PROLINE-CE

WORKPACKAGE T4, ACTIVITY 4.2

D.T4.2.4. OPERATIONALISATION STAKEHOLDER WORKSHOP

29.11.2018, METKOVIĆ, CROATIA
PP 8 / HGI-CGS

«DRINKING WATER RESOURCE PROTECTION AND NON-STRUCTURAL FLOOD MITIGATION MEASURES»

December 2018

Lead Institution	**HGI-CGS**
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Date last release	**24.12.2018.**

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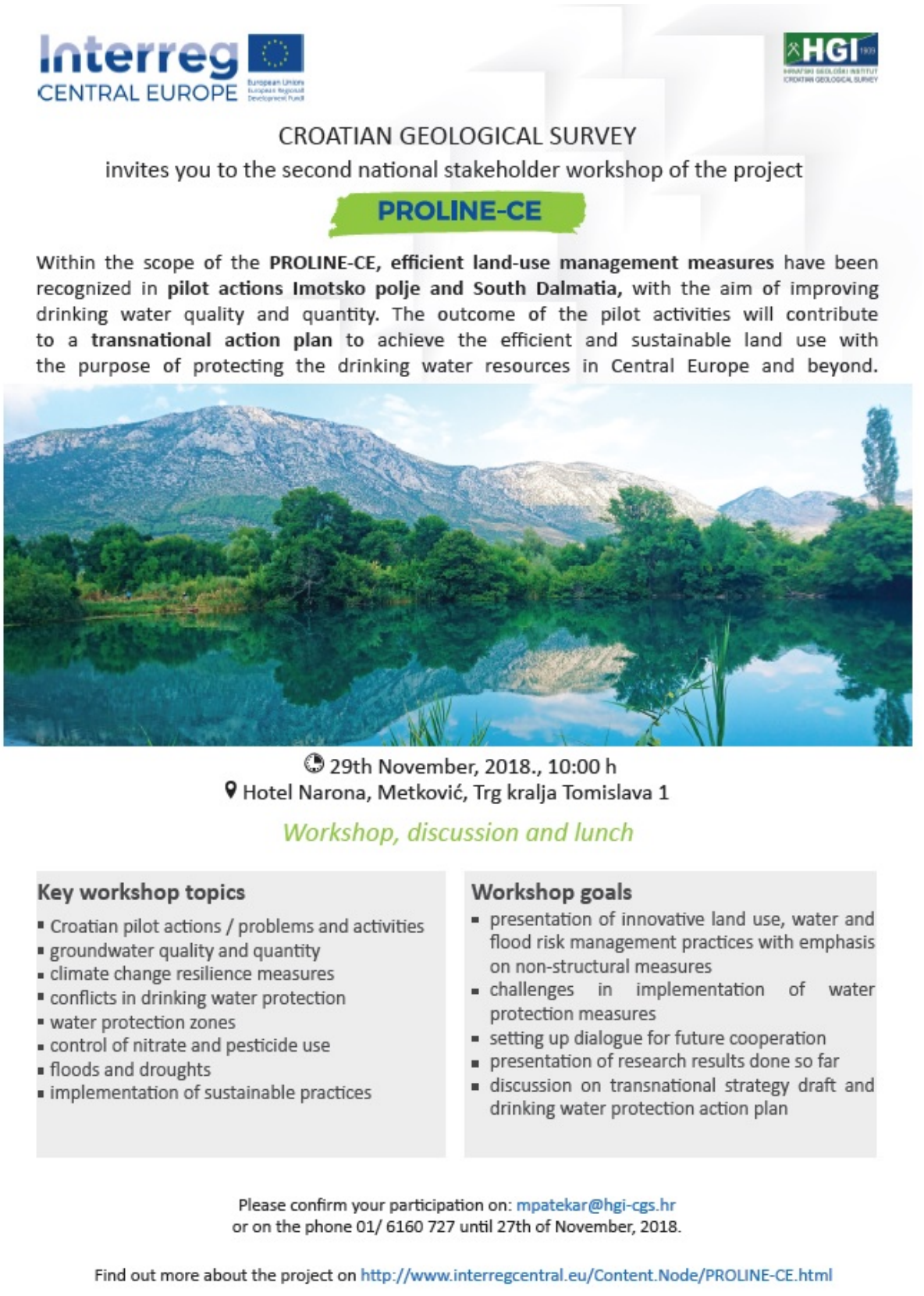
1. Introduction

The second national stakeholder workshop was organized by the Croatian Geological Survey, Department of Hydrogeology and Engineering Geology on November, 29th 2018 in Hotel Narona, Metković, Croatia within the thematic WPT4: Advancement: Strategic Positioning and Commitment. City of Metković was chosen due to its strategic geographical position within the pilot actions, specifically within pilot action South Dalmatia. Invitations were sent to over 155 stakeholders via post and e-mail, as well as through individual telephone calls. 31 stakeholders attended the workshop.

