PILOT ACTION 6 - VIENNA WATER DRINKING WATER SOURCES

OUTPUT O.T3.8

WORK PACKAGE T3 - IMPLEMENTATION AND FEEDBACK – TOOLBOX VERIFICATION

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Version	V-01
Date last release	09.12.2021

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1. Introduction

Testing of the Toolbox beta version by project partners (PPs) in pilot actions (PAs) will provide:

- documented learning experience, where PPs from different countries and disciplines will verify the Toolbox applicability and
- an important communication tool where project results will enable important outreach and key post-project capitalization leverage supporting bottom-up participatory principles in water management planning processes, generally drafted by the Common Implementation Strategy for the Water Framework Directive (WFD CIS No.11).

The Toolbox will also be tested by stakeholders during training workshops and in the post-training implementation phase, when strategies will be discussed. These stakeholder interactions will enable clarification of needs and provide recommendations for Toolbox improvements (bottom-up approach) and for direct local and regional implementation of the Toolbox.

The Output OT.3.6 puts a specific focus on the land-use types alpine pastures and tourism and will also provide insights about forestry – all of them within the context of water-resources protection. The stakeholder engagement will cover all issues about toolbox-testing with specific regard to water-resources protection in PA6.

2. Basic data about Pilot Action 6

The catchment area of the Vienna Water Supply, the Vienna Water Drinking Water Sources (Pilot Action 6 = PA6) is characterized by steep karstic mountain ranges with forest ecosystems, alpine pastures and rock areas. Focus of the broad study is the “Zeller Staritzen and Central Hochschwab area” with “Zeller Staritzen” as main part (Fig. 1). The PA6 is situated in the North-Eastern Limestone Alps of Austria, in the Austrian province Styria.

As most important economic factors of the region forestry, drinking water supply, agriculture with alpine pastures and tourism have to be mentioned. The karstic alpine terrain of PA6 is situated in a remote region - tourism is hence an important aspect of this area, where people are moving for practicing mountaineering, paddle-sports in the natural river Salza and skiing in winter seasons. The human settlement areas are rare and consist of small villages around PA6. On the top of the karstic plateau mountain ranges, alpine pastures with huts and mountain huts are situated, creating a well-desired and scenic area for mountaineering. The aspects of tourism, alpine pastures and forestry create the most important impact factors for drinking water supply, which were, are and will be thematized in the course of the stakeholder engagement of the TEACHER-CE project.

The Hochschwab Mountain Range, which includes Zeller Staritzen, was declared and decreed as water protection zone in the 1970-ies. The related aspects of all mentioned land-use types with regard to drinking water supply will be thematized.

All PA-specific information is provided in the subsequent chapters.

