PROLINE-CE

WORKPACKAGE T2, ACTIVITY T2.3

IMPLEMENTATION OF BEST PRACTICES FOR WATER PROTECTION IN PILOT ACTIONS

D.T2.3.1 EVALUATION REPORTS FOR EACH PILOT ACTION

PILOT ACTION: PA2.4 Groundwater protection in karst area

Lead Institution	PP8 - HGI-CGS
Contributor/s	See next page
Lead Author/s	Jasmina Lukač Reberski
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Contributors, name and surname	Institution
Josip Terzić	PP8 - Croatian Geological Survey, Department of Hydrogeology and Engineering Geology
Ivana Boljat	PP8 - Croatian Geological Survey, Department of Hydrogeology and Engineering Geology
Matko Patekar	PP8 - Croatian Geological Survey, Department of Hydrogeology and Engineering Geology
Ivona Baniček	PP8 - Croatian Geological Survey, Department of Hydrogeology and Engineering Geology
Daria Čupić	AP17 - Croatian Waters

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1. Introduction

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

Review of main land use conflicts and BMPs on Pilot Action level has already been done in Pilot Action BMPs reports, which were a basis for *D.T2.1.2 Transnational case review of best management practices in pilot actions*. Description of natural characteristics of Pilot Site is presented in *D.T.1.4 Descriptive documentation of pilot actions and related issues*.

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

The Deliverable *D.T2.3.1 Evaluation reports for each pilot action* presents an evaluation of actual implementation and thematic interpretation of tested management practices as well as their acceptance among stakeholders and experts is carried out for pilot action PA2.4 Groundwater protection in karst area. Pilot action activities in PA2.4 were performed in two adjacent test areas: 2.4.1 – South Dalmatia: Prud, Klokun and Mandina spring and 2.4.2 – Imotsko polje springs.

2. Evaluation of BMPs in Pilot Action

2.1. Implementation of BMPs

Best management practices, as seen in PROLINE-CE Interim report (D.T2.4.4), have not yet been implemented in pilot actions. Majority of proposed BMPs are either structural or require substantial amount of preparation and planning (e.g. economic evaluation), which often results in long implementation time. However, the first step towards implementation has been done - consultations with local stakeholders, which are described in the following chapter.

2.2. Acceptance of BMPs among stakeholders

The implementation of BMPs in pilot areas relies greatly on their acceptance amongst local, regional and even national stakeholders and decision makers. If there is no acceptance of particular level, the implementation has small chances.

Therefore, the first step was addressing relevant local stakeholders – water supply companies. During the regular monthly field work in pilot action PA2.4 – Groundwater protection in karst area, experts from Department of hydrogeology and engineering geology participated in several bilateral stakeholder meetings with decision makers and executive directors from water supply companies in Vrgorac, Metković and Ploče. The purpose of the meetings was to obtain first hand experiences regarding gaps and issues the companies experience in daily business and introduce BMPs proposed in PROLINE-CE project. Considerable amount of topics were covered during those meeting; the details can be seen in Annex 1 containing meetings minutes. In this chapter only, main topics are presented.

The utility service **Vrgorac** was represented by director, technical director and a city representative (April 2018). Main topic was flooding of Vrgoračko polje. Despite numerous tunnels and hydrotechnical works, polje still floods and therefore a new drainage tunnel is planned to drain water from southwest part of the field. Technical details were discussed and elaborated, pinpointing potential problems and changes in water regime after its construction. Furthermore, good news for water quality are that Croatian waters are planning to construct micro-sewage system near Butina spring, as well as finish the plant purification system in Vrgorac. Hosts provided HGI-CGS experts with positive feedback concerning application of proposed BMPs in pilot areas, however they were sceptical about dynamics of implementation as finding the right financial models for BMP implementation is a demanding task.

In May 2018, HGI-CGS experts held consultation in **Metković** Water Supply company with director and laboratory analyses executive. Discussed topics included: seawater intrusions in Doljane spring, agricultural pollution of surface water and groundwater, the need for transboundary cooperation in Prud catchment area (with Bosnia and Herzegovina) and planned hydrotechnical structure near Opuzen which will prevent seawater intrusions in Neretva River during summer. HGI-CGS experts presented BMPs to hosts, which also showed positive feedback and highlighted the importance of their application. However, they also mentioned potential issues which could linger the implementation of BMP, such as lack of funds, lack of will of higher management instances and resistance of local population (e.g. farmers, which should shift towards organic agriculture).

