions (PA) to start BMP implementation and to elaborate and define strategies how to engage in this specific field of action. The overall purpose of drinking water protection and flood mitigation was focus of both pilot activities.

The results achieved in PAC1 showcase that the implementation of BMPs within mountainous water protection zones is crucial for providing drinking water supply security.

PA1.1 - DWPZ Vienna Water - Zeller Staritzen and Hochschwab

All issues related to alpine pastures are of great importance for the overall drinking water protection policy and actuation within the drinking water protection zone (DWPZ) of Vienna Water. Hence information about basic interdependencies within the context of alpine pastures is relevant for the key stakeholder, the staff of Vienna Water. Only if information of the staff is given on a high level, guidelines for the alpine pastures can be set up and the compliance to them can be claimed.

In the course of stakeholder information days both staff from Vienna Water and from the alpine pasture farmers were informed about essential dynamics and interdependencies of alpine pastures. The presentation was given through scientific experts.

The most important Best Practices (BMPs) within the DWPZ were identified. Those are dedicated to the avoidance of potential erosion processes, to the avoidance of potential source water contaminations and to a more efficient use of the resource alpine pasture. The implementation of the related most crucial BMPs is essential and will be tracked through the staff of Vienna Water.

Some of the BMPs are already implemented on the area of some alpine pastures within the DWPZ. The sustainable and continuous implementation of the BMPs for alpine pastures (mountain grasslands) within the whole DWPZ will have to be tracked in presence and future through Vienna Water staff. For this essential task in the field of source water protection the stakeholder training was important. Further focus on BMP implementation in the field of alpine



pastures will be necessary. The staff of the alpine pastures requires more training regarding new and challenging BMPs which demand a change of habitual management practices.

Further focus within the Pilot Action 1.1 was put on surface flow modelling. This resulted in spatial and temporal patterns of surface runoff occurrence and frequency in the catchment at different events. The hydrological model applied in PROLINE-CE is the hydrological precipitation-discharge model KAMPUS which was run on Zeller Staritzen. This model will contribute to a further understanding of the karstic alpine water protection zone, especially the impact of surface runoff dynamics and precipitation infiltration on the spring water quality.

PA1.2 - DWPZ Waidhofen/Ybbs

Securing the water protection functionality of the forest ecosystems within the DWPZ of PA1.2 can be described as the main interest of the municipality of Waidhofen/Ybbs. Drinking water supply security is directly dependent on stable and functional forest ecosystems.

Within PA1.2 the main activities were related to persuasive efforts for the main stakeholders, which are the local councillors of the municipal council. They were informed about the requirements of integral drinking source water protection within the forested watershed. The whole set of BMPs was presented and discussed. The most important BMPs were condensed into the “Guideline for securing the Water Protection functionality of the forest ecosystems within the DWPZ” of Waidhofen/Ybbs (GWP). The GWP is written in German and was based on the BMP catalogue of PROLINE-CE. The **resolution** of GWP through the municipal council can be regarded as **milestone** towards the implementation of integral drinking source water protection and was accomplished in May 2018. This was the main test for the whole catalogue of BMPs assigned for PA1.2.

The selected most important BMPs in PA1.2 focus on the stabilisation of the forest ecosystems within the DWPZ and on the sustainable provision of their drinking water protection functionality. Both water quality and water quantity aspects were integrated into the BMP set.

Also, in PA1.2 the need for hydrological monitoring and modelling was identified. The negative impact of dolomite quarries on groundwater recharge was shown through model applications. Hydrological monitoring will have to be a sustained action.

For the strategic implementation of the whole BMP package, the set-up process of the GWP within the municipal council was essential.

Overall Pilot Action Cluster 1

Within Pilot Action Cluster 1 implementation and showcasing Best Management Practices (BMPs) was carried out in both Pilot Actions in a very strategic manner. The purpose was an initial impetus to start the implementation process. In both cases intensive stakeholder integration was the basic condition for the success of the activities. Insights were driven from stakeholder interactions and integration of basic scientific studies.



The sustainability of BMP implementation within PAC1 will depend on the continuation of efforts put on this thematic field. This will have to last far beyond project life-time. Further activities will have to be carried out in order to develop the already started process of BMP implementation.

Both local/regional/national authorities and staff of alpine pasture and forest enterprises need further training and stakeholder involvement activities in order to overcome habitual management practices which are in contradiction to the requirements of a consequent BMP implementation. This crucial task has to be accomplished in order to establish a sustainable protection of drinking water resources in mountainous regions and will require additional efforts in this thematic field. Hence further stakeholder trainings can be seen as necessary task to be fulfilled in future. Also, improvements in the field of policy could contribute to a better drinking water supply security. An improved interaction between authorities and land-users with the purpose of improved drinking water protection strategies should be intended.



4. References

PROLINE-CE WORKPACKAGE T2, ACTIVITY T2.1 REPORTS:

- D.T2.1.2 Best management practices report. PILOT ACTION: PA 1.1 Catchment area of Vienna Water
- D.T2.1.2 Best management practices report. PILOT ACTION: PA 1.2 Catchment area of Waidhofen/Ybbs
- D.T2.1.4 Descriptive documentation of pilot actions and related issues. PILOT ACTION: PA1.1 Catchment area of Vienna Water
- D.T2.1.4 Descriptive documentation of pilot actions and related issues. PILOT ACTION: PA1.2 Catchment area of Waidhofen/Ybbs

PROLINE-CE WORKPACKAGE T2, ACTIVITY T2.2 REPORTS:

- D.T2.2.2 Partner-specific pilot action documentations. PILOT ACTION: PA1.1 Catchment area of Vienna Water
- D.T2.2.2 Partner-specific pilot action documentations. PILOT ACTION: PA1.2 Catchment area of Waidhofen/Ybbs
- D.T2.2.3 Pilot action cluster report: PILOT ACTION CLUSTER 1 - Mountain Forest and Grassland Sites

PROLINE-CE WORKPACKAGE T2, ACTIVITY T2.3 REPORTS:

- D.T2.3.1 Evaluation reports for each pilot action. PILOT ACTION: PA1.1 Catchment area of Vienna Water
- D.T2.3.1 Evaluation reports for each pilot action. PILOT ACTION: PA1.2 Catchment area of Waidhofen/Ybbs
- D.T2.3.3 PA reports about climate change issues in pilots. Transnational report
- D.T2.3.4 Strategic identification of needs for action for clusters. PILOT ACTION CLUSTER 1 - Mountain Forest and Grassland Sites