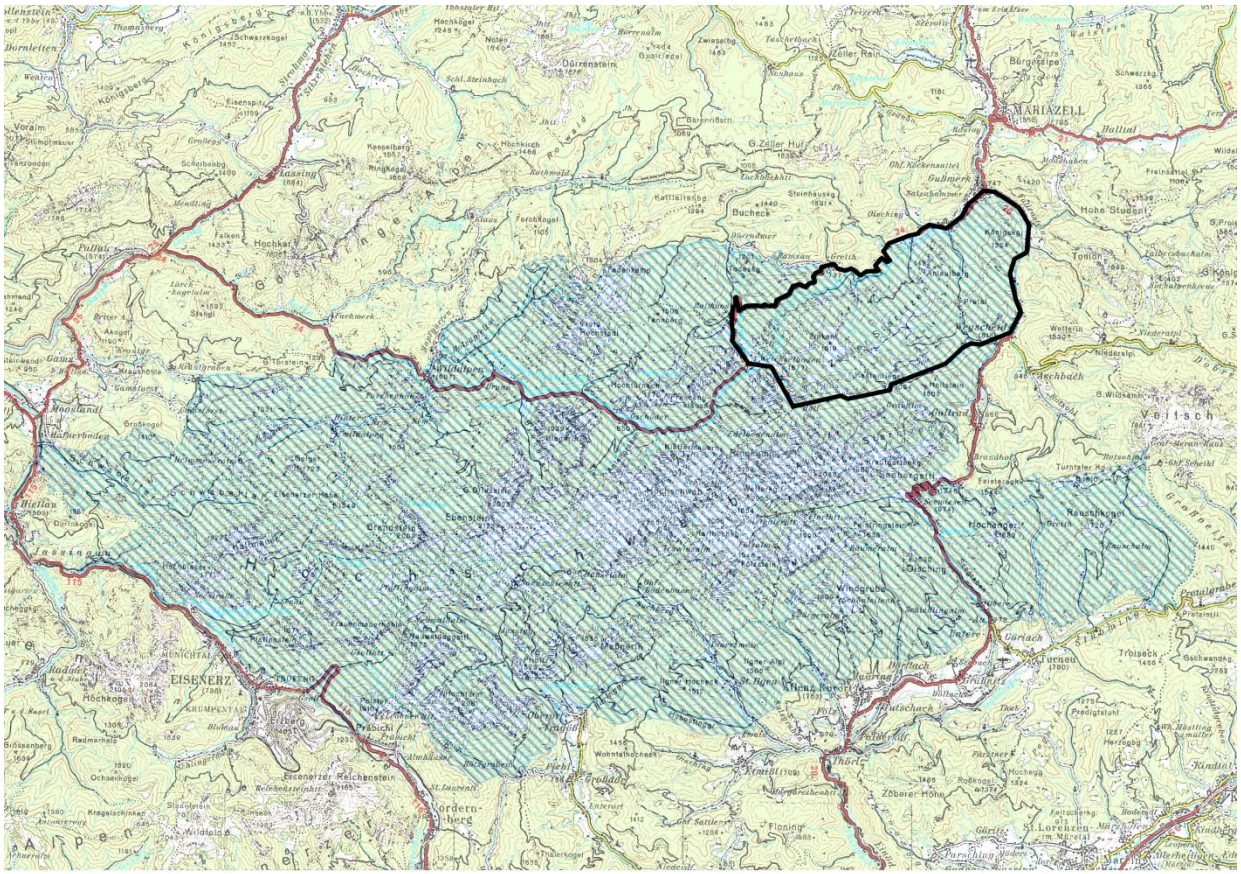

Figure 1: Water Protection Zone of Central Hochschwab area (shaded) with PA6 - Zeller Staritzen (surrounded black), (Source: Project PROLINE-CE, C. Reszler & G. Kuschnig).

2.1. Geographical description

The Zeller Staritzen is situated in the Styrian Salza valley, which is part of the forest growth district 4.2 (Eastern part of the Northern Alps of Austria). Also the Central Mount Hochschwab is ranging from the Salza valley to the respective summit areas. The Zeller Staritzen area is marked with a black line (Fig. 1).

Zeller Staritzen is ranging from 677 m ASL (close to Weichselboden in the Salza valley) up to the summit "Zinken" (1619 m ASL). The main part of Zeller Staritzen is forested, the second most important area is covered with alpine pastures. There occur also rock areas in the steep karstic alpine terrain. The Styrian villages Wegscheid, Gusswerk and Weichselboden are situated already outside the PA but mark the surroundings of PA6. The total area of PA6 is 41.6 km^2.

The karstic alpine terrain includes various types of the bedrocks Limestone, Dolomite and Werfener Sandstone.

Three karstic alpine springs are located within PA6 (Fig. 2), all of them contribute as raw water sources to the drinking water supply of the City of Vienna.

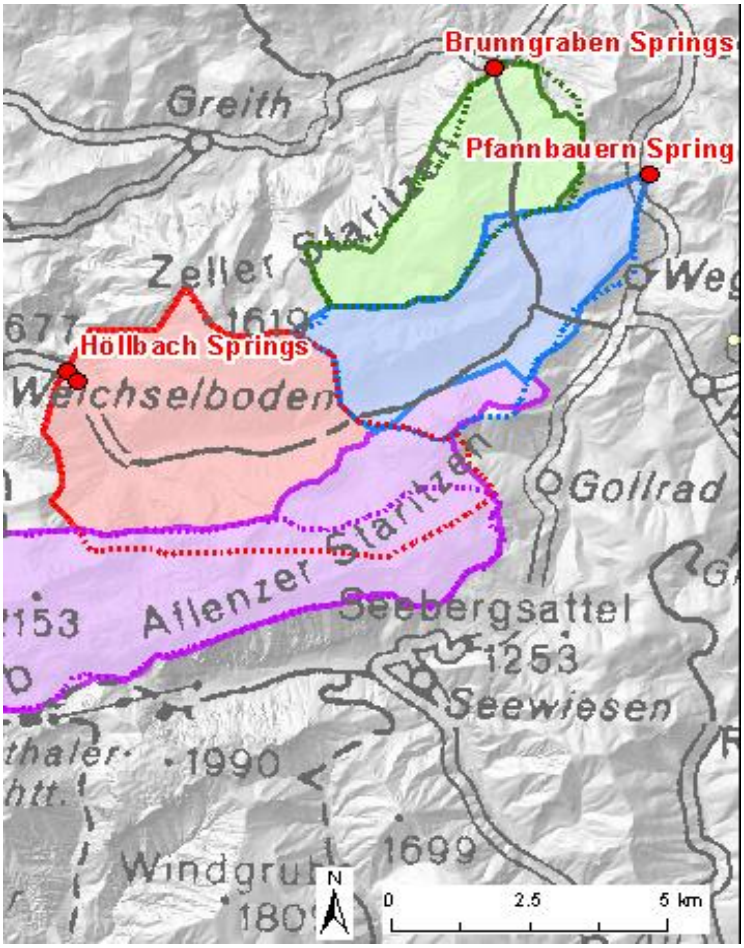

Figure 2: The karstic alpine springs and related meteorological measuring stations in PA6 (Source: C. Reszler & G. Kuschnig, PROLINE-CE).