The main goals of the workshop were:

- presentation of innovative BMPs for drinking water protection, especially through non-structural measures
- challenges in daily water protection implementation
- striking up transnational dialogue
- presentation of research results
- discussion on PROLINE-CE project outcomes and their implementation and acceptance, namely DriFLU charta

The translated workshop invitation and agenda are attached below.



CROATIAN GEOLOGICAL SURVEY

invites you to the second national stakeholder workshop of the project

PROLINE-CE

Within the scope of the **PROLINE-CE, efficient land-use management measures** have been recognized in **pilot actions Imotsko polje and South Dalmatia,** with the aim of improving drinking water quality and quantity. The outcome of the pilot activities will contribute to a **transnational action plan** to achieve the efficient and sustainable land use with the purpose of protecting the drinking water resources in Central Europe and beyond.

29th November, 2018., 10:00 h

Hotel Narona, Metković, Trg kralja Tomislava 1

Workshop, discussion and lunch

Key workshop topics

- Croatian pilot actions / problems and activities
- groundwater quality and quantity
- climate change resilience measures
- conflicts in drinking water protection
- water protection zones
- control of nitrate and pesticide use
- floods and droughts
- implementation of sustainable practices

Workshop goals

- presentation of innovative land use, water and flood risk management practices with emphasis on non-structural measures
- challenges in implementation of water protection measures
- setting up dialogue for future cooperation
- presentation of research results done so far
- discussion on transnational strategy draft and drinking water protection action plan

Please confirm your participation on: mpatekar@hgi-cgs.hr
or on the phone 01/ 6160 727 until 27th of November, 2018.

Find out more about the project on http://www.interregcentral.eu/Content.Node/PROLINE-CE.html

***Figure 1**. Workshop invitation that was sent to the stakeholders*

AGENDA
Second national PROLINE-CE workshop

„Drinking water resource protection and non-structural flood mitigation measures“

29th November, 2018.
HOTEL NARONA, Trg kralja Tomislava 1, Metković

9:30 - 10:00	Registration
10:00 - 10:10	Opening words and greetings by the mayor of Metković
10:10 - 10:30	“Hydrogeological relations in the pilot action Imotsko polje and South Dalmatia“ dr. sc. JOSIP TERZIĆ, dipl. ing. geol. Croatian Geological Survey
10:30 - 11:15	“Hydrology of the Neretva River delta” Prof. dr. sc. OGNJEN BONACCI
11:15 - 11:45	“Natural and antropogenic processes are changing the quality of water and soil in the lower part of the Neretva River“ Prof. dr. sc. DAVOR ROMIĆ Faculty of Agriculture, Zagreb
11:45 - 12:15	“Innovative approach to land use as a tool of drinking water resource protection“ MATKO PATEKAR, mag. geol. Croatian Geological Survey
12:15 - 12:30	Coffee break
12:30 - 14:00	Interactive discussion: • Innovative water protection management praxis and non-structural measures, • Current and future challenges in water management and flood risks, Creation of a transnational water protection strategy
14:00 - 15:00	• Lunch

Figure 2. *Workshop agenda that was sent to the stakeholders*

2. Minutes

The workshop was opened by introductory words from the project partner leader Josip Terzić, the Head of the Department of Hydrogeology and Engineering Geology in Croatian Geological Survey. The mayor of Metković – Dalibor Milan offered his welcome to all attendees and wished for a successful workshop.

The invited lecturers are all renowned experts in their field of research with much work experience in the pilot action. PhD Josip Terzić is a karstic hydrogeology expert and the project partner leader whose presentation dealt with the status quo of hydrogeological conditions in the pilot actions, the history and future of research in the area and the effort HGI-CGS has put into investigation of complex hydrogeological relations in karstic environments.

Professor emeritus Ognjen Bonacci from University of Split, Faculty of Civil Engineering, Architecture and Geodesy, is a famous hydrology expert who specialized in hydrological modelling and environmental impact assessment. He presented the hydrology of the Neretva River delta, importance of wetland protection and its ecosystem properties. He stressed out negative impacts of changes in hydrological regime in Neretva river system, namely environmental degradation of Ramsar site Hutovo Blato in Bosnia and Herzegovina. As an example, he pointed out the case from California, San Joaquin valley, where due to extensive water abstraction for irrigation purposes the land subsided 9 meters.