Shortly after Metković, another consultation session took place in **Ploče** with the director of water supply company. Director indicated that although Klokun spring as the primary source of water, currently meets the need for water, the inclusion of alternative drinking water sources (Modro oko spring) is envisioned in order to reduce dependencies on the existing source. Important factor to consider are exceptionally large water supply system losses (losses up to 70%) due to deterioration of the water supply network. Furthermore, we discussed about new waste water treatment facility that is planned in near future and about the proclamation of drinking

water protection zones (for Klokun spring) is another great issue that needs to be dealt with promptly. But positive changes have been observed as well. The director gave positive feedback about the implementation of BMPs in pilot area but emphasized the lack of experts (generally and even in Ploče water supply company) who could "push" the implementation.

Full documentation of meetings with utility services and water suppliers can be found at the end of this document in **Annex 1**.

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

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

Actual management practice (GAP)		Increased water demand	Pressure on water resources quantity
Proposed BMP		Establishment of groundwater level monitoring network in Imotsko polje and South Dalmatia	Climate change adaptation and resilience / Reconstruction of public water supply network
Proposed solutions and recommendations	Adaptation of existing land use management practices	If BMP is implemented, more efficient use of water in agriculture could be achieved. On the basis of new findings, agricultural stress on groundwater could be quantified and if necessary, land use change could be prevented.	Aim of measures is to mitigate negative effects of CC, therefore to prevent negative land use change and spreading of concrete surfaces. Instead, green retention and infiltration zones must be designated
	Adaptation of existing flood/drought management practices	Groundwater monitoring network will reduce uncertainty and could enable better responses and management action in case of floods and droughts	Flood management practices should include further construction of retention objects in flood prone areas. Agricultural production must adapt to upcoming CC scenarios and prolonged droughts by rationalizing water consumption and making it more effective
	Adaptation of policy guidelines	Relevant for water market: if necessary, revisions of payments, schemes and quotas	CC Adaptation Strategy 2040-2070 and Action Plan 2019-2023 provide good guidelines for adaptation and resilience for CC. Local authorities should

			incorporate it in local plans and strategies
IMPLEMENTATION		No	Partly yes
In case of NO:	• possibility of implementation	The measure is simple, but requires funding sources, which is unclear at the moment	Some structural measures are in implementation process, such as construction of new irrigation system for Imotsko polje
	• proposal of procedure for implementation	Water suppliers, municipality or county can seize the initiative or even finance it, but they can also file an official request to Croatian Waters	Local authorities should incorporate CC Adaptation Strategy 2040-2070 and Action Plan 2019-2023 provide good guidelines for adaptation and resilience for CC it in local plans and strategies
	• other (please, specify)		
ACCEPTANCE AMONG STAKEHOLDERS AND EXPERTS			
	• possibility of implementation	Stakeholders gave positive feedback, but realistic possibility is questionable (mainly due to financing)	Stakeholders gave positive feedback, but realistic possibility is questionable (consensus of all involved groups is hard to reach)
	• proposal of procedure for implementation	As in previous section	As in previous section
	• other (please, specify)		

Actual management practice (GAP)		Unsanitary and illegal waste disposal	Unsanitary and illegal waste disposal
Proposed BMP		Educative brochure and awareness raising activities	Encourage and promote innovative solutions of sustainable waste management
Proposed solutions and recommendations	adaptation of existing land use management practices	Not relevant	Not relevant
	Adaptation of existing	Not relevant	Not relevant

	flood/drought management practices		
	Adaptation of policy guidelines	Policy guidelines are good, penalties are prescribed for illegal waste dumping, but inspections are poor and misdemeanour is not punished	Innovative solutions for waste management are not mandatory, but rather an option. However, positive management examples can serve as a catalyst to improve waste management guidelines.
IMPLEMENTATION		Partly yes (in progress)	No
In case of NO:	• possibility of implementation		Main obstacle is unwillingness of the local community to adopt new environmentally friendly habits as a consequence of insufficient education on environmental issues and lack of government stimulations.
	• proposal of procedure for implementation		Small scale application must start in order to provide a positive example for the rest of community.
	• other (please, specify)		
ACCEPTANCE AMONG STAKEHOLDERS AND EXPERTS			
	• possibility of implementation	Stakeholders gave positive feedback and claim that foreseen activities will have positive impact on behaviour.	Stakeholders are a bit doubtful about the success of this measure. Although positive trends can be observed, the process is slow and requires persistence.
	• proposal of procedure for implementation	Details of optimal brochure dissemination and awareness raising activities will be discussed with local stakeholders	education of the local community to adopt new environmentally friendly habits
	• other (please, specify)		