2.2. Climate characteristics

The alpine climate in PA6 is characterized by rather high mean annual precipitation values ranging from 1299 mm (Buchberg) up to 2157 mm (Sonnschienalm). The most relevant values for PA6 in the valley area can be derived from the Weichselboden station with 1595 mm (Tab. 2), which is situated very close, at the edge of Zeller Staritzen. The mean annual temperature was in the rather cold year 2010 4.64 °C, 4.92 °C and 4.69 °C and in the rather warm year 2014 6.78 °C, 7.02 °C and 6.82 °C (Tab. 1, karstic springs HOELL, PFANN and BRUNN respectively, all in PA 6). The climatic conditions characterize an alpine region which is well suited for providing water resources for the City of Vienna, as annual precipitation and mean annual temperature point out the presence of valuable water storage within the karstic alpine groundwater bodies.

Table 1: Yearly mean temperature at the 3 karstic spring locations of PA6. (Source: C. Reszler & G. Kuschnig, PROLINE-CE).

Year	HOELL	PFANN	BRUNN
2010	4,64	4,92	4,69
2011	6,20	6,35	6,22
2012	5,63	5,86	5,67
2013	5,30	5,54	5,34
2014	6,78	7,04	6,82
2015	6,61	6,80	6,64

Table 2: Mean annual precipitation (mm) from 2009 to 2016 and station altitude at the stations in the wider region of Zeller Staritzen/Hochschwab (Operator MA31: stations of the Vienna Water Works; HD Stmk: stations of the Hydrographic Service Styria). All stations are situated close to PA6, Weichselboden directly beside it. (Source: C. Reszler & G. Kuschnig, PROLINE-CE).

Station	Operator	Altitude (m a.s.l.)	Mean annual precip. 2009 - 2016
Brunnsattel	HD Stmk	872	1590
Seeau	HD Stmk	650	1640
Hinterwildalpen	MA31	800	1641
Wildalpen	HD Stmk	610	1599
Winterhoehe	MA31	670	1491
Kreuzpfaeder-Siebensee	MA31	1270	1919
Sonnschienalm	MA31	1520	2157
Trawies	HD Stmk	1000	1587
Buchberg	HD Stmk	1299	1299
Edelboden	MA31	880	1828
Weichselboden	HD Stmk	680	1595
Seewiesen	HD Stmk	980	1506
Gollrad/Wegscheid	HD Stmk	850	1471
Brunngraben	HD Stmk	710	1405

2.3. Hydrology

2.3.1. Surface waters

The most important surface water around PA6 is the river Salza, which marks the Northern boundary of the Pilot Action. Actually, it is together with the Gollrad-Brook, which is flowing from Wegscheid to Gußwerk and enters there river Salza, the only water area in PA6, as due to the karstic region water can above all be found as rivers or brooks in the valley areas. There does not exist any lake in PA6. For this respective sector of river Salza there does not exist any data about river-discharge. Due to the karstic alpine character of river Salza the highest flow rates can be expected in the spring season in April and May, when the snow is melting in the alpine summit areas and provides high groundwater recharge.

2.3.2. Flooding

Flooding occurs frequently in PA6 but does not bother any human settlement areas, as the whole area of the Pilot Action is situated in a rural zone. The water intake zones (the karstic spring buildings) are not endangered by floods, hence there do not exist any flood maps for PA6.

2.3.3. Heavy rain

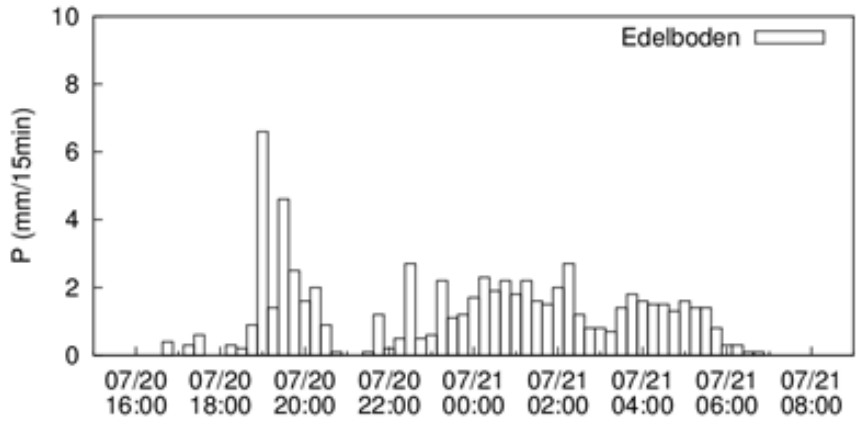

Figure 2: Graph of the heavy rain event in July 2012 in the region of PA6, Edelboden-Alm (MA 31, PROLINE-CE, C. Reszler & G. Kuschnig).