Professor Davor Romić from University of Zagreb, Faculty of Agriculture, is the former minister of agriculture in the Republic of Croatia and a native from Metković who did numerous studies and research in the Neretva River area. His presentation described the agricultural situation which stems from various natural and anthropogenic processes in the Neretva River area. He spoke of the adverse effects of the salinization process which is occurring in Neretva, as well as the irrigation with salt water and all the negative consequences to the soil. The presentation entailed footage of land-use change of the valley and how agriculture expanded throughout the years, marking an ongoing expansion trend which is pressuring the resources of the area.

Matko Patekar, mag.geol., from HGI-CGS, presented PROLINE-CE activities in the pilot action, the recognized gaps and issues, as well as the integrated approach to water protection, ecosystem services, especially the hydrological services in agricultural ecosystems as well as project outcomes. His presentation stressed the importance of non-structural measures and climate change effects which must be taken into account during any planning.

2.1. Presentation of pilot action outcomes

The pilot actions have several major issues, which were discussed in great detail during the workshop. Some of the most important being: field flooding, intensive agricultural activity, deficiencies in the sewage and waste water drainage systems, illegal waste dumps, water supply system losses, lack of sanitary protection zones and lack of transboundary cooperation on catchment level.

Pilot action outcomes, namely challenges, solutions, potential ecosystem services and PROLINE-CE outputs and results, were contained within a project brochure which was handed out to all workshop participants.

Josip Terzić accentuated the lack of established drinking water protection zones and deficient legislation as being a pressing matter which requires prompt response from the responsible authorities. Furthermore, he also presented on-going field investigation carried out by HGI-CGS – regular monthly hydrogeochemical investigations, performed at 20 springs across pilot action area as well as the results of climate change modelling done for the pilot areas Imotsko polje and parts of South Dalmatia. In short, climate models (Aladin, RegCM3, Promes) for these areas predict substantial losses of water resources as well as changes in precipitation trends in period from 2021 to 2050. Workshop participants agreed that climate changes cannot be ignored anymore and immediate action is necessary. After the conducted investigations, all results will be available to all relevant stakeholders (e.g. water suppliers, local/regional water policy and decision makers).

Prof. emeritus Ognjen Bonacci, a renowned expert in local and regional hydrological projects, discussed about difficulties in organizing a transnational project of Neretva and Trebišnjica River management whose purpose is to ensure efficient water distribution between users of the catchment area and enhance the biological diversity. He stressed out that it necessary to deal with downstream erosion, which is caused by increased sedimentation in accumulations of upstream hydrotechnical objects, namely hydro power-plants on Neretva. As the most important BMP, he stated that it is necessary to re-establish strict monitoring of water levels and minimum flow rates, as the current situation is such that there is no monitoring, so that the legal restrictions in power-plant operations could be evaded.

Prof. Davor Romić mentioned education of farmers regarding irrigation water and techniques as a best management example. Consequently, he concluded that it is necessary to equip farmers with electro conductivity measuring instruments so they can monitor the water salinity. As it stands, many irrigate their crops with salt water due to no-choice situation, causing crops to dry up and perish. Also, more detailed monitoring as well as agricultural planning is necessary.

Matko Patekar presented the pilot action activities which include hydrogeochemical research, both *in-situ* and in the laboratory, as well as the climate change modelling. His presentation emphasized the issues of the pilot action, but pointed out concrete measures that could alleviate the majority of the problems such as establishing a groundwater monitoring network in the Imotsko and Vrgoračko polje for water quality and quantity monitoring, non-structural flood mitigation measures, change in spatial plans through preventive land use (protective forests, protection of natural retentions), natural wastewater treatment systems and ecological agriculture. As several natural wastewater treatment systems are already constructed in the vicinity, stakeholders pointed out some of possible downsides of such a facility (e.g. lack of maintenance).

Majority of recognized BMPs received positive feedback and generally high acceptance. As the main challenge, funding options are pointed out. As BMPs promote topics such as water protection, pollution and climate changes, they managed to increased awareness among the whole community and water users. Media coverage (Radio Delta) also enhanced the dissemination of workshop topics amongst population. All lecturers were asked for a brief

interview by the radio journalist, who expressed a high interest in workshop topics and asked precise thematic questions.

Intensive stakeholder involvement is the first step towards the implementation of any BMP as its success depends solely on their acceptance on a local and regional level which can be instigated through various planned activities such as the second national workshop. Hence, this workshop provided a great step forward towards implementation and acceptance of promoted BMPs.

One important shortcoming is the duration of the project, i.e. its shortness to test the BMPs on pilot actions. But tendencies towards a positive change can be observed within the project timeline. Another limitation to successful BMPs implementation is the fact that HGI-CGS is a research institution and therefore not authorised to directly implement measures, only use incentives such as brochures, consultation with decision makers, education and further research.