Actual management practice (GAP)		Insufficiently effective waste water treatment system that needs to be reconstructed and expanded	Periodic field flooding
Proposed BMP		Natural waste water treatment system	Infrastructure maintenance and reconstruction / Non-structural flood mitigation measures
Proposed solutions and recommendations	adaptation of existing land use management practices	If measure is to be applied, land use and spatial planning documents and practices must be modified in a way that the municipality designates an area to be utilised as natural WWTS. This usually requires 3-5 m2 per population equivalent, making it ideal for small settlements, industrial sites, farms or landfills	Non-structural flood mitigation measures include prevention of land use change, establishment of protective forests and promotion of cultures resistant to floods (e.g. grapevines).
	Adaptation of existing flood/drought management practices	Natural WWTS must be flood-proof to avoid spreading of pollutants and degradation of water quality	Proposed measures could enhance flood mitigation and management action
	Adaptation of policy guidelines	Plans for the extension of sewage and purification network must shift towards green and innovative methods	Prevention of land use change should be included in designated sensitive areas (e.g. prevention of agricultural land spread on the account of Prološko Blato wetland areas).
IMPLEMENTATION		No	No
In case of NO:	• possibility of implementation	Hard to predict. Challenges include high costs (which is also case with other purification methods) and extensive land surface is needed for the method (up to 5 m2 per PE)	Measure is complex, as it faces resistance of local population, lots of financial compensation for losses, and generally, structural measures are still favoured
	• proposal of procedure for implementation	Local authorities or county starts the initiative and tries to find financial models	Expert community, service providers, decision makers and population must reach consensus in order to apply this measure
	• other (please, specify)		

ACCEPTANCE AMONG STAKEHOLDERS AND EXPERTS			
	• possibility of implementation	Unknown, mostly due to high costs.	Stakeholders gave positive feedback, but realistic possibility is questionable (consensus of all involved groups is hard to reach)
	• proposal of procedure for implementation	A first step towards the implementation of this BMP, will be the stakeholder involvement actions (authorities, local community, economic subjects etc.). Natural UWWT possibilities will be included in educative brochure (see previous BMP).	As in previous section
	• other (please, specify)		

Actual management practice (GAP)		Insufficient number of proclaimed drinking water protection zones on valuable springs in South Dalmatia
Proposed BMP		Defining and establishing sanitary protection zones in South Dalmatia
Proposed solutions and recommendations	Adaptation of existing land use management practices	If sanitary protection zones are proclaimed, land use management practices must definitely change. This is mostly related to agricultural practices, construction, spatial planning and waste management.
	Adaptation of existing flood/drought management practices	Not relevant
	Adaptation of policy guidelines	Policy guidelines are well developed concerning DWPZ, but implementation is lacking, inspections are inadequate, and penalties are rarely given.
IMPLEMENTATION		Partly yes
In case of NO:	• possibility of implementation	Realistic
	• proposal of procedure for implementation	Determination of drinking water protection zones (DWPZ), obligatory measures and limitations that are conducted in them as well as the deadlines for decisions on protection and the process

		of making these decisions are governed by The Ordinance on the conditions for the establishment of sanitary protection zones (Official Gazette No. 66/11 and 47/13).
	• other (please, specify)	
ACCEPTANCE AMONG STAKEHOLDERS AND EXPERTS		
	• possibility of implementation	The administration of this measures is expected to be more efficient in near future
	• proposal of procedure for implementation	Further education activities and awareness raising are needed to fully implement DWPZs
	• other (please, specify)	