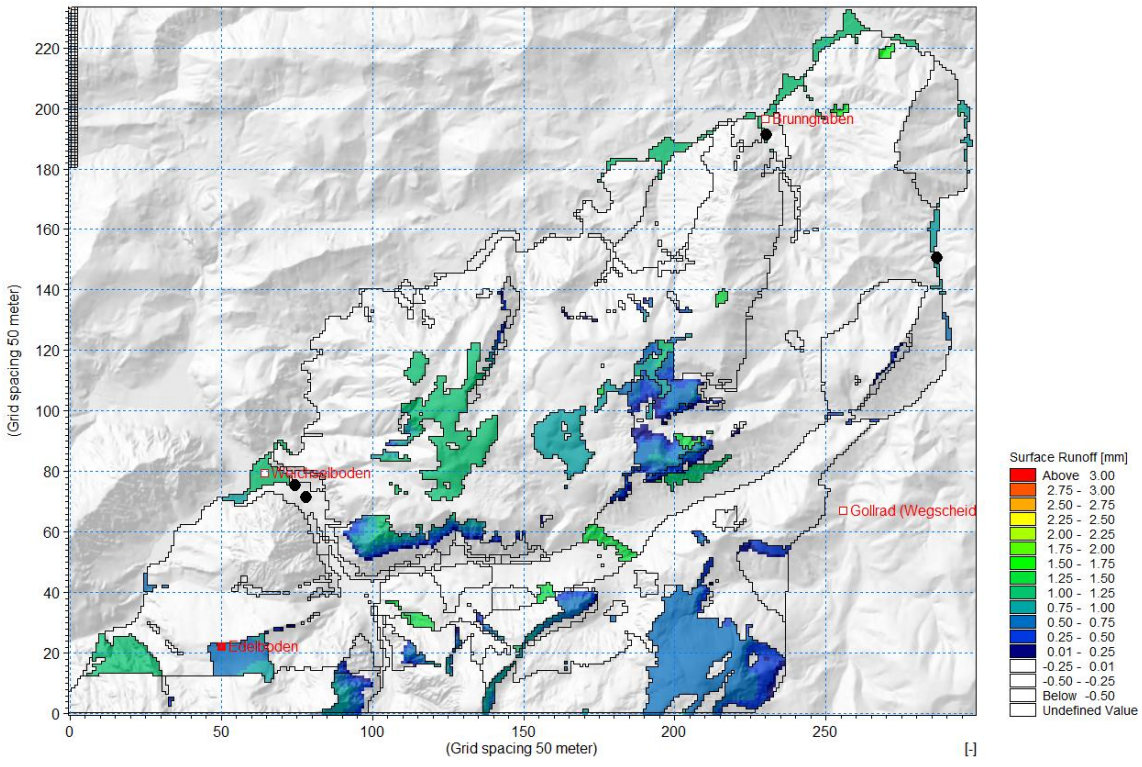

Figure 3: Graphical description of surface-runoff occurring due to the heavy rain event of July 2012 within PA6 Zeller Staritzen. The fact that there were no red areas is due to the karstic alpine terrain of PA6 (source: PROLINE-CE, C. Reszler & G. Kuschnig).

Heavy rain events are characteristic for PA6 and occur each year. Some of them are outstanding and show very high intensities of rainfall during short time periods. Here the heavy rainfall event from July 2012 is displayed, showing both rainfall intensity during time (Fig. 2) and surface runoff patterns provoked by this event within the area of PA 6 (Fig. 3).

The relevant impact of heavy rain events within PA6 is the creation of turbidity within the karstic spring waters, caused by erosion of soil- and karst-body materials. These erosion processes are intended to be mitigated or prevented by Vienna Water, which can be reached through application of specific Best Practices. Those were elaborated through PP6 in the course of the partner project CAMARO-D.

2.4. Hydrologeology

The Pilot Action 6 is part of the water protection zone of the City of Vienna. The karstic alpine springs Pfannbauer-Spring (PFANN), the Höllbach-Springs (HOELL) and the Brunngraben-Springs (BRUNN) of Vienna Water Supply are situated in PA6. All those springs form together with other karstic springs the source for the drinking water supply of the City of Vienna. At all springs just a predefined amount of water can be discharged into the Viennese Spring Water Mains which are transporting the raw spring water to Vienna. In PA6, the two Viennese Spring Water Mains are at their starting points both emerging from the Zeller Staritzen area. Spring discharges statistics will not be provided.

