PILOT ACTION KAMNIŠKA BISTRICA RIVER BASIN, SLOVENIA

OUTPUT O.T3.3

WORK PACKAGE T3 - IMPLEMENTATION AND FEEDBACK - TOOLBOX VERIFICATION

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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).

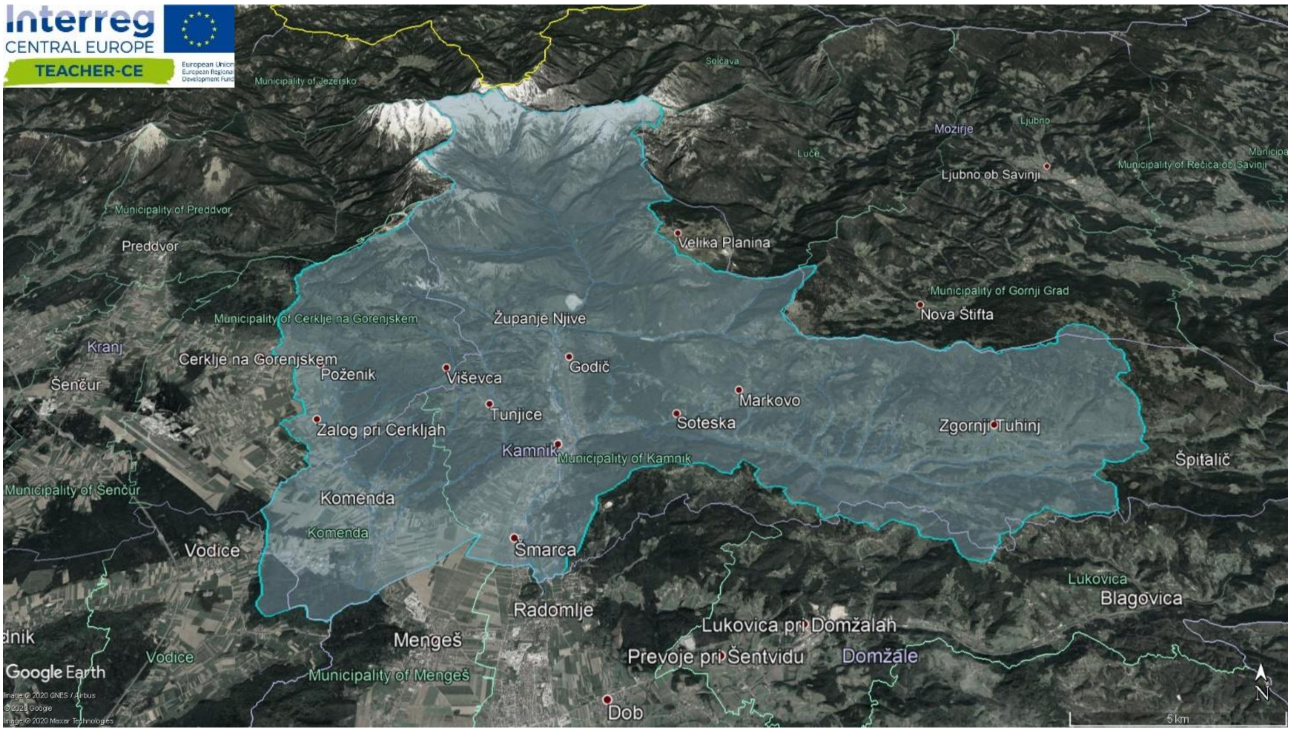
The Toolbox will also be tested by stakeholders during training workshops and in the post-training implementation phase, when strategies will be discussed. These stakeholder interactions will enable clarification of needs and provide recommendations for Toolbox improvements (bottom-up approach) and for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

2. Basic data about pilot action

2.1. Geographical description

The selected pilot area represents the Kamniška Bistrica river basin. It covers 590 km^2 within three municipalities: Municipality of Komenda, Municipality of Kamnik and Municipality of Cerklje na Gorenjskem; Figure 1: Geographical position of PA.Figure 1. On the north side the area extents to the mountainous area of Kamnik Alps with peaks over 2000 m high and on the south part to the urban area – the city Kamnik with the altitude of 380 m. The western part of the area is quite diverse from hilly parts on the north to the plain area on the south. The eastern part presents a Tuhinj valley ascending to the Kozjak pass (altitude of 658 m) with the high plateau on its north - Menina planina (altitude of 1450 m).

The Kamniška Bistrica River is the largest Slovenian torrential river, with its karst spring at an altitude of 623 m at the southern foot of the Kamnik-Savinja Alps. In its upper course, the Kamniška Bistrica River formed a deep gorge. There are several permanent springs along the river, including the slightly lower Mali izvirek, and springs that dry up several times a year (e.g. spring under Mokrica or Studenci, Prosek, spring under the barn, etc.). Kamniška Bistrica River enters the flatland of Kamnik plain in Županove Njive. In its central part, the Kamniška Bistrica River flows through the town of Kamnik, where it is highly regulated due to urbanization.



2.2. Climate characteristics

General climate characteristics of PA surroundings are influenced by its geographical width, effects of air circulation from the west and location on the eastern side of the Alps massive. Additionally, the transition between lowlands and highlands has an impact on some local characteristics. The PA has a moderately warm and humid climate which gradually transits into a mountainous climate.

Due to numerous factors regarding topography, land use etc. every province in this area develops unique local climate characteristics, named topoclimates. In this connotation, the PA is most influenced by prominent alpine valleys.

Sun radiation is specific to a location due to extremely diverse topography. Annual air temperature differs in lowland and highland parts of the PA. Lowland parts have an annual temperature average between 8-10°C, whereas the highest parts (mountains up to 2558 m a.s.l.) are much colder with annual average temperatures between 0-4°C. Average annual vertical gradient is between -0.4 and -0.5°C/100m.

It is not unusual to witness inversions, which happen mainly in colder parts of the year with a cloudiness rate less or equal 2/10 and wind speeds less or equal to 4 m/s.

Annual evapotranspiration is between 700-750 mm and is highly affected by severally factors including land use, radiation and others.

Table 1: Main climate characteristics of the catchment (Hydrological yearbook of Slovenia 2018; Wysoudil, Ogrin, Mrak, 2013)

Main climate characteristics	Unit	Value
Annual precipitation low/avg/high*	mm	998/1383/1851
Annual air temperature min/avg/max*	°C	9/11/13
Annual evapotranspiration	mm	700-750
Annual vertical temperature gradient	°C/100m	-0.4 up to -0.5
Annual quazi-global radiation	MJ/m^2	4600-4800 (sunny side) <3400 (shady side)

2.3. Hydrology

2.3.1. Surface waters

In the downstream part of the PA the Kamniška Bistrica River is highly regulated due to its hydropower potential and as protection against floods. This part of the catchment is covered with a dense network of artificial channels that is used to supply water for the operation of water and sawmills. Today, they are mainly used for supplying small hydropower plants.

There are three main water bodies within the PA catchment: Kamniška Bistrica, Pšata, and Nevljica of lengths 38, 36, and 19 km, respectively.

All rivers in the PA have moderate ecological status, except the upper course of Kamniška Bistrica which has a very good ecological status. The chemical status of Kamniška Bistrica is very good while Pšata and Nevljica have a good chemical status. The main problem to achieve a good ecological status lies in hydro morphological alteration.

According to official data, there are currently four (4) gauging stations (GS) located on the PA. Gauging stations Pšata and Kamniška Bistrica are located at the most upper course hence have limited calibration and validation usability.