2.2. Presentation of measures and funding systems for supporting ecosystem services

Agricultural ecosystem services are due to intensive production, the dominant type in the pilot actions. Provisioning ESS (namely food production) is expected to rise in near future as the agricultural production intensifies due to the construction of irrigation system (in Imotsko polje). Planned irrigation system will significantly change agricultural production and shift it towards fruit production, which requires more water than vineyards. This may cause adverse effects on local hydrologic attributes as more water will be used by plants, therefore affecting surface and groundwater flow and storage in polje and finally affecting local climate interactions and water supply (water for municipal use). Together with climate change and predicted possibility of great loss of water resources in the future, the pressures are stacking.

Besides agriculture, livestock production is also an important economic driver in the area. Grassland and pastures are at risk due to land-use change (mostly regarding conversion to agricultural land) and expansion of cities and infrastructure. From the point of hydrologic services, grasslands in the optimal state mitigate flood and drought effects, cycle and remove nutrients and other pollution, protect soil from erosion, contribute to climate stability and to soil production.

Central and south-eastern parts of Imotsko polje are prone to periodical flooding. Similar problems are present in Vrgoračko polje and Neretva River valley. Natural conditions of ecosystems in these poljes were negatively modified by the numerous construction interventions (channel and tunnel for drainage of surplus water from the flooded fields) both in Croatia and upstream in the neighbouring Bosnia and Herzegovina. The choice of structural measures over non-structural or natural measures for flood mitigation often creates a false sense of security, encouraging people to accept high risks (such as construction in previously flood prone areas).

The presentation from prof. Ognjen Bonacci showcased ecosystem benefits from protecting Neretva River delta wetlands such as water purification, production of organic and mineral matter, energy production and protection of hydrological regime, just to name a few. Matko Patekar mentioned best management practices for establishment and protection of agricultural ecosystem services in the pilot action which includes grassland conservation, crop rotation,

conservational tillage, establishment of buffer strips and green retention measures. Prof. Romić demonstrated the benefits of organic farming in the Neretva River area.

Possibilities for funding encompass several programmes:

- Measure 11 from the Rural Development Programme of the Republic of Croatia for the Period 2014-2020 (incentive to encourage organic farming)
- HBOR loans and credits (Croatian Bank for Reconstruction and Development) for the improvement of water supply systems
- European Investment Bank funds for water management financing facility – investment for bringing existing water supply and wastewater systems into good operating condition and minimize the great water losses of the region

2.3. Carousel discussion

A moderated discussion led by the project partner leader Josip Terzić ensued after the coffee break. The discussion was a two-way, productive interaction between experts and local water suppliers.

Some of the highlighted topics were:

- Issues related to the drinking water protection zones - cross-border cooperation, spatial range, determination of the catchment area, political obstacles in implementation
- Projects that significantly change the hydrological regime of Neretva River - "Upper Horizons" and "Lower Horizons"
- Soil and water salinity – salt water irrigation problems, inadequate equipment
- Future development projects and potential solutions for problems in the Neretva River hydrological system

Two projects that inspired controversy are Gornji Horizonti and Donji Horizonti on the Trebišnjica River in Bosnia and Herzegovina. They represent a megaproject which is comprised of great technical constructions – seven hydroelectric power plants, six accumulations, numerous dams, channels and tunnels which collect the water from the Trebišnjica River catchment area for electrical energy purposes. The idea behind the projects had potential, but through the years the implementation was lacking, structural measures were too severe and not all stages of the project were realized. The consequences affect both countries and entail salinization of drinking water resources, field flooding, lack of water during summer months, poor hydroelectric power plant management and various others.

Some good management examples were mentioned that are relevant for the pilot action, such as the cabbage production that caused high nitrates in the water in Blato on the island of Korčula. After intensive educative activities, the locals moved cabbage away from the drinking water source (abstraction point) which drastically reduced the nitrates and effectively cleared the

water. Numerous examples of seawater intrusion due to over-extraction that happened all over Europe were brought up. It only proved that such an issue is manageable and not seldom. As one of the main problems to be tackled with are education of the local people and instigation of awareness raising activities.

The representative from Croatian Waters mentioned the soon-to-be signed transnational agreement of a collective piezometric monitoring of water levels in both Croatia and Bosnia and Herzegovina, which is the first step to tackle with the water problems of the region.

Many participants spoke of the lacking transnational regulations for water management that are not settled between the two countries and their different legislations in the matter.