3. Conclusions

Without intensive stakeholder engagement, the application of best management practices in pilot actions of Imotsko polje and South Dalmatia is impossible. In order to secure their involvement, various activities should be conducted such as an educative brochure assembly, awareness raising activities including consultations with local expert community, farmers, service providers (water utilities, waste disposal) and local government. These activities will have the sole purpose of educating the stakeholder groups in the numerous benefits of good management strategies coupled with BMPs that are in the best interest of the community as a whole. Some activity towards achieving this goal has already been done, but much more has to be done. Upcoming activities include further bilateral meeting with wide variety of local stakeholders, consultation with associated partner (Croatian Waters) and organisation of 2nd round of stakeholder workshops in pilot area. The latter is most important one, as it will gather local and regional stakeholders, decision makers, expert community and population. Possible shortcoming here could be the duration of the project. Although PROLINE-CE duration is too short to test the BMPs in pilot areas, indications towards positive changes in practices could be observable within project timeline. Croatian geological survey is a research institution, and therefore is not competent to directly implement measures and BMPs, but could only push such incentives via brochures, consultation with decision makers, education and further research.

4. References

- Bubnova, R.; Hello, G.; Benard, P.; Geleyn, J. (1995): Integration of the Fully Elastic Equations Cast in the Hydrostatic Pressure Terrain - Following Coordinate in the Framework of the ARPEGE/ Aladin NWP System. Monthly Weather Review, 123, p. 515-35.
- Castro, M., Fernandez, C.; Gaertner, M.A. (1993): Description of a mesoscale atmospheric numerical model. Mathematics, Climate, and Environment, Rech. Math. Appl. Ser., 27, p. 230-153.
- Langbein, W.B. (1962): The Water Supply of Arid Valleys in Intermountain Regions In Relation to Climate, IAHS Bull., Vol.7/1.
- Pal, J. et al. (2007): Regional Climate Modeling for the Developing World: The ICTP RegCM3 and RegCNEt. Bulletin of the American Meteorological Society, 88(9), p. 1395-1409.
- Programme of educative-informative activities on sustainable waste management. (2017). [online] Zagreb: Ministry of Environment and Energy. Available at: http://www.mzoe.hr/doc/program_izobrazno-informativnih_aktivnosti_aktivnosti_o_odrzivom_gospodarenju_otpadom.pdf [Accessed 27 Mar. 2018].
- Strategy for climate change adaptation, Ministry of Environment and Energy (2017) http://prilagodba-klimi.hr/wp-content/uploads/docs/Zagreb%20radionica%2006.04.2017.%20-%20HIDROLOGIJA%20-%20Rubinic.pdf
- Turc, L. (1954): Le bilan d'eau des sols, relation entre les précipitations, l'evaporation et l'écoulement, Troisiémes journées de l'hydraulique à Alger.