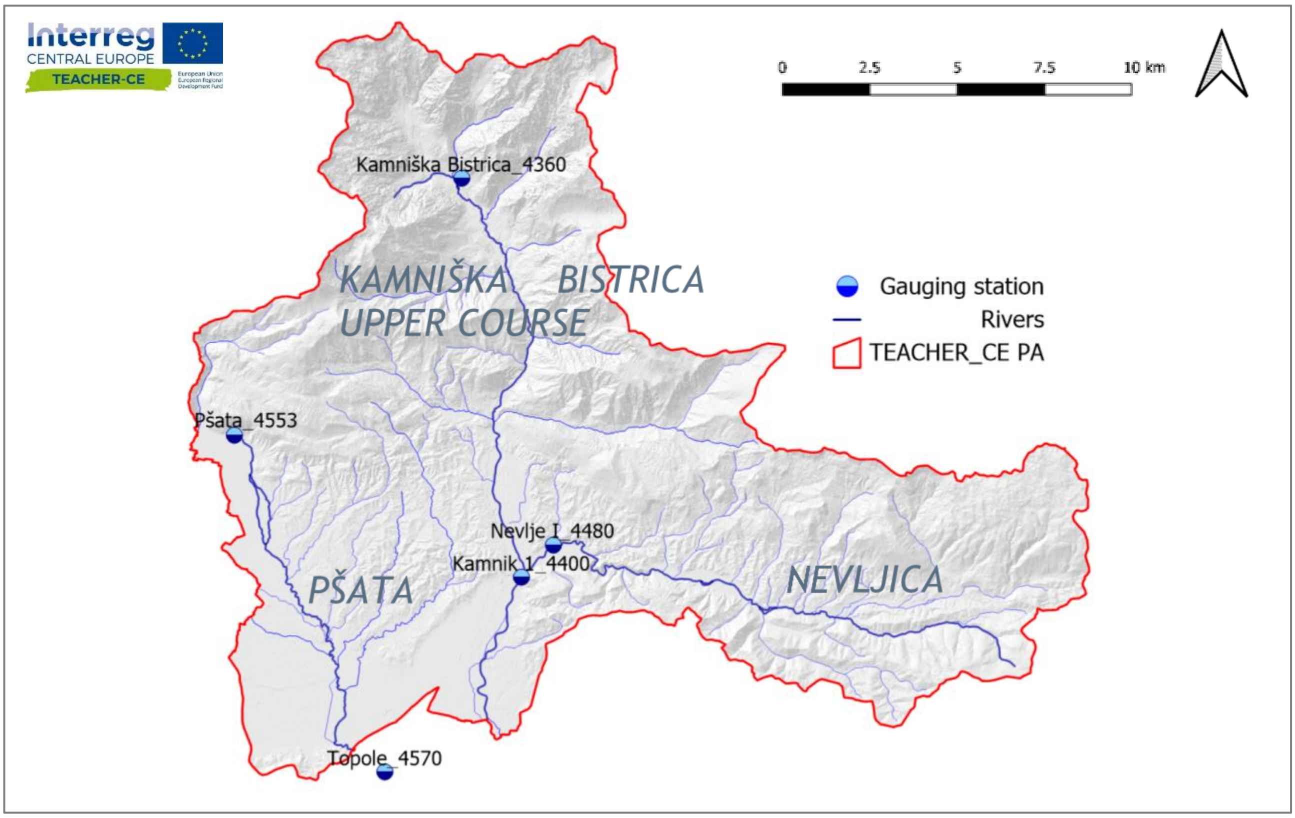


Figure 2: Main water bodies in Teacher PA and Gauging stations

All surface waters in the PA have nivo-pluvial regimes with typically two peak discharge periods, the first being in late spring-early summer and the second one in autumn. The prevailing type of floods is flash floods.

Table 2: Draining area and statistical discharge (Log Pearson III) at gauging stations (ARSO_2013)

Gauging station	GS code	F (km2)	Q10 (m3/s)	Q100 (m3/s)	Q500 (m3/s)
Kamnik 1	4400	195	151	226	276
Nevlje I	4480	82	51	81	106
Pšata*	4553	/	/	/	/
Topole	4570	94	42	66	87
Kamniška Bistrica*	4360	/	/	/	/

*not available

2.3.2. Flooding

The main problem within the PA are relatively frequent floods, especially in late autumn. Based on previous flooding events we can define three areas of significant impact of flood within the PA: Stahovica-Kamnik, Komenda-Moste-Suhadole and Nožice.

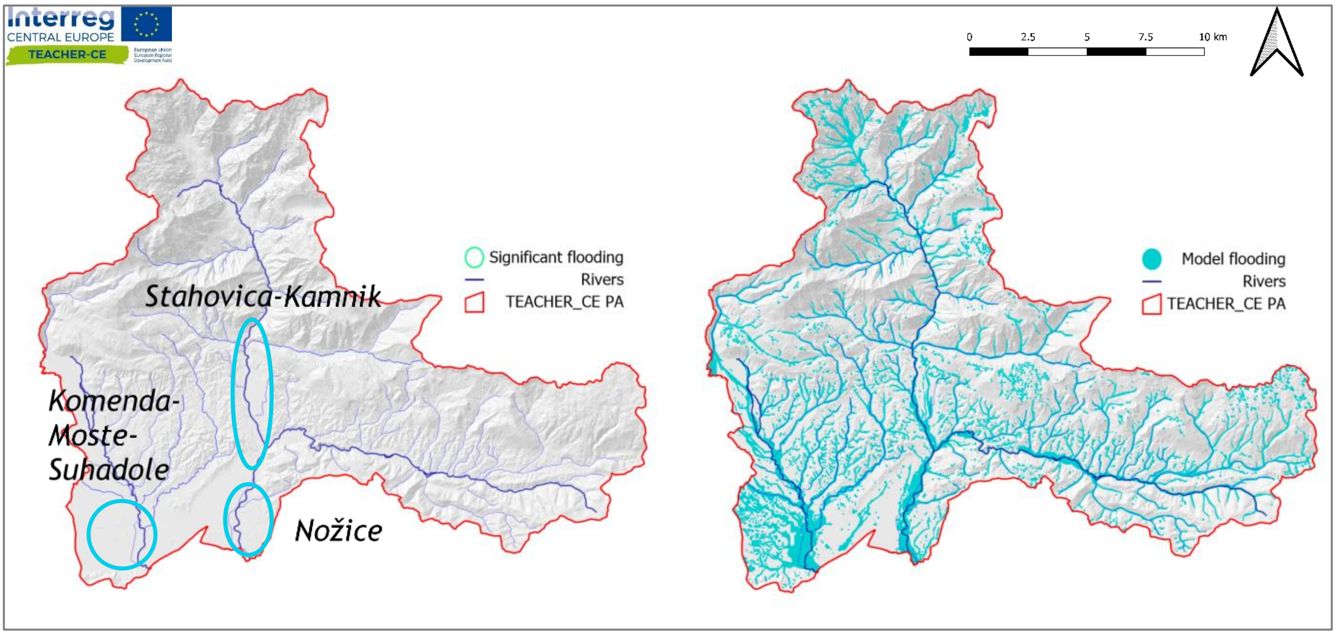


Figure 3: Areas of significant flooding in the past (left) and calculated flooding (model) for 15 hours event with 100-year return period (right).

Calculations confirmed observed floods in the past and showed some other areas which could be severely affected in case of floods with longer return periods. Such areas are shown on the previous picture.

In the last years, four major precipitation/flooding events have occurred on the PA. The worst event, based on maximum measured discharge at Vir river gauge (8 km S of city Kamnik), happened in the year 2010, others followed in years 2007, 2012 and 2014. In general, observing the measured data in the past, several conclusions can be made:

- lack of measurements at several gauging stations (GS) during extreme events
- stage of uncertainty at others
- main event suitable for analysis/calibration is 2010

Table 3: Main precipitation/flooding events and maximal measured discharges at gauging stations

GS	GS code	River	year of event and max. measured discharge (m^3/s)			
			2007	2010	2012	2014
Kamnik 1	4400	Kamniška Bistrica	157	135	177	132
Nevlje 1	4480	Nevljica	/	65	65	59
Topole	4570	Pšata	/	56	42	45

2.3.3. Heavy rain

A typical heavy rain event in the PA is relatively short, and in general does not exceed 1-2 days. In this interval there are repeating intervals of high precipitation intensities which decrease with duration. The typical half hourly intensity for the 100-year return period is usually between 15 to 20 mm, depending on location.

The Slovenian Environmental Agency is performing continuous monitoring of spatial precipitation. We have defined all available weather-precipitation stations with measurable impact on our catchment (impact based on Thiessen polygons) and obtained detailed precipitation measurements for all precipitation events mentioned in previous chapters (Figure 4). To be able to model precipitation events effectively, we obtained half-hourly precipitation measurements (Figure 5-8). Measurements were filtered due to occasional lack of data.

