#4 newsletter

december 2021

Interreg Italy - Croatia WATERCARE

EUROPEAN UNION

THE PROJECT WATERCARE PRESENTED DURING THE IRBIM DAY (1 DECEMBER 2021)

A Watercare User Manual (Penna P. and Moro F.: https://zenodo.org/record/5774333#.Ybyu0VnSKUk) has been drown up in order to be used for field operation by all partners of the project. It will be used and updated in new sites.

New promotional Watercare video will be published soon!

INTRODUCTION

The vulnerability of the Adriatic area to the climate changes, in particular of the Italian territory but also Croatian, and its natural resources, is very high. Massive rainy events are causing floods of rivers and streams with relevant consequences on environment. These events significantly affect the quality of bathing and coastal water.

WATERCARE aims to improve the quality of the microbial and environment and resource efficiency in bathing and coastal waters reducing the microbial contamination by using innovative tools in waste management and treatment WATERCARE will: develop an innovative Water Quality Integrated System (WQIs) composed by a real : time hydro-meteorological monitoring network; realize an ad-hoc infrastructure for bathing waters management in a pilot site through a forecast operational model; realize feasibility studies in other 4 target sites to improve planning and management of environmental problems of the marine system; develop a real-time alert system able to preventively identify the potential ecological risk from focal contamination of bathing waters and to support governance decision and processes in bathing water management.

PARTNERSHIP

CNR IRBIM
Aset Spa
Marche Region
Abruzzo Region
University of Urbino
Split-Dalmatia County
Dubrovnik-Neretva Region
University of Split
Istrian University of Applied Sciences (former Metris)
Croatian Water Agency

BUDGET

2.833.019,40 EUR

PROJECT DURATION

january 2019. -31 december 2021.

THE FINAL CONFERENCE OF THE WATERCARE PROJECT (14 DECEMBER 2021)

The final conference of the WATERCARE project was held in the premises of the Student Dormitory in Dubrovnik. All participants were greeted by vice president od Dubrovnik Neretva Region Joško Cebalo, emphasizing the importance of successful implementation of projects for conservation of the sea and water. The conference was held in a hybrid format due to limitations caused by the COVID-19 pandemic. The conference was attended by representatives of the Dubrovnik-Neretva Region, representatives of the Regional Development Agency of the Dubrovnik-Neretva Region Dunea, the Public Health Institute of the Dubrovnik-Neretva Region, Split-Dalmatia County, University of Split, Istria Polytechnic and Croatian Waters, while EUSAIR Of Bosnia and Herzegovina - Senad Oprašić, JS representative Marin Miletić, Head of the Croatian Waters Development Sector - Danko Bjondić and partners from the Italian side participated in the conference through Zoom.

WATERCARE GUIDELINES (MARCHE REGION) - CREATION AND STATUS OF GUIDELINES

As part of the WATERCARE project, cooperation between public administrations (local, regional and national authorities), the private sector and scientific and research institutions has been witnessed. This collaboration has allowed the sharing of knowledge relating to the Adriatic Sea and the application of innovative approaches in various Italian and Croatian coastal areas, in order to improve the water quality of the coastal areas.

One of the final products resulting from this collaboration is represented by WATERCARE Guidelines, which constitute a management, control tool and good practices for improving wastewater discharge and bathing water quality.

The guidelines contain environmental governance systems for the sustainable development of bathing water quality for better management of water treatment and watercourses in various Italian and Croatian territories: divided into 12 chapters, they will be made available at the end of the project.

Starting from the necessary introduction (chapter 1), we move on to a quick description of the 2030 Agenda strategy (chapter 2), within which the entire project moves, defining, then, what are the specific objectives of Watercare and presenting the Partners who were part of it (chapter 3).

Following the examination of the various regulations in force both in Italy and in Croatia, both at European level and at national and territorial level, a reflection is made regarding the correlation of these regulations with the project itself (chapter 4).

Chapter 5 proceeds with a description of the conceptual methodology and of pressures and impacts with the exposure of the occasional and continuous criticalities to which the various sites are subjected and to a site-specific assessment, which takes into account the elements that affect the spread of contaminants in bathing waters. The five pilot sites examined during the project are described in the same chapter.