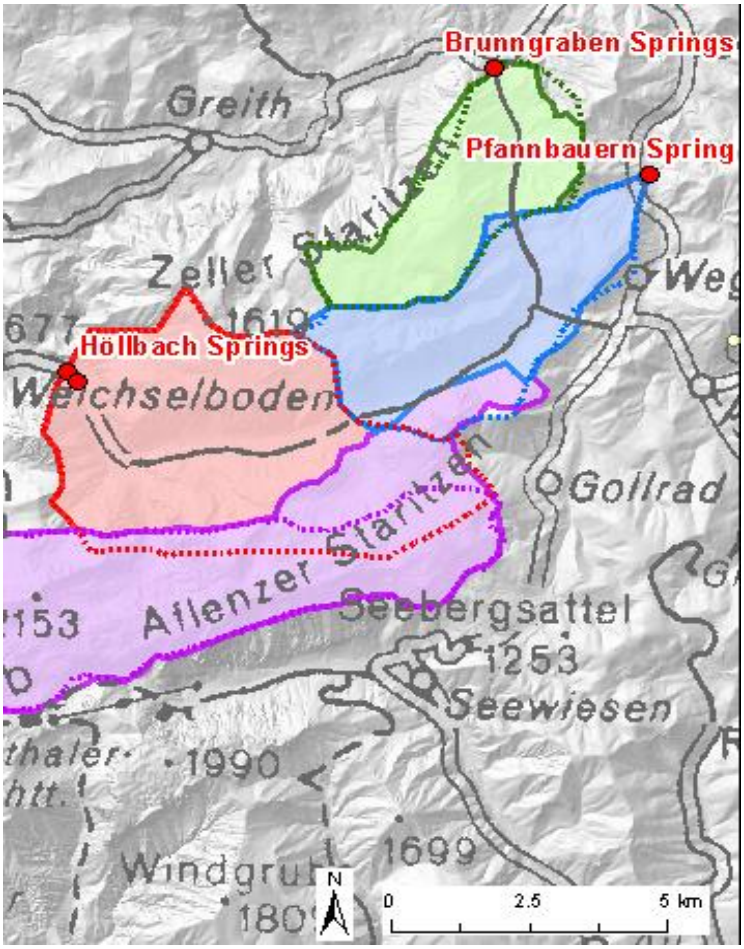

Figure 4: The karstic alpine springs in PA6 (Source: C. Reszler & G. Kuschnig, PROLINE-CE).

The aquifers are in all three spring-cases karstic fissured groundwater aquifers.

2.5. Land use

The PA 6 region is characterised through the dominance of forest cover. About 5 % of the area (41.6 km^2) is covered by alpine pastures, 2 % by rock- or gravel areas and 93 % by forests. Within PA 6 the following forest hydrotope types are present:

+ Montane Spruce-Fir-Beech forest hydrotopes on carbonate substrates
+ High Montane Spruce-Fir-Beech forest hydrotopes on carbonate substrates
+ Montane Maple-Ash forest hydrotopes on carbonate substrates
+ Montane Spruce-Fir-Beech forest hydrotopes on siliceous substrates
+ Subalpine Spruce forest hydrotopes on carbonate substrates
+ Subalpine Dwarf-Pine forest hydrotopes on carbonate substrates

The forest hydrotope map shows the spatial explicit distribution of each hydrotope type (Fig. 5). It has to be mentioned that a huge percentage of the forest area within PA 6 shows natural tree species distribution, what is due to the remote location of the majority of the forest stands. Some forest areas are of course characterised by homogeneous spruce-plantations. Best Practices were specifically defined for each forest hydrotope, including tree species sets for current climates and climate change scenarios (Source: CC-WaterS Project, Koeck and Hochbichler, 2012).