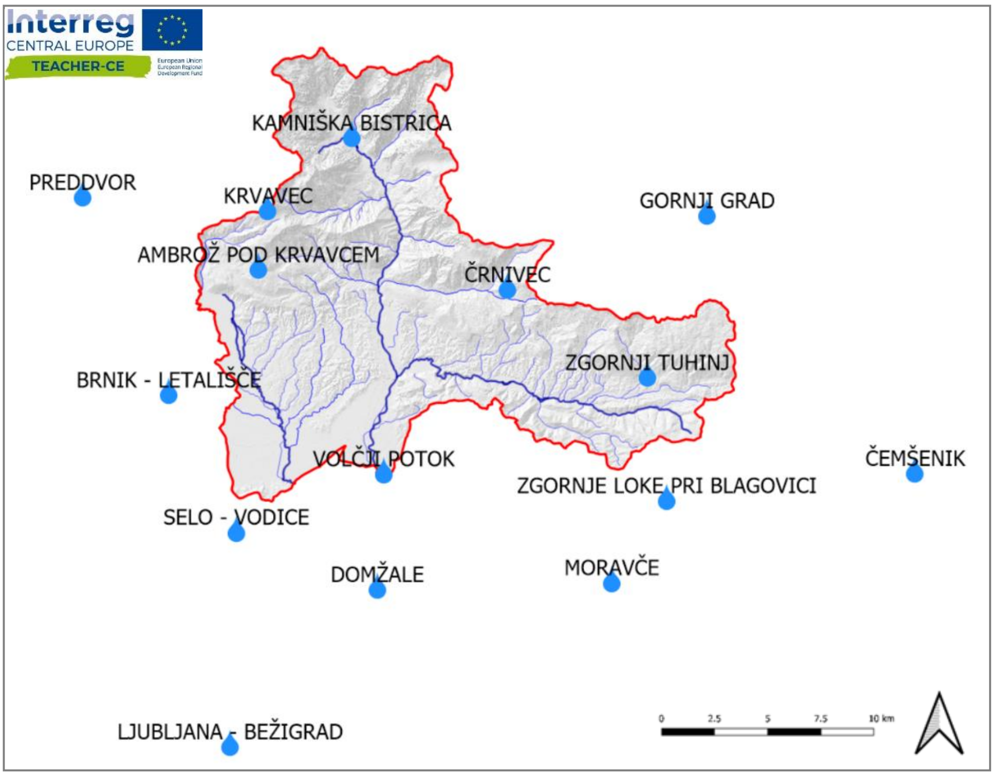


Figure 4: Precipitation stations with satisfactory measurement data

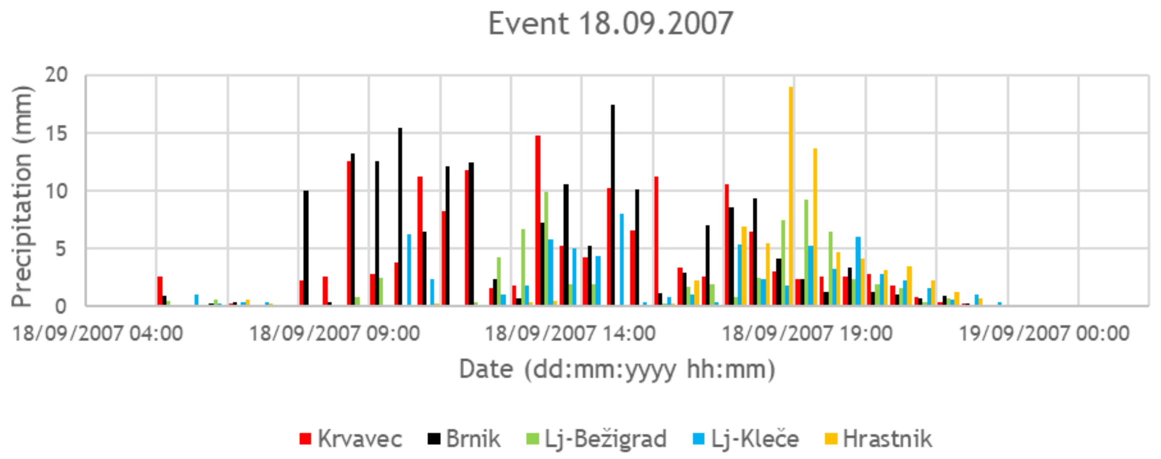


Figure 5: Half-hourly precipitation histogram for the 2007 event

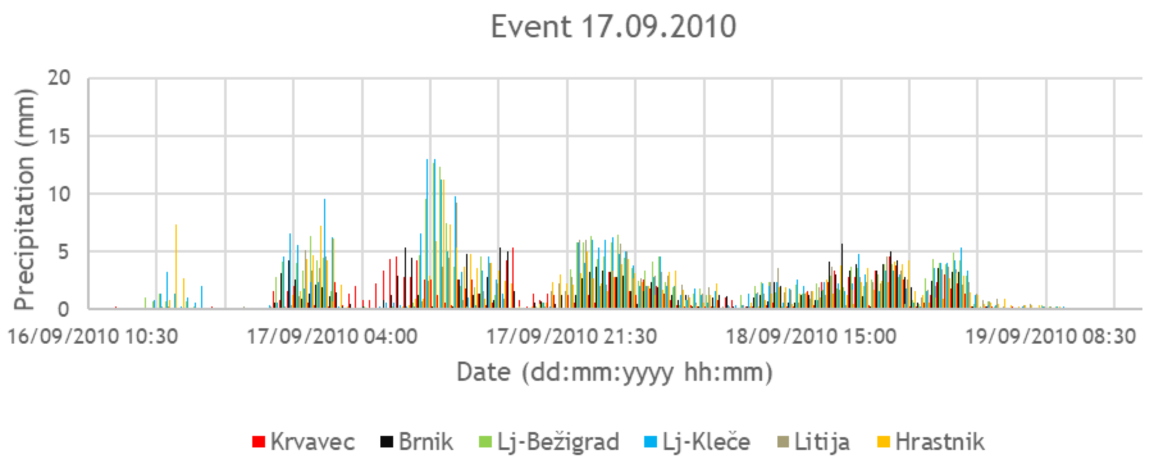


Figure 6 Half-hourly precipitation histogram for the 2010 event

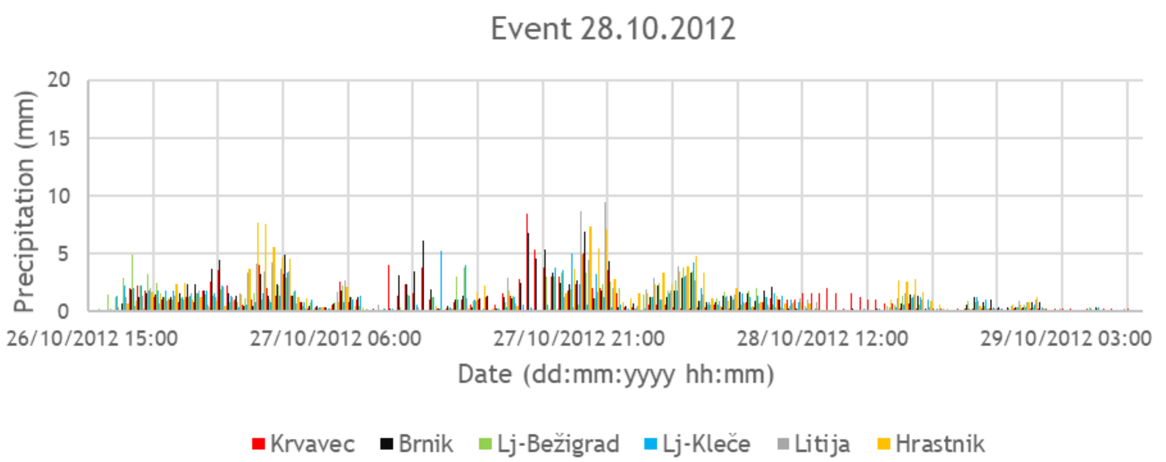


Figure 7: Half-hourly precipitation histogram for the 28.10.2012 event

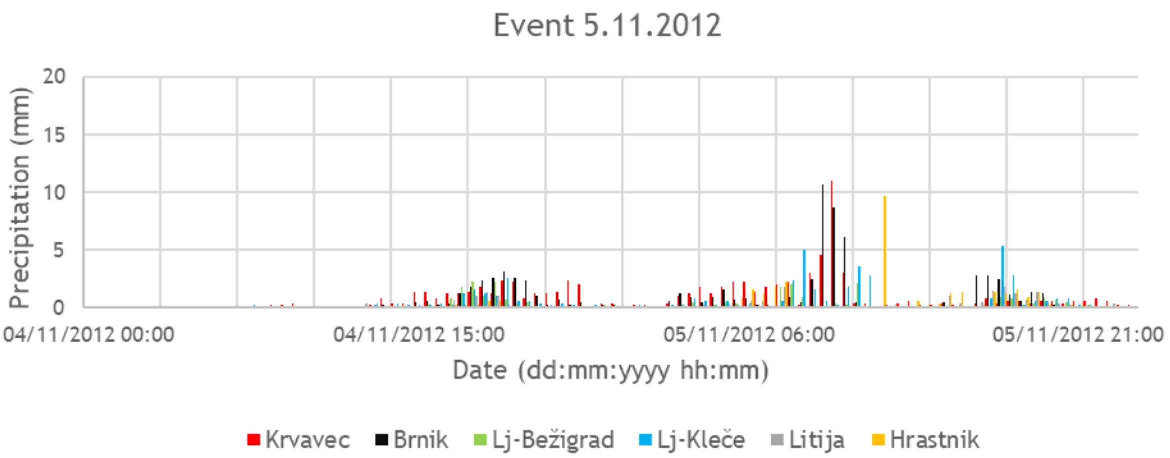


Figure 8: Half-hourly precipitation histogram for the 5.11.2012 event

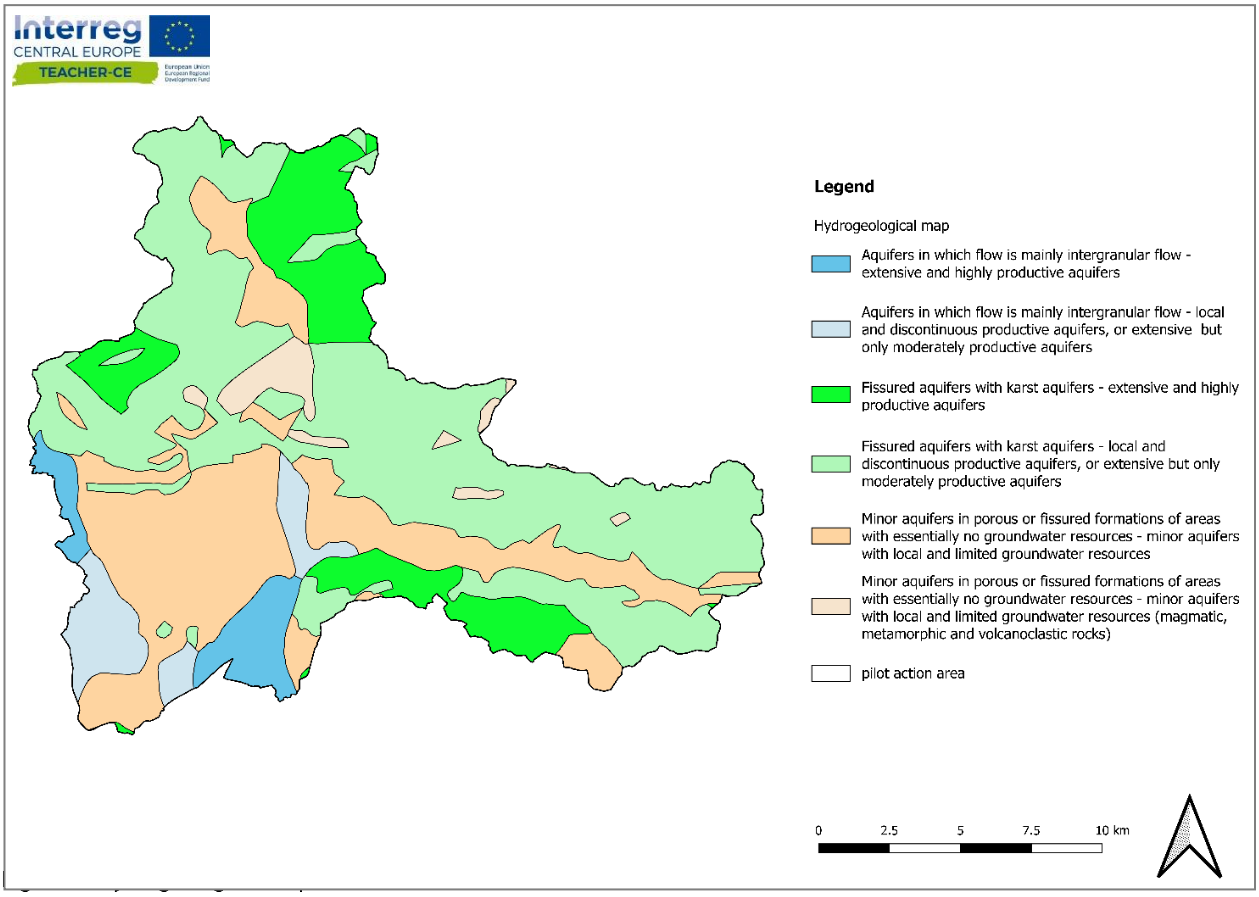
In Table 4, we compare daily statistical precipitation for a 100-year return period calculated from daily and 5 minutes precipitation (courtesy of ARSO, 2018) data.

Table 4: Comparison of daily statistical precipitation for 100-year return period calculated from daily and 5 minutes precipitation (courtesy of ARSO, 2018) data.

daily statistical precipitation - Gumbel distribution method												
Return period (years)	**Brnik-letališče**			**Ljubljana Bežigrad**			**Kamniška Bistrica**			**Črnivec**		
	from data **5min**	from data **daily**	factor	from data **5min**	from data **daily**	factor	from data **5min**	from data **daily**	factor	from data **5min**	from data **daily**	factor