After the description of the working methodology of WQIS system, in which the sampling systems and tools are described, as well as the points, periodicity and frequency of the samplings themselves, also focusing on the microbial contamination indicators (chapter 6), chapter 7 describes the administrative procedures and good practices CURRENTLY implemented by the various subjects involved in the decision-making processes, then moving on to the exposure relating to the administrative procedures that may be implemented IN THE FUTURE by the various subjects involved in the decision-making processes, thanks to the objectives achieved by the WATERCARE project (WQIS, FOM and Alert Tool).

If in chapter 8 the structural interventions necessary to reduce the spread of contaminants are proposed and described, with the territorial intervention proposals of chapter 9 a study of the territory is carried out (specific for each project partner) and appropriate intervention proposals are made and adapted to the region under consideration.

Chapters 10 and 11 close the guidelines: in these chapters the financial framework and the publications produced are presented respectively.

In conclusion (chapter 12), the guidelines will be useful to transfer, replicate and extend what was implemented during WATERCARE project, improving improve the interaction between project partners and other regional and local bodies, external to the partnership, who want to adopt the same innovative solutions or similar ones.

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SAMPLING ON PILOT SITE ARZILLA RIVER

Project partner ASET is building a sewage storage tank in order to definitely eliminate faecal impact of wastewater discharge in bathing waters. Although the execution of the works has been delayed due to the pandemic, the works are about to be completed.

A storage tank will be at the service of the spillway of urban waste water site on the right bank of the stream Arzilla in Fano, a few hundred meters upstream from the mouth of the creek, together with the construction of a pumping plant and electrical, control and monitoring accessory works. The storage tank for excess stormwater will have a detention volume of 1.600 cubic meters with a return time equal to ten years.

The waters accumulated will be pumped to existing sewage system and then to the municipal waste water treat-ment plant with a delay time variable between 24 and 48 hours.

The development and execution of an ad-hoc infrastructure tank will result in positive effects in terms of environmental, health and hygiene and with a significant improvement of water quality at the mouth of the stream Arzilla and bathing water surroundings.

In the pilot site Arzilla stream in Fano, CNR has installed the downstream water sampling system at the Arzilla mouth, the weather station in a position free from obstacles, the level sensor and the second sampling station located upstream the Arzilla river.

These two sampling stations are equipped each with an automatic sampler positioned into an adapted box to protect the instrument. The upstream station is located 7 meters higher from the river level making more complicated to suck the water from the Arzilla.

For this reason an efficient pump system was realized to carry the water from the river to the automatic sampler. The entire sam-pling system to monitor the rainfall events along the Arzilla stream is completed.

SAMPLING IN THE PILOT AREA OF THE PESCARA RIVER

Equipment is installed on Pescara river. The box is located within a fenced area close to the north quay along the Pescara river, flowing out the Adriatic Sea.

Like on other project sites, specializes equipment will measure and chemical para-meters of river water polluted with sewage waters of Pescara.

SAMPLING IN THE PILOT AREA OF THE NERETVA RIVER

Dubrovnik Neretva Region installed the specialized equipment on their site, the mouth of river Neretva. After a careful review and analysis of potential locations in cooperation with stakeholders and experts, the location on Neretva was selected and the equipment was installed. Equipment will measure meteorological, hydrological and bacteriological data and will take samples of water at weather-adjusted intervals.

CETINA PILOT SITE (SDC)

In the target area of the Cetina estuary, in the downstream part of the riverbed, two automatic measuring stations have been set up at a location under the jurisdiction of Hrvatske vode, which together with the Split-Dalmatia County are partners in the implementation of this project. In addition to measuring basic climatological data, the equipment will also perform automatic water sampling of the Cetina River in extreme hydrological conditions.

In addition to the river, sampling of transitional seawater was performed and surface parts of sea water near the mouth of the river Cetina. 6 measuring stations were determined at regular distances from 150 to 200 m from the zero point. Water samples were collected during the summer months of 2021 from the areas visible in Figure, and sampling was performed in sunny weather and after extreme hydrological conditions. Sampling after extreme rainfall was performed at hourly and multi-hour intervals for 24 hours from the onset of heavy rainfall (1 mm / 30 min).

Samples for bacteriological analysis were collected in sterile bottles, which were transferred to portable refrigerators in the laboratory as soon as possible for testing. E. coli and intestinal enterococci were determined by membrane filtration. A correlation analysis was performed between the examined microbiological indicators in samples collected from the Cetina River and seawater samples from bathing beaches for sunny and after rainy weather.