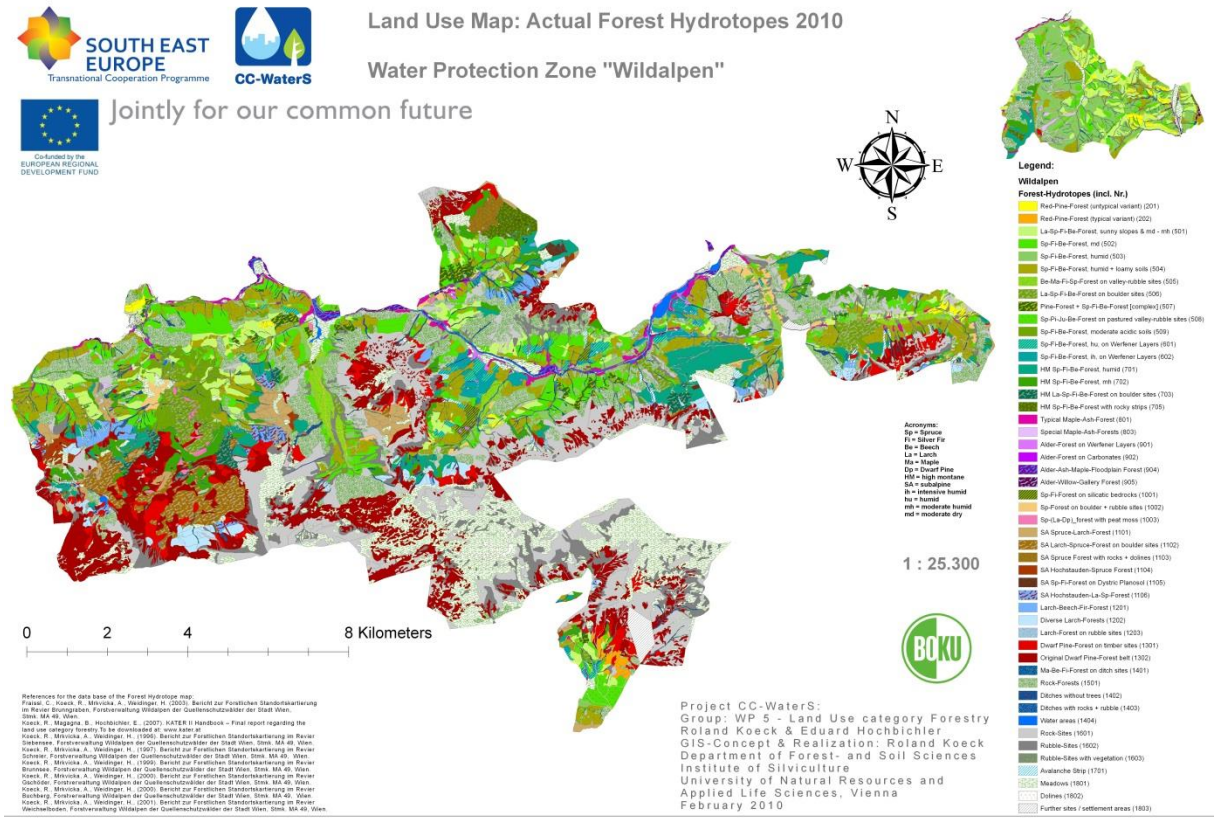

Figure 5: Forest Hydrotope Map of the region Wildalpen, PA 6 is situated in the North-Eastern section of the map. (Source: Interreg SEE Project CC-WaterS, Koeck & Hochbichler 2010).

2.5.1. Forestry

The related data are described in chapter 2.5 land-use.

2.6. Protected areas

The Salza valley in Styria is characterized by the “Nature Park Salza-Valley”, which creates a rather weak level of nature conservation. Actually all normal forestry and agricultural practices are allowed. Further levels of nature conservation are currently issue of political discussion in this region of Styria.

2.7. Drinking water sources and protection

PA6 as part of the water protection zone of the City of Vienna has also some very important springs, which contribute to the water supply of the Austrian capital. There have to be mentioned:

Pfannbauer-Spring:	Piped in the First Vienna Water Main
Höllbach-Springs:	Piped in the Second Vienna Water Main
Brunngraben Springs:	Piped in the Second Vienna Water Main

All three karstic springs (Fig. 4) supply the City of Vienna with karstic spring water. The whole area of PA6 forms part of the Water Protection Zone Hochschwab for the City of Vienna and the City of Graz. The legal frame of this water protection zones defines some restrictions within the normal frame of land-use practices for forestry and agriculture. But those decreed restrictions do not go far enough for drinking water protection strategies. Hence the City of Vienna elaborated an own Best Practice Catalogue for forestry and agriculture (alpine pastures) and cooperated within this context during all related Interreg projects.

3. PA issues concerning TEACHER-CE topics

3.1. Heavy rain

Heavy rain events are of course an issue for drinking water supply, as turbidity caused by related erosion processes forms a major issue in karstic water bodies. Best Practices dealing with this threat were elaborated and defined for the Vienna Water drinking water sources area. This was done in the course of the CAMARO-D project. This issue will be detailed in the course of the TEACHER-CE project.

3.2. Floods

Floods are no relevant issue in PA 6, as all water intake facilities are situated protected from any flood event.

3.3. Drought

Drought could impose a threat for water supply, if the period would last too long. This has not been the case until now. This issue will be detailed in the course of the TEACHER-CE project.

3.4. Forest management

Forest Management is a major issue in PA 6 and is tackled through an internal Best Practice Catalogue of the City of Vienna (Vienna Water & Forest Administration of the City). This issue will be detailed in the course of the TEACHER-CE project.

3.5. Drinking water sources protection

Drinking water protection is a major issue in PA 6 and is tackled through Vienna Water through the synopsis of scientific research in the water protection zones, covering geology, hydro-geology, hydrology, karst-formation research, plant sociology and forest research. All those basic research activities formed the fundamentals for the definition of Best Practices Catalogues for (A) Water Management, (B) Forest Management, (C) Alpine Pasture management, (D) Karst Formation integration, (E) Tourism Management and (F) General Agricultural Management. These issues will be detailed in the course of the TEACHER-CE project.