Annex 1. Documentation from bilateral stakeholder meetings

A1.1. Meeting with Ploče water supply

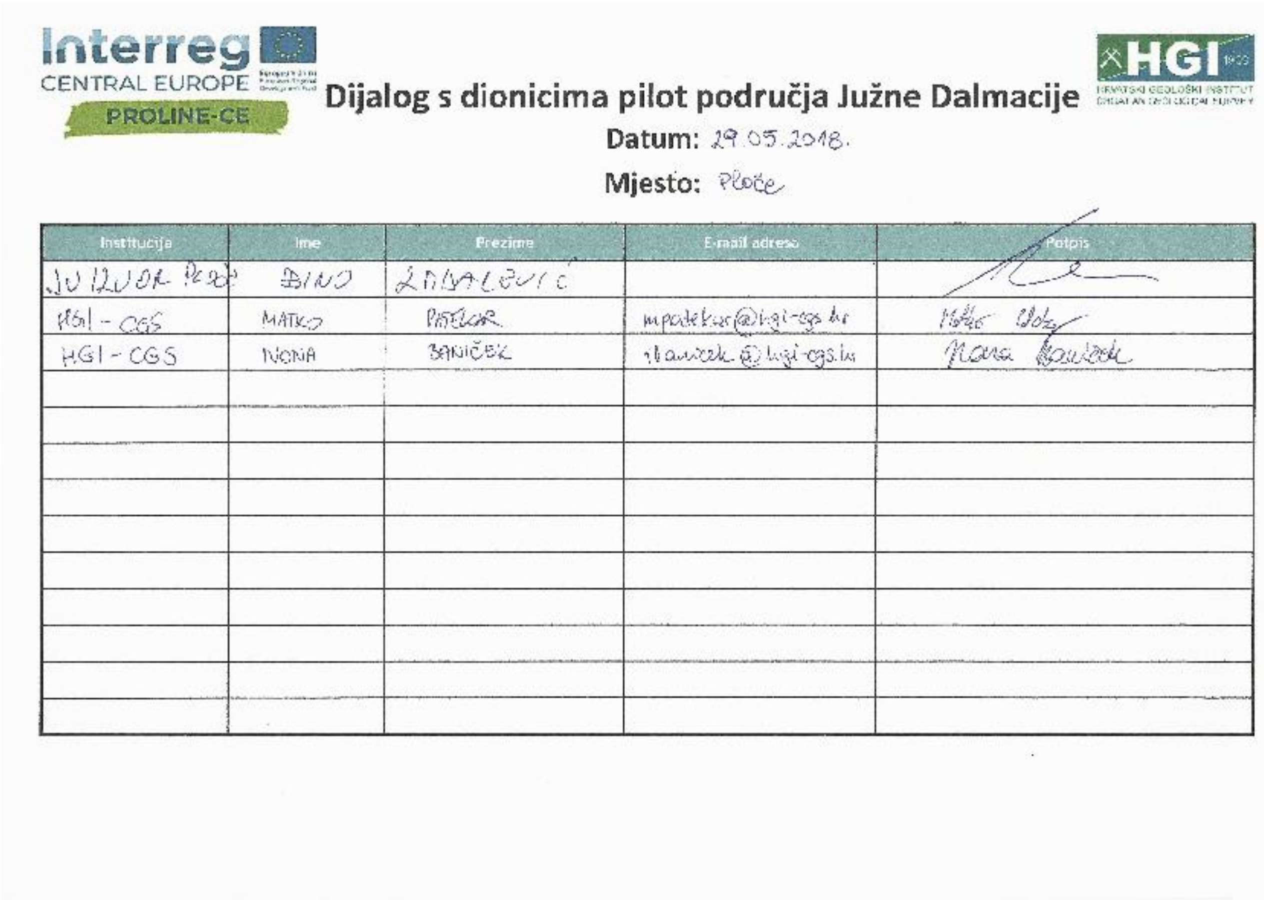
A bilateral meeting with the Ploče water supply from PAC2: South Dalmatia – Prud, Klokun and Mandina spring pilot action was organized on 29th of May 2018 in JU IZVOR PLOČE headquarters. The pilot action stakeholder was represented by director Mr. Đino Zmijarević. The aim of the meeting was to assess the status quo of the water supply area, its existing issues, take note of good management examples and also to inform the director of PROLINE-CE activities, preliminary results and pilot actions.

First discussed topic was the Klokun spring, which is very important for the water supply system of the City of Ploče and its surrounding area that includes some islands. The system supplies 2,629 households with water (100% connectivity). Their water consumption amounts to 41% (about 220,000 m^3) of the total annual water consumption of the household of water supply area. The port of Ploče, the second largest Croatian port, has around 55% of the total annual consumption of economic entities in the Ploče area. Mr. Zmijarević pointed out that although Klokun spring as the primary source of water, currently meets the need for water, the inclusion of alternative drinking water sources (the Modro oko spring) is envisioned in order to reduce dependencies on the existing source. He also pointed out exceptionally large water supply system losses (the loss values go up to 70%) due to deterioration of the water supply network. Despite such large losses, the system is functional and fully meets the current water supply needs, both in terms of pipeline permeability and pressure.

The gaps that were mentioned by the water supply director Mr. Zmijarević include the deterioration of the system due to age and the lack of wastewater treatment plant. Its legal permits will be done by the end of the year when the start of the facility construction is planned. The fact that Klokun spring has no drinking water protection zones is another great issue that needs to be dealt with promptly. For five years the water supplier has gathered the necessary documentation and conducted research but to no avail. The legal authority institutions are painstakingly slow and are thus hindering progress. The local population is averse to their enactment as it was proved when the water supplier closed a local road that goes through the first drinking water protection zone of the Klokun spring and the people rebelled against it. To some it is the fastest way to get to their fields. Another problem represents the lack of expert people in the JU IZVOR Ploče water supply.

But positive changes have been observed as well. Mr. Zmijarević claims that the agriculture is gradually growing less intensive, and the water supply has never had any nitrates and pesticides in the system. Younger people are returning to the area invigorating the economy and raising the awareness of the population, which is another reason to be optimistic, claims Mr. Zmijarević. JU IZVOR Ploče is continuing to apply for projects and subsidies and hoping to leave a positive mark on the area.