A good management example presented is the first case of a transboundary water protection project for Prud water supply which will include restrictions from both countries as well as the compilation of a new study. HGI-CGS applied on the tender to lead the research. The results of the tender are still pending.

3. Main Results/Feedback

The workshop in general was a success. Many local stakeholders responded to the invitation and 31 people attended the event from which the following target groups could be formed:

- Higher education and research (expert audience): 12
- Public service providers (water suppliers): 7
- General public (retired experts, media reporter): 4
- Regional public authority (County representatives): 3
- National public authority (National agency, Croatian Waters): 2
- Other (consulting agency): 2
- Local public authority (Bosnian and Herzegovinian municipality representative): 1

Important questions were raised, current research in agriculture and hydrogeology was presented and a transnational dialogue was established due to attending water supplier representatives from the neighbouring Bosnia and Herzegovina. The high-profile lecturers attracted a lot of attention from expert audience which in turn resulted in a highly dynamical discussion. Nevertheless, the establishment of a transnational dialogue and its continuation should be carried on through similar events. Majority of participants have concluded that the solution for majority of water related issues are simple and at hand, but requires high level of commitment in order to be implemented. Generally, participants expressed high interest in workshop topics which prompted many questions and debates. All participants received a project brochure (Fig. 10) with challenges, solutions, potential ES services and major PROLINE-

CE outputs, e.g. DriFLU charta, in order to further promote water protection topics in pilot area and beyond.

4. Photos

The pictures are the courtesy of Radio Delta (radiodelta.hr) that made a media coverage of the event.