	1970-1993, 2004	1970-1993, 2004		1948-2008	1948-2008		1977-2008			1977-1991		
100	134	131	1.02	145	/	/	253	254	1.00	186	149	1.25

2.4. Hydrologeology

The PA, despite covering a small area, is geologically very diverse and consequently almost all types of aquifers are present. In the PA the main aquifers are fissured and karst (60 %), following minor aquifers with local and limited groundwater resources (30 %) and the least represented are intergranular aquifers (10 %); shown in Figure 9.



2.5. Land use

Being an upper part of Kamniška Bistrica river catchment, land use in the PA is predominately forest and semi natural areas (Figure 10, Table 5). Artificial surfaces (urban area etc) are located on the lower part of the PA in valleys and flat areas.

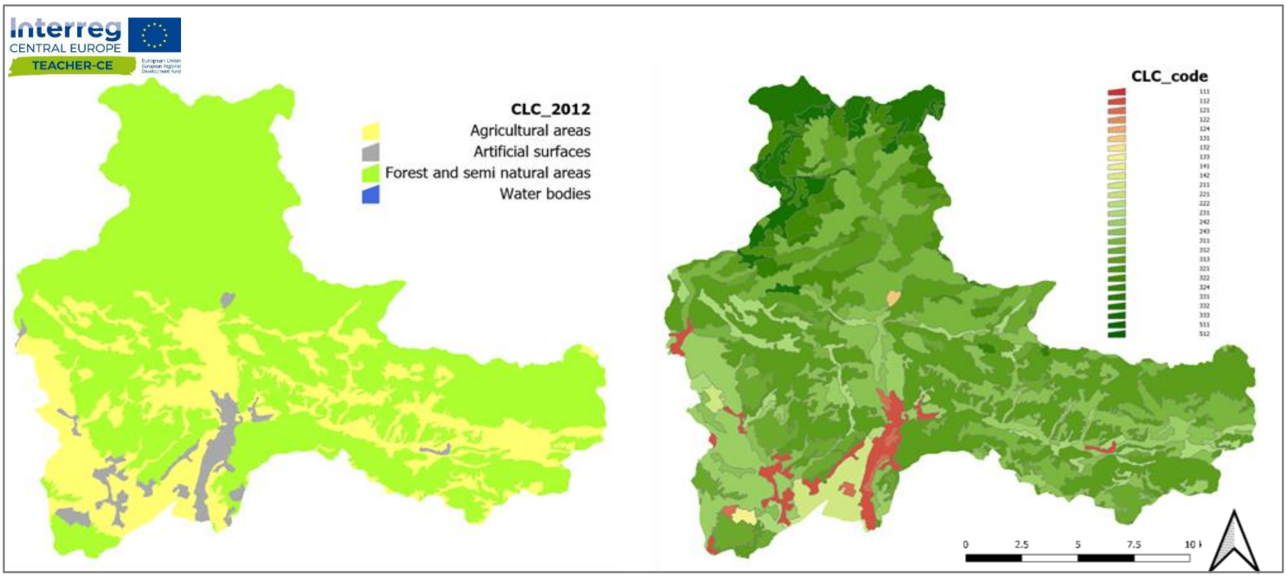


Figure 10: CORINE land cover 2012 (land use- left, land use code - right)

A hydrologic soil characteristic classification system in which a soil may be categorized into one of four soil groups (A, B, C, or D) based upon infiltration rate and other properties; all types of soils are presented, dominated by type B (Type A - Low runoff potential, Type B - Moderately low runoff potential, Type C - Moderately high runoff potential, Type D - High runoff potential), shown in Figure 11.