Experts from HGI-CGS informed the hosts about PROLINE-CE overall progress and further activities. 2nd round of stakeholder’s workshops, that will be organised in pilot area, was discussed and some helpful organisational advices were gather, namely who to invite and how to motivate people to attend. Important topic was application of best management practices for drinking water protection as the main activity of WP T2 – Pilots: Implementation and Feedback. Mr. Zmijarević gave helpful advice concerning implementation, namely, some problems which may occur and how to overcome them. He also pointed out some potential measures to include in existing measure bundle, which is a topic for further discussion.



Dijalog s dionicima pilot područja Južne Dalmacije

Datum: 29.05.2018.

Mjesto: Ploče

Institucija	Ime	Prezime	E-mail adresa	Potpis
JU IZVOR PLOČE	DINO	ZMIJAREVIĆ		
HGI - CGS	MATKO	PATEKAR	mpatekar@hgi-cgs.hr	
HGI - CGS	NONA	BANIČEK	ibanicek@hgi-cgs.hr	

Figure 1: Participant list for bilateral meeting in Ploče.

A1.2. Meeting with Vrgorac utility service

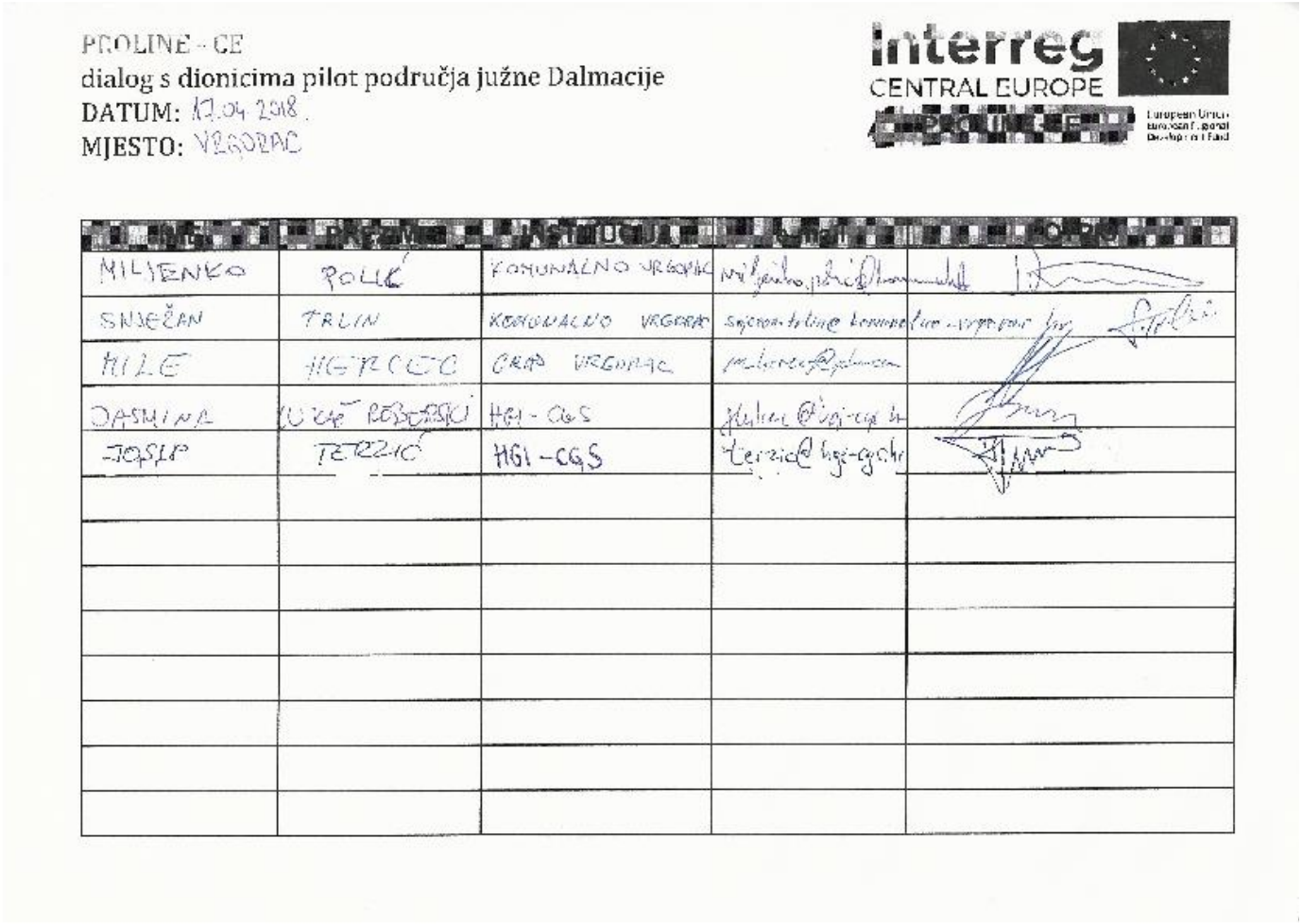
A bilateral meeting with the utility service Vrgorac representatives Mr. Miljenko Polić and technical director Mr. Snježan Trlin, as well as the representative from the City of Vrgorac Mr. Mile Herceg was held on the 17th of April 2018. in Vrgorac utility service headquarters. The City of Vrgorac and the Vrgorac polje belong to the PAC2: South Dalmatia – Prud, Klokun and Mandina spring pilot action. During the meeting, problems of the area were discussed, as well as ways to tackle with them.