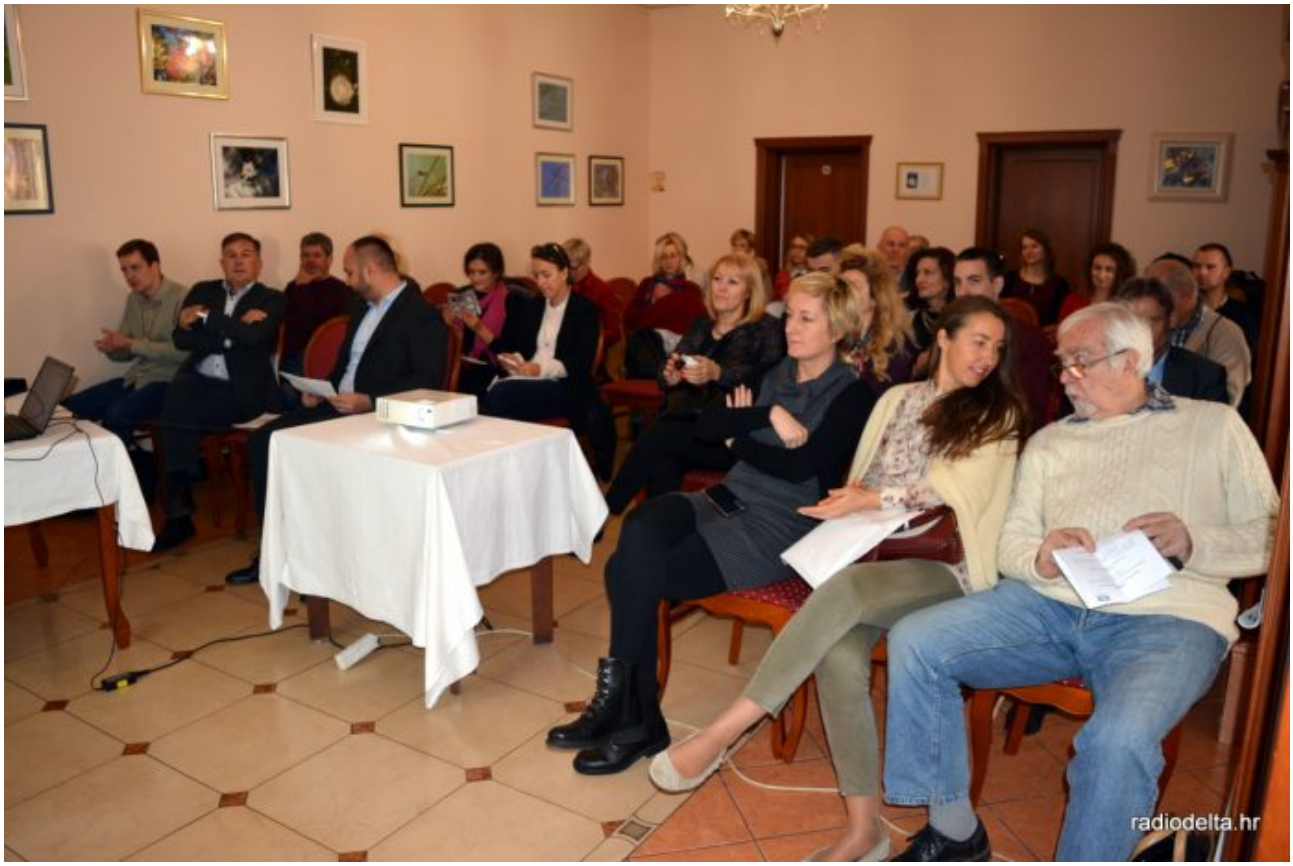


***Figure 3**. Stakeholders which attended the workshop*

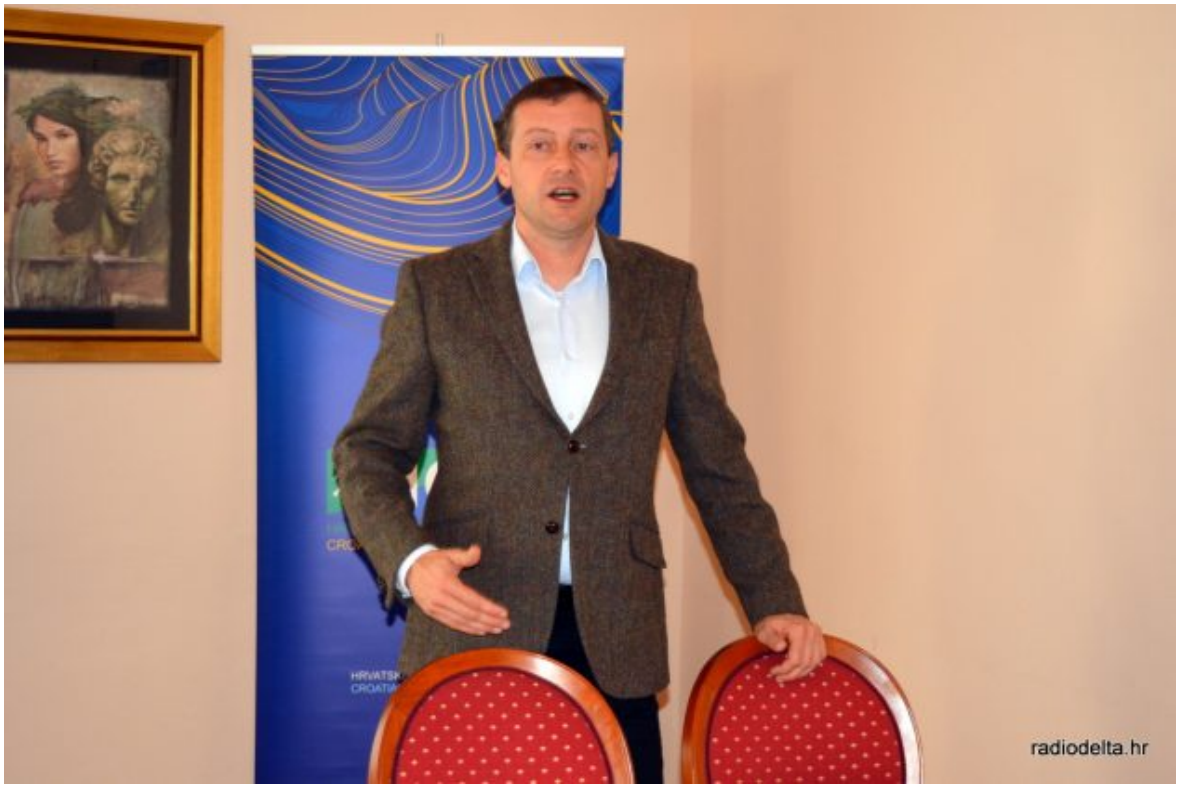


***Figure 4**. PhD Josip Terzić during presentation*

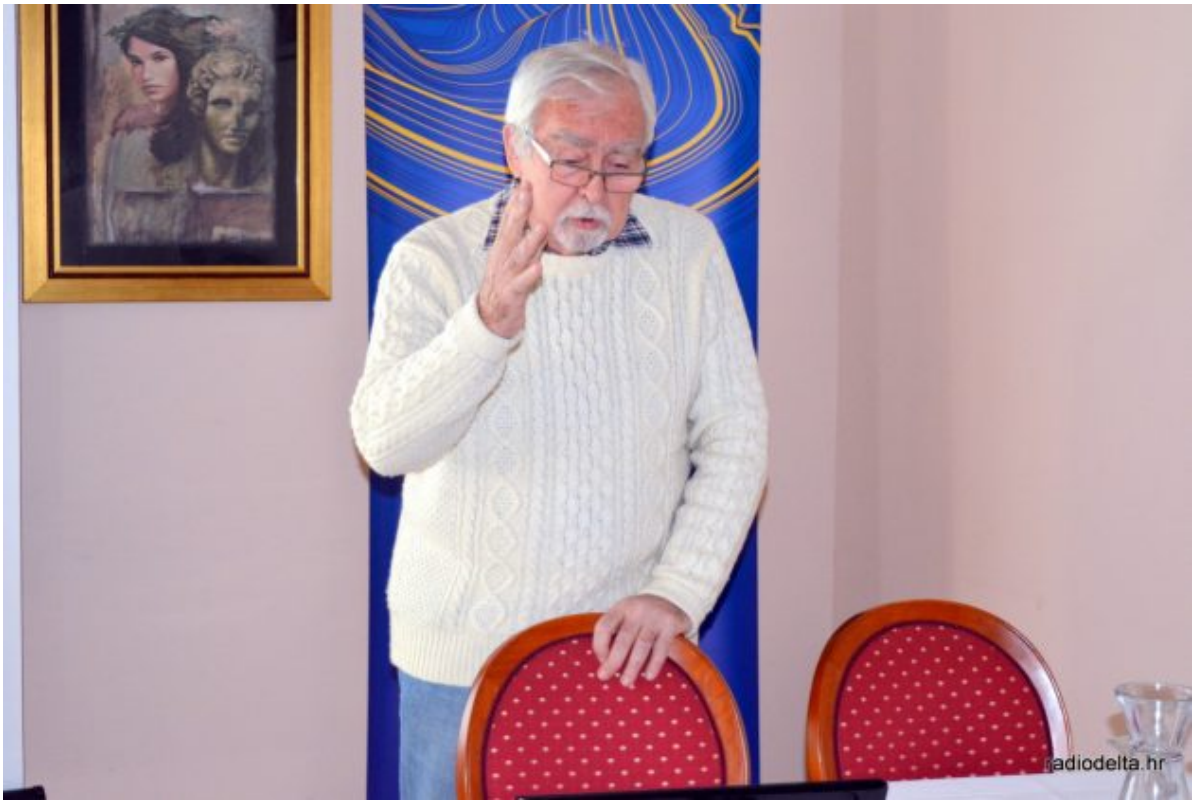


***Figure 5**. Professor emeritus Ognjen Bonacci during his presentation*

Figure 6. Professor Davor Romić during his presentation