3.6. PA6 Vienna Water drinking water sources

Related problems are alpine pasture practices and touristic activities which could create adverse effects on the karstic drinking water resources. Moreover forest ecosystem stability has to be secured, also with respect to climate change. Best Management Practices (BMP) implementation represents a challenge. A huge catalogue of Best Practices exists already and is also implemented in the presence.

4. Testing of the TEACHER-CE toolbox CC-ARP-CE

The two Austrian project partners PP6 (BOKU) and PP7 (BFW) conducted an online workshop on 19.10.2021 with a broad range of participants. Although only 9 people participated at the end, it has to be mentioned, that all of them were coming from different institutions on different levels and different field of actions, so that a wide spectrum of stakeholders was covered. The discussion after the presentations was very fruitful and efficient.

Generally, the Toolbox was seen as an interesting instrument for the presence and the future, especially due to integrated climate scenarios and indicators, showing a huge amount of recommended measures in various land uses based on well-founded previous studies and projects. Thus, this Toolbox could play an important role for decision-making processes in the future to enhance transparency and acceptance within involved stakeholders. This means, that it should be spread also to other stakeholder groups and the access should be made very user-friendly and easy, so that it can be really used and improved through additional inserted issues or comments.

Water scarcity and drought risk management were seen as the most challenging issue for the future, followed by other fields of action (drinking water supply, fluvial and pluvial flood risk, increase of irrigation) correlated with climate change.

One crucial issue will be the administration and applicability of the Toolbox for interested stakeholders also after project end.

Beforehand the beta version of the CC-ARP-CE Toolbox was intensively tested by the Focus group, which is in principle composed by representatives of the Austrian Strategic partners (Vienna Water, Municipality of Waidhofen/Ybbs and the Federal Ministry of Agriculture, Regions and Tourism). This kind of meetings were conducted on 27.10.2020 in Neuberg/Mürz (within the Vienna drinking water catchment area) and on 25.05.2021 due to the actual COVID-situation only online. These meetings turned out to be very fruitful as the involved participants will be the key stakeholders for using this Toolbox in the future. All partners asked questions regarding the functionality of the Toolbox and communicated their point of view within the context of all Toolbox specialities. The climate change indicators were a true focus of interest as people want to know more about the climate change signal within their watersheds. The testing was carried out in an interactive way, the partners were asked and also asked questions, the presentations of the Toolbox were received in a positive way. This resulted in increased interest in the Toolbox, which is the basis for its utilisation.

5. Synthesis of the National Stakeholder Workshop

In general, the Toolbox is seen as an interesting instrument, which could be applied related to various aspects and fields of action (e.g. water supplier, preparation of concepts in "KLAR!-regions" – climate change adaptation model regions). It provides a good overview of recommended measures based both on new scientific findings and on already realised best practices in different land uses. Therefore, this tool can be used as a well-founded argument and decision support tool for the implementation of certain measures. Also, the awareness raising and willingness to implement recommended measures by land users could increase. The pilot actions of TEACHER-CE are suitable as perfect showcases.

The climate indicators and the various links to the national data base were seen as very important and helpful for users.

Besides some stakeholders stated, that they will present the Toolbox in their institution and will review the related measures and evaluate them related to practicability.

Furthermore, the administration and applicability of the Toolbox, also after project end, are very central. In this context the information of other stakeholder groups and experts (like official experts - "Amtssachverständige") would be important.

a) *Does the **functionality and usability** of all parts of the toolbox convince the stakeholders? Do stakeholders know, how to use the toolbox and does it meet user expectations?*

   As far as the participants could already assess the Toolbox in this phase it seems user-friendly, simple and clear. Of course, it has to be tested further on.

b) ***What are the decision-making processes** in the user's fields of responsibility – do stakeholders think decision support systems enhance public acceptance of the results?*
   For all participants the Toolbox provides an important tool for an enhanced acceptance of the results, not only within the general public, but also within a wide spectrum of stakeholders.
   Perhaps new measures could be integrated within existing strategies or guidelines (like the new guideline for water protection forests in Waidhofen/Ybbs). Furthermore, it increases the transparency as a basis for future proceedings. It could also provide a kind of orientation guideline for certain land uses (e.g. in forestry) as it already exists for example in the field of water supply (ÖWAV-guidelines).

c) *Regarding the representation of all relevant issues? – Do the stakeholders find a measure quotation for their relevant **fields of action**?*

As far as most of the recommended measures, especially related to forestry and water protection, are based on previous numerous studies and partially already implemented in some pilot areas (Vienna Water, Waidhofen/Ybbs) they are really well-proved and should be further applied also in other regions. Additional suggested measures will be checked, especially related to the level of detail.