First topic was the largest surface flow in this area - Matica River in Vrgoračko polje. During normal water levels, Matica flows from the Vrgoračko polje through the sinkholes and canal into the Baćina lakes. In the rainy season of the year, the sinkholes and canals of Vrgorac and Rastok fields cannot contain the water, so the fields get flooded. As highlighted in the Flood mitigation plan of the local water network of the Splitsko-Dalmatinska County, all current works on the design of these fields have had the basic aim of shortening the duration of the floods or reducing the maximum water level in order to enable better conditions for the agricultural production in the field. Hosts pointed out that numerous hydrotechnical works (the Rastok tunnel that drains water from the Rastok field to the Vrgoračko polje, the Krotuša tunnel that drains the water from the Vrgoračko polje in Baćina lakes), which reduced the level and duration of the fields flooding, were carried out, but the floods were not prevented. For this reason, a new drainage tunnel is planned to drain water from the Vrgoračko polje to Birina lake, which would also help to improve the ecological quality of the lake. But the local population are against it for it is planned to traverse across 360 000 m^2 of their most fertile agricultural land, which in turn prompted the responsible organizations to remedy their plans and abide by the farmer suggestions. Mr. Polić said that the new drainage tunnel will be constructed to the southwest of the field, near Kutac from where the majority of flood water originates in winter. Croatian waters are planning to construct micro-sewage system near Butina spring, as well as finish the plant purification system in Vrgorac.

During the meeting, recent studies have been mentioned, where it has been established that the Vrgoračko polje, which is intensively farmed, belongs to the second zone of sanitary protection (according to the valid Ordinance). This fact should encourage the local population to turn to ecological farming because such production prohibits the use of most mineral fertilizers and almost all pesticides whose use is prohibited within the second zone of sanitary protection. Everybody agreed that it should become a legal obligation, not just the free will of the local population, but for agricultural practices to change and also for the consciousness of the population, significant time is usually needed.

Experts from HGI-CGS informed the hosts about PROLINE-CE overall progress and further activities. 2nd round of stakeholder's workshops, that will be organised in pilot area, was discussed and some helpful organisational advices were gather, namely who to invite and how to motivate people to attend. Important topic was application of best management practices for drinking water protection as the main activity of WP T2 – Pilots: Implementation and Feedback. Mr. Polić gave helpful advice concerning implementation, namely, some problems which may occur and how to overcome them. Hosts from Vrgorac water utility service also showed interest in modelling activities, climate changes and

hydrogeological field investigations, so these results will be presented to them either in another bilateral meeting in near future.



PROLINE - CE
dialog s dionicima pilot područja južne Dalmacije
DATUM: 12.04.2018.
MJESTO: VRGORAC

MILJENKO	POLIĆ	KOMUNALNO VRGORAC		
SNJEŽAN	TRLIN	KOMUNALNO VRGORAC		
MILE	HERCEG	CRO VRGORAC		
DASMINA	UČAK REBERŠAK	HGI - CGS		
JOSIP	TERZIĆ	HGI - CGS		

Figure 2: Participation list for bilateral meeting in Vrgorac.