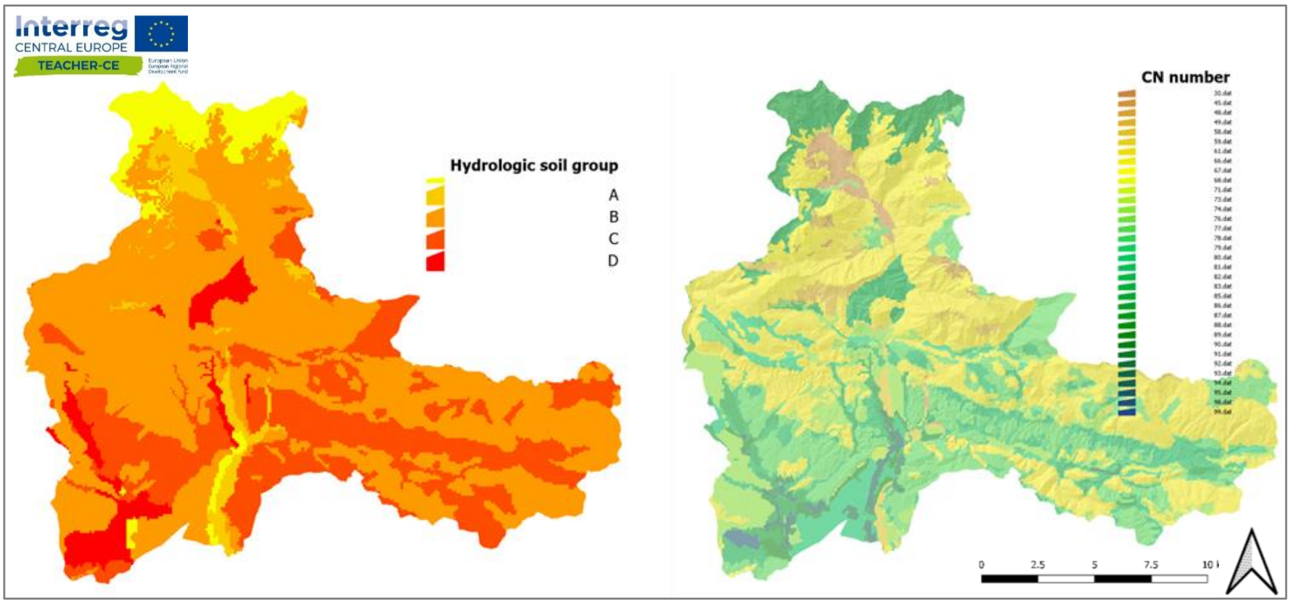


Figure 11: Hydrologic soil group (left) and Curve number classification (right)

Table 5: Land use characteristics

Characteristic	Unit	Value
Catchment size:	km^2	282
Agricultural area	%	25
Artificial surfaces (urban area etc)	%	4
Forest and semi natural area	%	70
Water bodies	%	<1

2.5.1. Forestry

The Slovenian PA Kamniška Bistrica spreads over two forest management areas: Ljubljana (forest management units Kamnik, Kamniška Bistrica and Tuhinj-Motnik) and Kranj (forest management unit Cerklje). Average forest cover is 57 %, ranging from 43 % (Cerklje) to 69 % (Tuhinj-Motnik).

Forest cover in the PA is mostly with mixed forest 34 %, with Broad-leaved forest 15 % and Coniferous forest 7 %, of the PA area; shown in Figure 12. Current forest composition in forest management units in the PA are 11.7 % Hornbeams, 66.1 % Beech, 6.2 % Fir and Spruce, 7.8 % Pines, 1.9 % Shrubs, 4.9 % Peat bogs and 1.6 % other forest species; shown in Table 6.