a) *As regards the suitability of the suggested measures - do the stakeholders identify with the Toolbox's approach to adapting landscape management in line with different **measures**?*

Yes

b) *With regard to the problems and remarks concerning the procedure or selection of MEASURES – **AHP Criteria ranking** – with regard to the usability of the AHP Criteria ranking tool – is it clear for users how to select the priorities/rank the criteria? Is it clear how to interpret the output?*

Yes, this possibility is good and important as an additional information and for implementation and interpretation of related measures.

c) *Usability of **climate indicators and scenarios**?*

They are seen as very important

d) *What are the **expectations** – What are the stakeholders hoping to gain?*

*What are the **limitations** - what stops stakeholders from providing information?*

In general, the usability seems very good (precondition is the usability also after project end), the implementation of climate scenarios and indicators is very interesting and important. The testing of the range of possibilities is seen as very central. Additional measures should be inserted by planners, authorities, land users, water suppliers and the adequate umbrella associations respectively. All participants think that the provision of information and data to the Toolbox will not really be a problem, especially related to authorities, provided that the backflow of information is guaranteed. But in this context, it is important, that stakeholders (e.g. smaller water suppliers) are not forced to save their information about existing problems and to make it public within the Toolbox by that way.

The limitations are seen in the level of detail and perhaps some stakeholders are afraid of handling IT-issues.

e) *What about the **usability** of the Toolbox within Your institution/authority/service? Do you know of institutions/persons that may have been interested in using the toolbox?*

Some ideas on how to spread the information about the Toolbox are: presentation within existing KLAR!-regions, ÖVGW (Austrian Association for gas and water) as well as ÖWAV (Austrian Water and Waste Management Association), municipality forest inspections, surveyors (within proceedings of authorities, e.g. approval for clearcutting) and forest companies, integration within research projects and student works

The most important issues are climate change scenarios and the respective measures in different land uses.

An easy access to the Toolbox for users would be important (e.g. common access-code for a group of stakeholders).

f) ***What strategies/policy** documents related to water management in the Pilot Area **are known to you**?*

Water Framework Directive, National water management plan, flood risk management plans, protective water management concepts, decree for water conservation area, internal guideline for forest/agricultural management of Vienna Water, management plan for mountain pastures (Vienna Water), guideline for forest management within the water protection area (Waidhofen/Ybbs), decisions of the water authority

g) *In which FofA is the greatest need to update / develop a strategy in aspect of Climate Change?*

a. water scarcity and drought risk (management) – 3x (less amount of snow-melt causes less spring discharge and trees suffer from drought damages and pests; the period of low water levels and the related problems like rise of water temperature of springs and surface water increase, thus influencing water quality)

b. drinking water supply (management) – 2x (actualization, change of behavior of customer, future influences on spring discharge due to changes in snow cover)

c. fluvial flood risk (management) – 1x (several studies)

d. pluvial flood risk (management) – 1x (sensibilization of municipalities, subsidies)

e. irrigation water (management) – 1x (regional differences, financial burdens despite subsidies, in Styria: development of pilot projects – intermediate storage capacities for frost irrigation in fruit production, protection-nets against hail)

f. management of water-dependent ecosystems – 1x (utilization and quality – nutrient loads)

h) ***Do you know institutions*** *or people that may have been* ***interested in updating existing strategies*** *related to water management using the toolbox? - What about your institution?*

All participants or their institutions respectively would be interested in using the Toolbox for updating existing strategies related to water management. Following additional stakeholders should be involved in the future: water cooperatives, KLAR!-regions, other departments within the Ministry of Agriculture, Regions and Tourism (e.g. forest department – has been invited to this workshop, but unfortunately didn´t participate)

6. Conclusions

The conclusions of the National Stakeholder Workshop in Austria are as follows:

+ It was necessary to hold the workshop via Videoconference in order to get all interested participants integrated.

+ The Videoconference was an adequate tool within this context, it was possible to hold the workshop through it.

+ The number of participants was rather small, with 9 stakeholders and 3 project partners, but: This small number allowed a very intensive and interactive workshop, where discussions and questions were actively carried out by all participants.

+ It was possible to motivate rather different types of stakeholders, like (I) staff from ministries, (II) water suppliers, (III) foresters, (IV) governmental research centres, (V) regional governments, (VI) ÖVGW- Austrian Association for Gas and Water and (VII) universities. This provided a very wide spectrum of decision makers and researchers, what is a very good basis for the implementation of the TEACHER-CE Toolbox CC-ARP-CE.

+ The outcome of the Stakeholder Training Workshop in a conclusive way can be described as very fruitful, it was possible to gain the interest of the stakeholders for the Toolbox and also to integrate them in the process of the Toolbox refinement.