A1.2. Meeting with Vrgorac utility service

During the regular monthly field work in pilot action PAC 2 – South Dalmatia, on May 29 2018, experts from Department of hydrogeology and engineering geology participated in a bilateral meeting with the Metković Water Supply company, which manages karst spring Prud, used for water supply of Metković and surrounding area, as well as important water supply system of "NPKLM" – Neretva, Pelješac, Korčula, Lastovo, Mljet islands. The Metković water supply representatives were the director Mr. Filip Dominiković and the laboratory analyses executive Mr. Matko Jerković.

The meeting started with general topics regarding local water supply and springs. Firstly, Prud is a big karst spring which represents the easternmost boundary of the discharge zone and in itself represents the origin of the Norinska River, the right tributary of the Neretva River. The whole area is a part of a hydrogeologically and hydrologically complex system of a multi-named sinking river (called Ričina, Suvaja, Matica, Tihaljina, Sita, Mlade and Trebižat) which sinks and resurfaces repeatedly. In the course of the river, there are losses which appear as inflows in the neighboring drainage basins, including the drainage basin of Prud spring. The Prud spring has an aquifer of a transboundary character due to its location only 300 m from the border between Croatia and Bosnia and Herzegovina, with practically its entire catchment situated in the neighbouring Bosnia and Herzegovina.

Mr. Jerković illustrated the status quo of the water supply area, its current shortcomings and positively implemented measures. The greatest issue that they pointed out is cross-border cooperation on water protection. The opinion of Mr. Jerković and Mr. Dominiković is that Bosnia and Herzegovina is experiencing great institutional fragmentation which leads to decentralized legislation and ultimately makes it hard for any joint collaboration. They mentioned the example of the Doljane spring situated in the Čapljina County in the Bosnia and Herzegovina which is used for the Metković area water supply. Since the County isn't using the Doljane spring for their water supply, it hasn't invested in the infrastructure for the past 50 years, so Metković has taken over. Furthermore, the spring is in danger of seawater intrusion during spring rains. It lasts for about a month which prompts the Metković water supply to include the Prud spring into the water system in order to compensate for the losses.

Hosts from water supply also pointed out a great problem - the intense, unmonitored agriculture in Bosnia and Herzegovina that pollutes the catchment area of Ljubuški which borders Croatia. Hence the issue of turbidity in the Prud spring during high rainfall. The Metković water supply is working on a mechanical water pump model that will mix and filter the water to minimize contamination influences from across the border.

An example of good management practice is the construction of a hydrotechnical structure near Opuzen City that will tackle the issue of seawater intrusion in the Neretva River during summer. It poses a great threat for the supply of freshwater, especially in the height of the tourist season. Interesting anecdote was told by Mr. Jerković concerning seawater intrusions in Neretva River, strangely enough, it is possible to catch squid in Metković city centre. Furthermore, Metković water supply has constructed a natural

wastewater treatment system, as well as reconstructed a part of the sewage system network in Prud that has 150 people connected to it, while the target number is 500.

Experts from HGI-CGS informed the hosts about PROLINE-CE overall progress and further activities. 2nd round of stakeholder's workshops, that will be organised in pilot area, was discussed and some helpful organisational advices were gather, namely who to invite and how to motivate people to attend. Important topic was application of best management practices for drinking water protection as the main activity of WP T2 – Pilots: Implementation and Feedback. Mr. Jerković and Mr. Dominiković gave helpful advice concerning implementation, namely, some problems which may occur and how to overcome them. They also provided useful contacts from expert community and universities, regarding problematics of seawater intrusions in Neretva River.

Dijalog s dionicima pilot područja Južne Dalmacije

Datum: 29.05.2018.

Mjesto: Metković

Instituција	Ime	Prezime	E-mail adresa	Potpis
METKOVIĆ D.O.O.	FILIP	DOMINIKOVIĆ		
METKONIĆ doo.	MATKO	JERKOVIĆ	mjerkovic@vodovod-metkovic	
HGI-CGS	MARIO	TAFRA	m.tafra@hgi-cgs.hr	
HGI-CGS	IVONA	BARIČEK	ibaricek@hgi-cgs.hr	

Figure 3: Participants of bilateral meeting in Metković