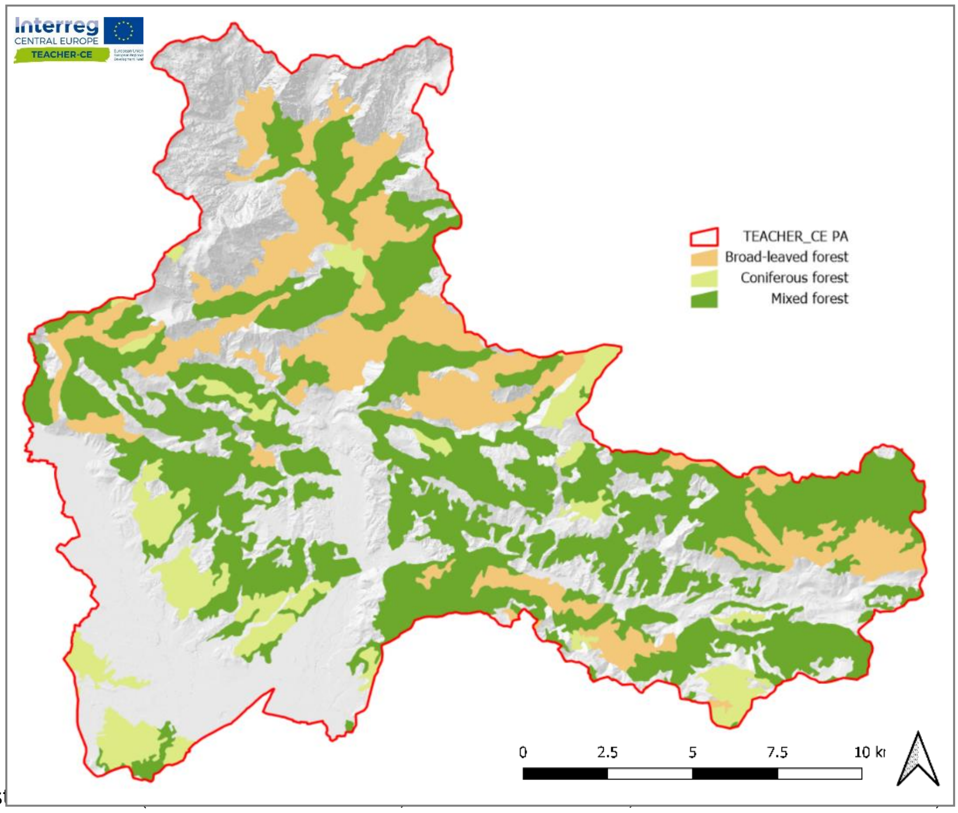


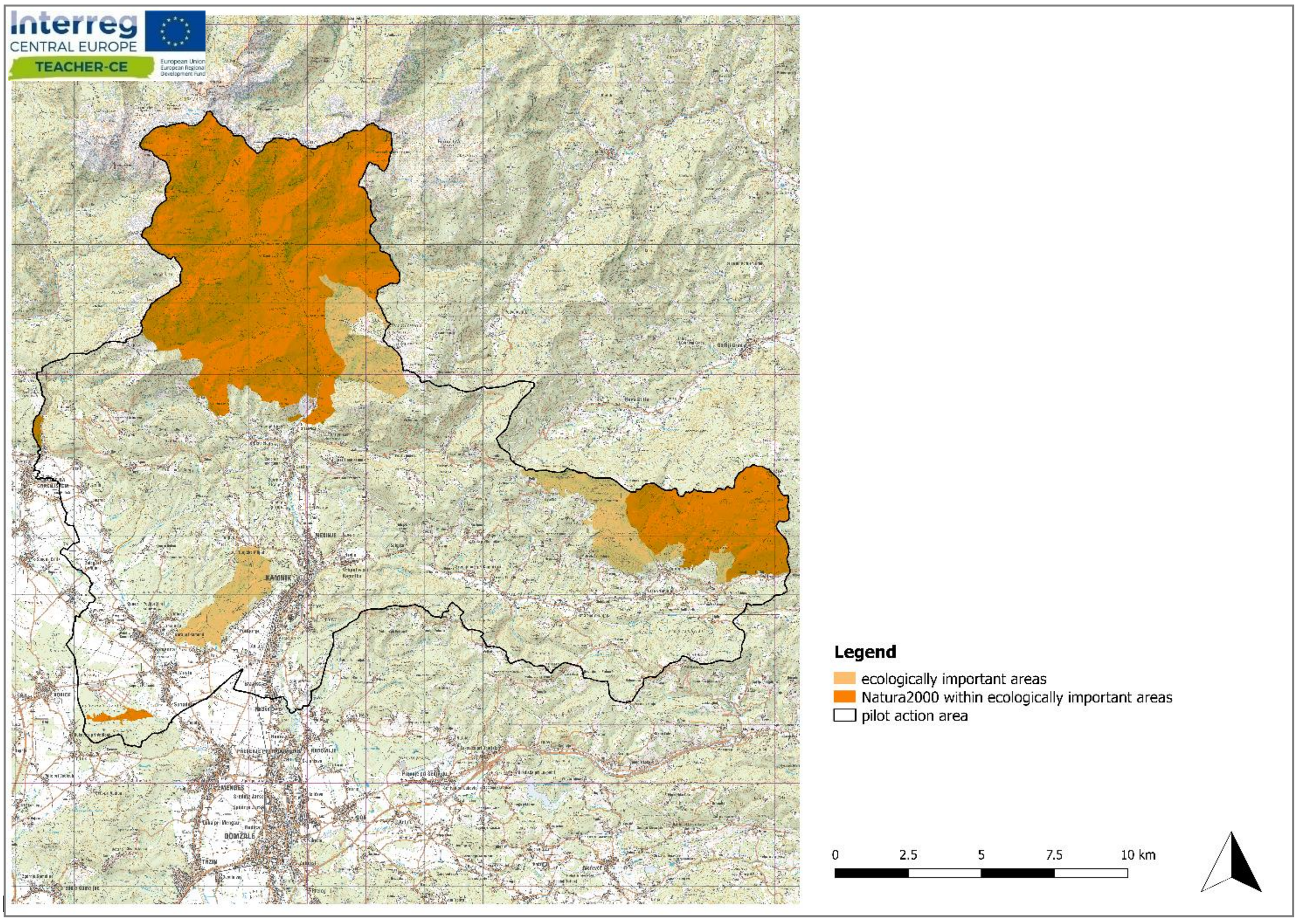
Figure 12: Forest

Table 6: Current forest composition in forest management units

	FMU Kamnik	FMU Kamniška Bistrica	FMU Tuhinj-Motnik	FMU Cerklje	**average**
Hornbeams	6 %	7 %	3 %	31 %	**11.7 %**
Beech	70 %	58 %	91 %	47 %	**66.1 %**
Fir and Spruce	9 %	7 %	6 %	3 %	**6.2 %**
Pines	13 %	0 %	0 %	19 %	**7.8 %**
Shrubs	2 %	5 %	0 %	1 %	**1.9 %**
Peat bogs	0 %	19 %	0 %	0 %	**4.9 %**
Other	0 %	5 %	1 %	0 %	**1.6 %**

2.6. Protected areas

The Natura2000 areas cover more than 37 % of the country's territory. In the PA Natura2000 covers an area of 122 km^2 which represents 43 % of the whole area. Ecologically important areas are present as well and represent an important contribution to the conservation of biodiversity and are one of the starting points for the development of nature protection guidelines. In the PA ecologically important areas cover 33 % of the total area (94 km^2), shown in Figure 13.



2.7. Drinking water sources and protection

Drinking water sources are divided into two categories: water sources for private (local) use and water sources managed by the public utility services that are used for public water supply.

Water sources for private use are usually small and are supposed to be used only in areas where there is no public water supply system installed (as stated in Decree on drinking water supply - Uredba o oskrbi s pitno vodo (Uradni list RS, št. 88/12)). Water source use is specified by Water right that defines how much water can be used. In the area of the PA Kamniška Bistrica there are 162 allocated Water Rights for drinking water sources for private use. Those water sources do not need Drinking Water Protection Zones and are not regularly tested for water quality.

Within the PA Kamniška Bistrica there are 54 water sources used for public drinking water supply. For this sources Drinking Water Protection Zones are mandatory (Slovenian Water Act - Zakon o vodah (Uradni list RS, št. 67/02, 2/04 – ZZdrI-A, 41/04 – ZVO-1, 57/08, 57/12, 100/13, 40/14, 56/15 in 65/20)). Rules for the definition of DWPZs are described in Rules on the criteria for the designation of a water protection zone (Pravilnik o kriterijih za določitev vodovarstvenega območja (Uradni list RS, št. 64/04, 5/06, 58/11 in 15/16)). Drinking Water Protection Zones take up 30.7 % (86.5 km^2) of Slovenian PA area (281.9 km^2), out of which I. zone is 0.3 %, II. zone 2.9 %, III. zone 19.0 % and IV. zone 8.5 %.

The main drinking water source for public water supply is Iverje, which is located in the north part of PA and had the biggest DWPZ (see Figure 14). Maximum allowed annual water abstraction is 3 784 000 m^3. Pumping wells are in the vicinity of Kamniška Bistrica River, and the water pumped comes from infiltration of the river water through the sandy banks.

An alternative water source for the main water supply system is Pod Skalco with maximum allowed annual water abstraction of 1 078 000 m^3.

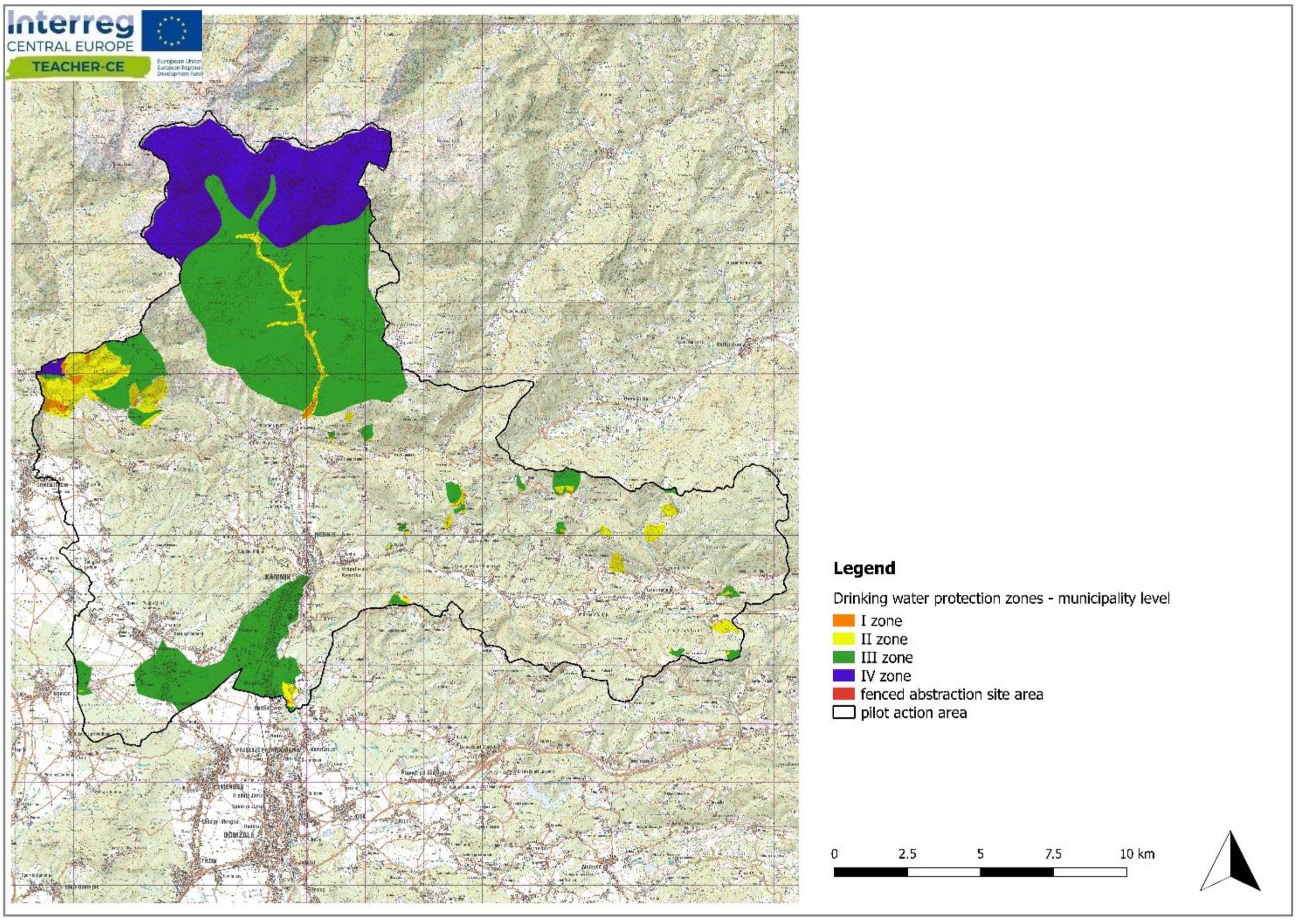


Figure 14: Drinking Water Protection Zones in PA.