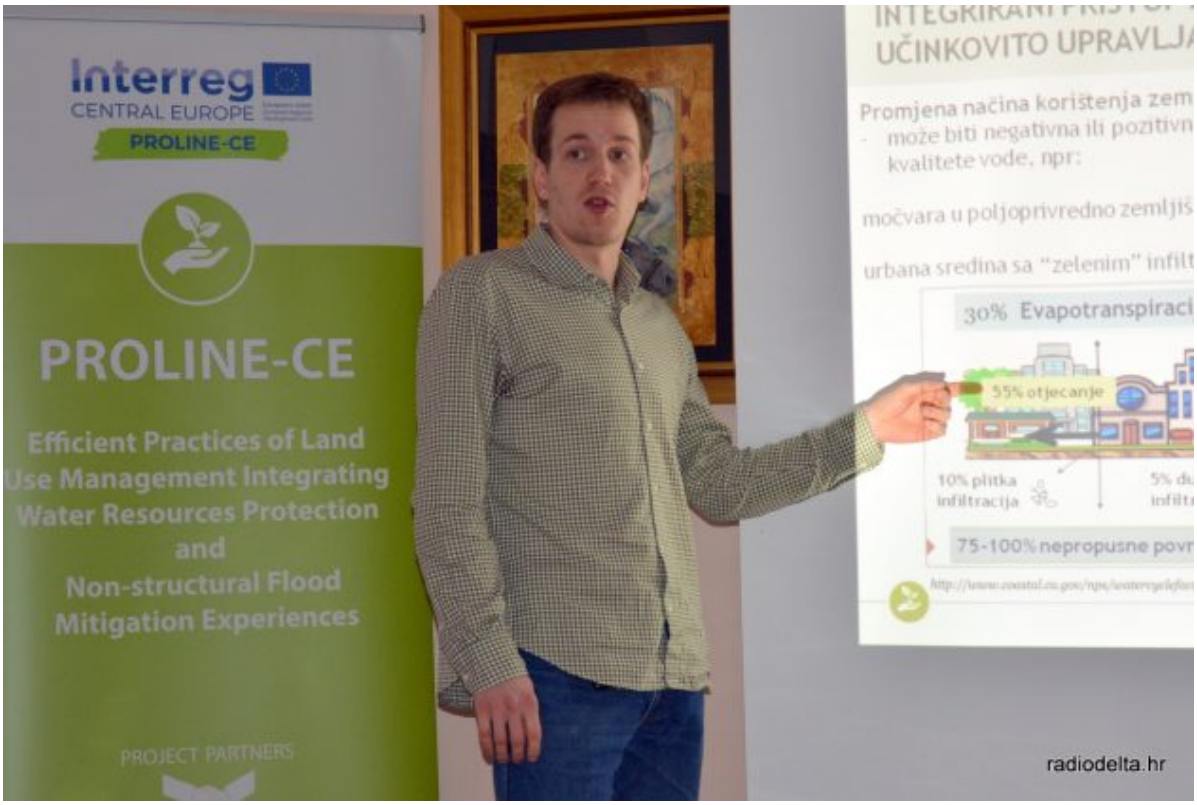


Figure 7. Matko Patekar, mag.geol. during presentation

Figure 8. Moderated discussion

Figure 9. Dynamic expert discussion

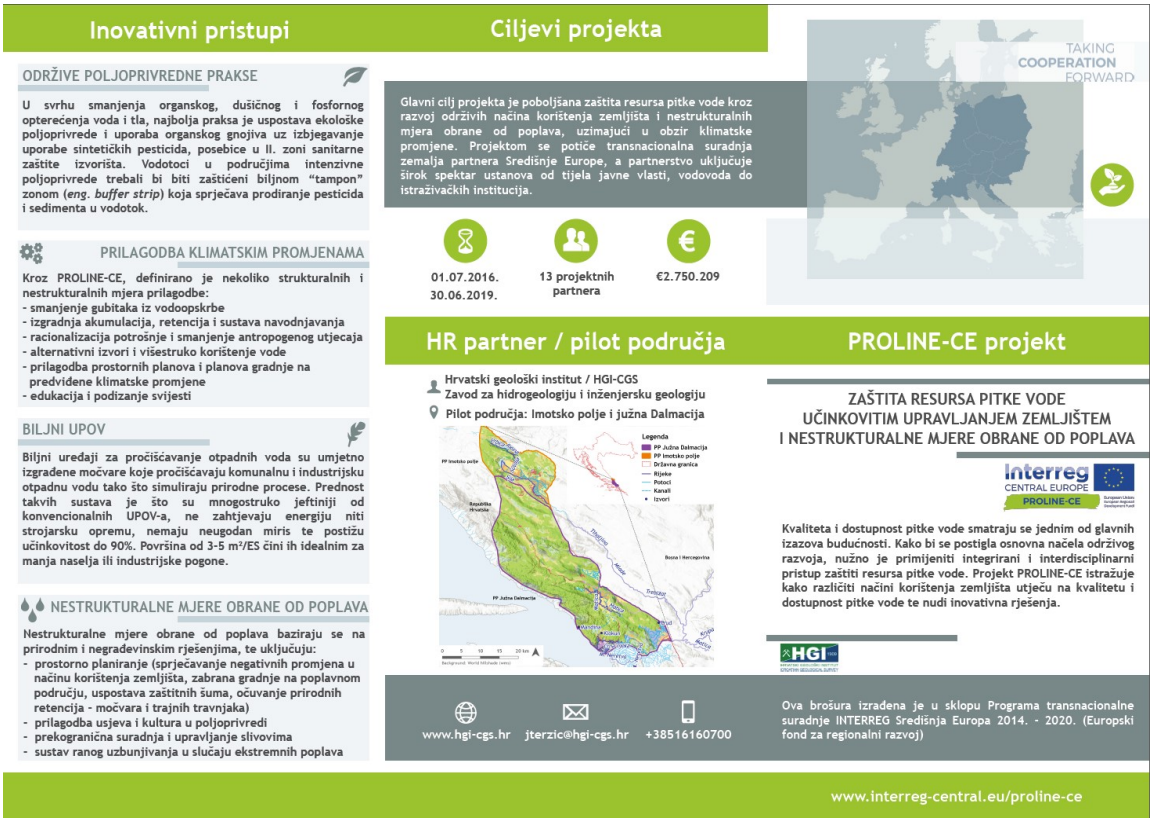


Figure 10. *Trifold PROLINE-CE pilot action brochure in Croatian language*

5.Participation List

PROLINE-CE Druga nacionalna radionica u Metkoviću - Registracijska lista
29.11.2018.

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PROLINE-CE Druga nacionalna radionica u Metkoviću - Registracijska lista
29.11.2018.

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PROLINE-CE Druga nacionalna radionica u Metkoviću - Registracijska lista
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