3. PA issues concerning TEACHER-CE topics

3.1. Heavy rain

Heavy rain is one of the main causes for extended and disastrous flooding which is one of the major natural disasters in the PA. General rain patterns are known for the PA and surroundings but can locally vary significantly. Measures regarding rain as such are not possible, thus other measures must be taken to avoid or prevent consequential flooding.

3.2. Floods

Flooding in the PA is often, especially in late autumn, and causes severe difficulties. The main problem represents flooding in urban areas and in areas of economic interest.

Measures to prevent or mitigate flooding can be structural or non-structural, lately natural small water retention measures (NSWRM) are becoming more and more popular. It has been proven, that the most effective way of mitigation in the PA is by accumulating excessive precipitation and to gradually release accumulated water after the main precipitation/flooding event, which causes less severe flooding on target areas. Other efficient measures are in means of diverting flow paths, complex measures, river regulations and keeping natural flood retention areas. Arguably the most appropriate measures in the PA in order of efficiency are:

- Dam retentions
- Keeping existing natural flood retention areas
- Small water measures NSWRM

Findings about the PA specifics are that by implementing proposed dam retentions, peak flows could be significantly lowered at downstream locations close to the dams themselves but going further downstream the impact weakens and becomes hardly evident at the very downstream end of the catchment.

Flood safety is a big issue on the PA, which cannot be resolved by only implementing NSWRM but will require a broader targeted approach with other available engineering solutions. We see NSWRM as complementary measures whose impact (in case of proper NSWRM type selection) can greatly contribute to flood safety only on targeted isolated areas (areas located immediately nearby the measures) but not on a bigger scale.

3.3. Drought

Annual precipitation in the PA Kamniška Bistrica is close to the average of Slovenia (ca. 1600 mm/year). Droughts are common in summer months, especially with prolonged periods without precipitation. The droughts effect vegetation and crops but do not represent a problem for water supply.

3.4. Forest management

The current forest composition in the PA Kamniška Bistrica is adequate and does not present any major issues. Reforestation is mainly natural with some help by planting in bigger empty spots. The forest is relatively old due to the lack of a forest industry. Rejuvenation of the forest is partly hindered by invasive foreign plant species.

Adaptation to climate change with changes to the forest composition is good, however hazards such as sleet will present bigger and bigger problems. Bark beetles are also more common due to climate change.

3.5. Drinking water sources protection

The vulnerability of the groundwater on the Slovenian pilot area is determined mainly by the activities that take place in Velika and Mala Planina and the surrounding mountains. High sensitivity of aquatic systems to any pollution occurring in the headwaters of streams were identified. The analyses show a large proportion of faecal and domestic sewage from huts, mountain lodges and other establishments on the plateau which appear relatively quickly in smaller springs on the plateau and in larger springs below. Of concern are the springs in the Kamniška Bistrica valley that supply the Iverje drinking water source, which provides drinking water to approximately 20,000 residents of the Kamnik and Komenda municipalities. An agreement, which would regulate the facilities and activities on the Velika, Mala planina and surrounding mountains, is crucial for improving the protection of water sources (Slapnik R. & V Kregar 2020: Zaključno poročilo o izvedbi naloge "Spremljanje kvalitete vode v 6 izvirih z opravljenimi 30 vzorčenji". Jamarski klub Kamnik).

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

Testing of the toolbox was organized by the Faculty of Science and Technology (UL NTF) and the Faculty of Civil Engineering and Geodesy (UL FGG). The workshop was held with our associated partners who are our key stakeholders and was organized in two parts. The first meeting with 2 associated partners at the Faculty of Civil Engineering and Geodesy in Ljubljana (Figure 15) and the second part with Municipality of Kamnik (also AP) in the pilot area.

The objectives of the workshop were:

- To test the features of the tool CC-ARP-CE. The main focus of the testing was on selecting/adding issues and the related measures and reviewing the ranking of the measures using the analytical hierarchy process AHP criteria. the testing also includes a general feedback section with input on all parts of the toolbox.

- To recognize the usefulness of tools for the needs of water management and other sectors. In the course of the testing of the toolbox beta version, eleven new issues have been added in the toolbox application. The focus of PA 1 was on issues related to the Fields of Action: Fluvial Flood Risk (Management), Pluvial Flood Risk (Management), Ground Water Management, Drinking Water Supply (Management), Irrigation Water (Management), Water Scarcity & Drought Risk (Management) and Management of Water-Dependent Ecosystems.

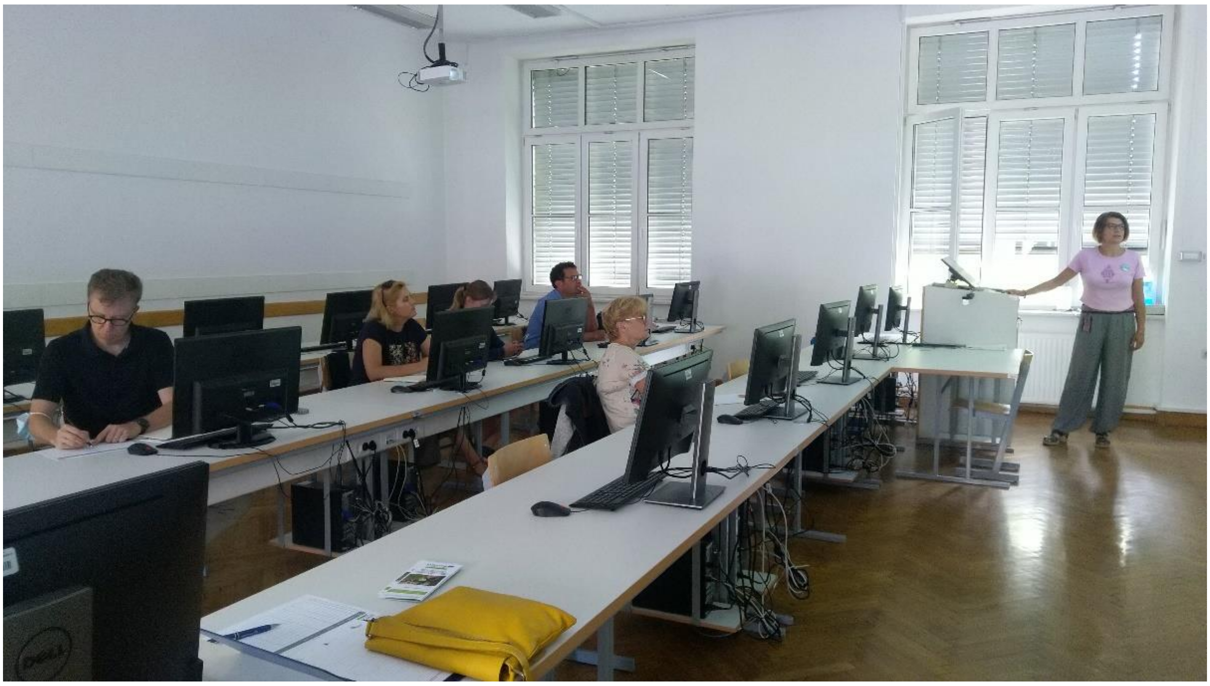


Figure 15: Toolbox testing

- **Does the Toolbox reach its goal as an identification platform for issues + measures and a discussion platform for stakeholders?**

In the opinion of our stakeholders - yes. Of course the toolbox could be improved and has some shortcomings (mainly technical), but nonetheless the stakeholders were happy with what they have seen so far. With a nice introduction and support from our team, they had no problems using the toolbox. They are very supportive of the idea of CC -ARP- CE. They like the functionality and the positioning as a decision support platform.

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

Stakeholders in Slovenia have no problems with providing information. The authorities are not strict. The only limitation was the availability of stakeholders due to summer holidays. In some cases of testing the limitation was also a poor internet connection, which resulted in a blurred screen and a waiting time for the toolbox response.

- **How is the user experience - do stakeholders know, how to use the toolbox and does it meet user expectations?**

At the testing workshop, we started with a detailed explanation of the toolbox and how to use it, therefore the stakeholders had no difficulty in using it.

The identification of gaps should consider gaps in knowledge, functionality and usability of the toolbox.

- **ISSUES recognized in PA1 Kamniška Bistrica (Slovenia):**

FIELD OF ACTION	REPORTER	LAND USE	LOCATION	DESCRIPTION
Fluvial flood risk (management)	Local public authority	Forest	Local/municipality level	Measures to stabilise land and landslide-prone areas - Perovo

Part of the urban development in the addressed location is exposed to local potential instability of the terrain due to the landslides. Close observation of the drainage mechanisms is necessary in order to avoid activation of the landslides. In general, large part of the area of the Kamnik municipality is exposed to potential landslides and activation of the landslides often occur in the case of intensive rainfall.

Fluvial flood risk (management)	Local public authority	River training and erosion control	Local/municipality level	Flooding caused by the Nevljica watercourse in Šmarno in the Tuhinjska valley. Flooded primary school, several buildings, fire station.

Šmartno v Tuhinju is a central settlement in the Tuhinjska valley in the municipality of Kamnik, because it has some important local institutions like primary school. The settlement was flooded several times, for the last time during the flood event of 2012. Flooding mechanism was already analysed with recognized impact of road infrastructure (bridges) and other measures impeding the efficient runoff.

Fluvial flood risk (management)	Local public authority	All land uses	Point level	Flooding of the Kamnik - Tuhinjska valley national road in Vrhpolje

On the outskirts of the city of Kamnik towards the Tuhinjska valley there is settlement Vrhpolje with important bridge crossing of state road 414 over the Nevljica river. The bridge is old by its construction, resulting that the discharges with higher return period flood the bridge surrounding and the adjacent buildings.

Fluvial flood risk (management)	Local public authority	Urban	Local/municipality level	Reducing flood risk on the left bank of the Kamniška Bistrica - Mekinje

Mekinje is a settlement north of the Kamnik city with large part of the settlement on the left bank of the Kamniška Bistrica river. The lower parts of the area are exposed to floods, which was already recognized in the identification of Areas of Potential Significant Flood Risk according to the Art. 4 and Art. 5 of the FD.

Fluvial flood risk (management)	Local public authority	Urban	Local/municipality level	Reducing flood risk in Šmarca and Nožice

During the floods of 1990 the area of Šmarca and Nožice, on the south of Kamnik municipality were flooded. After the event some emergency embankments were constructed. Recent hydraulic verification shown that the embankments are not suitable for the return periods above 20 years. The area is identified as an Area of Potential Significant Flood Risk according to the Art. 4 and Art. 5 of the FD.

Fluvial flood risk (management)	Local public authority	All land uses	Point level	Managing erosion hotspots in the Bistričica river basin - Korosaški falls

Bistričica is the sub-catchment of the Kamniška Bistrica on the foothill of the higher mountains. It has specific geological - tectonical formations (faults), resulting in intensive hydrological response of the catchments, together with erosion problems. The area was heavily regulated with the erosion management measures (i.e. check dams, erosion protection measures), but it is still in the focus of flood management in the Kamnik municipality.

Pluvial flood risk (management)	Local public authority	Forest	Local/municipality level	Managing water stagnation in forest areas below Perovo

The unmaintained stream beds are clogged and no longer allow water to pass through. The blockage is mostly trees and branches that have not been properly cleared from the forest. During heavy rains, the stream could cross the streambed and flow into the settlement at the bottom of the forest.

Pluvial flood risk (management)	Local public authority	Urban	Point level	Rainwater drainage in the business zone area - Titan of right bank of the Kamniška Bistrica

Kamnik urban drainage – several locations in the Kamnik municipality (i.e. lower parts of Tunjiška cesta, Livarska cesta, Cankarjeva cesta, business zone area - Titan) have issues with the urban drainage resulting in flooded cellars in the case of short, intensive precipitation.

Drinking water supply (management)	Local public authority	Forest	Local/municipality level	Groundwater management in the infiltration zone of the Iverje reservoir

Iverje – is the main drinking water source for the Kamnik municipality. It is functioning mainly as a bank filtration from the Kamniška Bistrica. Addressed issue is the water demand/supply balance at the water source. Sporadically occurance of coliform bacteria was detected.

Water scarcity & drought risk (management)	Local public authority	All land uses	Point level	Allocation of water to different users during low flows - water abstractions for millponds

Kamniška Bistrica is by its hydrological characteristics a torrential river with low discharges and high extreme discharges during the rainfall events and snowmelt. During the dry periods the discharges depend strongly on the snowmelt in the high mountains. From the water use point of view there are approximately 10 abstractions for small hydropower plants.

Management of water-dependent ecosystems	Local public authority	Agricultu re	Point level	Preventing the dumping of construction waste and the filling of flood plains

In some flood prone areas along the Kamniška Bistrica river illegal floodplain backfilling occurred in the recent history. The backfilling is reducing the retention volume of the floodplains.

5. Synthesis of the National Stakeholder Workshop

Second national stakeholder workshop was organised in vivo and online by University of Ljubljana in municipality of Kamnik (Figure 16), in the Slovenian Pilot Action. Alongside the TEACHER-CE team 10 participants attended the workshop in vivo and 8 participants online. Four participants came from the Ministry of the Environment and Spatial Planning (Environment and Climate Change Division), four participants were from the municipalities (2 from the pilot area) from different departments, most of them from the department for civil and environmental protection, one came from the Biotechnical faculty (Chair of Agrometeorology), six participants were from the local public services/utility companies and three participants were from different NGOs: focusing on water ecosystems (ichthyological and ecological research), Blue-Green Infrastructure and water management.

Figure 16: Second national stakeholder workshop in Kamnik

5.1. Stakeholders' insights regarding the Toolbox

Catalogue of measures

The stakeholders have identified with and liked the approach of how the measures are organised. The stakeholder have looked into the catalogue of measures regarding their profession and interest and their findings are that some of the measures should be additionally added, e.g. measures in water-dependent ecosystems and nature based solution measures. General comment was that measures could be described in more details and some of the measures could be illustrated with a picture.

Fields of action

Lack of involvement of ecosystems was identified. In the tool FoA Management of water-dependent ecosystems, ecosystems are not covered to a large extent with the measures. Also, nature based solution are not included as measures.

AHP Criteria ranking

After explaining AHP criteria as a ranking tool to the stakeholders they understood it. The only question was what happens if they do not change the ranking at all. We explained and pointed out that this is also written in the tutorial document for the toolbox, which will soon be integrated into the toolbox.

Climate indicators and scenarios

Participants were very interested in the climate indicators, they saw them as an added value to the toolbox and thought it was good to have these different data collected in one place. Nevertheless, they raised the question why these time periods were chosen and not the time periods used at Slovenian national level, e.g. 2011-2040, 2041-2070, 2071-2100.

For easier visibility and usability the climate indicators should be divided into groups, e.g. temperature, participation. The manual should include a more detailed description of the relevance of the climate indicators. Finally, the wish was expressed to downscale the existing data for the use on local level

5.2. General feedback from the Stakeholders

After testing and getting acquainted with the toolbox the stakeholders general feedback was that it is user friendly, data is accessible and useable, but their main concern was who will be the technical and data administrator, especially after the end of the project lifetime. Concern about checking the credibility of data was also expressed.

Stakeholders did not express any reservations about the publicity of the data, as issues are generally public. However, they appreciate the use of usernames. The usernames would be necessary in case of setting up a web forum system for commenting on identified issues.

It would be good to arrange the commenting in form of a web forum system. The user who entered the issue would receive the comments on the issue reports by e-mail and would be invited to a discussion with the commenter.

The tool should include examples of good practices in order to ensure knowledge shared among stakeholders and support them in the approach climate change adaptation. This approach encourages communication among experts with different expertise to express their view on identified issues to find a common and improved recommendations.

6. Conclusions

The pilot action of Kamniška Bistrica River Basin with its main river Kamniška Bistrica River faces many issues regarding water management in a broader sense. Kamniška Bistrica River is the largest Slovenian torrential river, which originates in the mountainous region of the Kamnik Alps and flows through the town of Kamnik into the lowlands. The main two issues recognised in the pilot action are in the following field of action; Drinking water supply management and Fluvial flood risk management. For both issues main measures were proposed.

The CC-ARP-CE web-based tool with all its features and strategies for climate change adaptation in water management was presented to the participants of the 2nd National Workshop. During the workshop, participants had the opportunity to review and test the tool and identify the issues in water management. They showed great interest in the CC-ARP-CE tool. Based on the practical testing of the tool, we obtained important findings and suggestions for improvements, which we will try to take into account in the future when building the final version of the tool.

Main opinion of the stakeholders was that the toolbox is well structured, useable and user friendly. They liked the idea of gathered information about climate indicators and an option to have an overlook of the issues in the selected area. Toolbox still needs a few upgrades (e.g., commenting section). Main concern was how the toolbox will be supported after the end of the project.

Existing strategies are well known. However there is a considerable lack of cooperation and communication between national and local level. A formation of water council or intermediate communication level was proposed.