The results indicate that increased precipitation affects higher values of microbiological pollution in the Cetina River and provide evidence of the impact of the quality of the river Cetina on the quality of sea water sampled near the mouth of the river Cetina, but which ultimately does not have a great impact on the quality of the sea on bathing beaches in the city of Omis. According to the guidelines of the World Health Organization, it is necessary to reduce, control and finally eliminate diffusion sources of pollution in order to maintain biodiversity and preserve the health of the population. This is a significant contribution of this project because it indicates the importance of synergy of local government with scientific research institutions in assessing the impact of environmental conditions on the quality of bathing sea, which in turn affects human health.

SDC team

THE PROJECT WATERCARE PRESENTED DURING THE IRBIM DAY (1 DECEMBER 2021)

1st December 2021 - Auditorium Orfeo Tamburi - Mole Vanvitelliana, Ancona. During the IRBIM-day event in Ancona, Pierluigi Penna and Mauro Marini have been invited to present the WAERCARE project: main aim and first successful results of this Italy-Croatia joint collaboration. Colleagues from different Institutes located in Messina, Lesina, Mazara del Vallo and Ancona attended the event organized in an hybrid format.

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SAMPLING ON PILOT SITE RAŠA RIVER

Functioning of the equipment: Vedrana wrote as well. *Samples taken:* In all 16 samplings were performed, of 4 sunny periods and 6 rainy periods during the bathing season of 2020 (september) and bathing season 2021 (may through september 2021). *Consclusion short text (cca 10 sentences):* During stable weather conditions micro-biological pollution on all stations in rivers, channel and bathing sea waters is low, but during rainy events microbioal contamination is evident in all loacations depending on rain intensity and rain continuity. Largest microbial pollutions is evident at Krapanj channel, especially during summer periods and low flows when percentage of watse water sin channel is on the rise.

UNIVERSITY OF SPLIT, DEPARTMENT OF MARINE STUDIES

During the implementation of the WATERCARE project in the Split and Kaštela area, the University Department of Marine Studies managed to fully purchase the equipment needed for studying the effect of heavy rain events on bathing water quality in the area under the anthropogenic impact. The study was conducted at 11 coastal sites in the central Adriatic Sea area, precisely in the urban areas of Trogir, Kaštela and Split. Sampling was conducted in two bathing seasons, from June to October 2020 and from April to October 2021. A total of 51 sampling campaigns were conducted fortnightly during the bathing season, as required by the Croatian Regulation on the quality of bathing water. In the case of a rain event higher than 2mm of precipitation, sampling was carried out immediately the next morning, 24 and 72 hours after the first sampling to determine the possible influence of precipitation on the changes in the concentration of indicators of microbiological pollut-ion. The concentrations of Escherichia coli and intestinal enterococci (FIB) were determined at 605 samples in total. Abiotic parameters like temperature, salinity and pH value and meteorological conditions of the sampling sites were also monitored.

The impact of precipitation on the quality of coastal bathing waters was not found in the Split region or Kaštela, probably due to the low amount of precipitation. The quality of bathing waters in the Kaštela area was significantly worse than in the Split area, which is due to the condition of the sewage system in these areas and not to the precipitation effect. It was also found that bathing water quality depends on the timing of sampling and the indicator against which it is assessed. Escherichia coli proved to be a better indicator for early morning sampling, while intestinal enterococci were better for late morning sampling. Further research should be carried out to develop appropriate and site-specific predictive models in areas where water quality exceedances were recorded. The spatio-temporal variations of FIB must be considered to make the model as reliable as possible. Once the models are developed and validated, they should be offered to the local authority, which can use them to provide early warnings to bathers of potential bathing water pollution.

WATERCARE GUIDELINES (MARCHE REGION) - CREATION AND STATUS OF GUIDELINES

Marche Region in March 2021 started the activities for the drafting of the Guidelines through comparisons with the partner WP5 leader of the Split-Dalmatian Region Bucan Martin, identifying the structure and the chapters to be developed according to the following scheme:

1. Introduction/ 2. Strategy of the 2030 Agenda/ 3. Objectives of the Water-care project/ 4. Current legislation: 4.1 European standards; 4.2 National regulations; 4.3 Regional rules; 4.4 Correlation between standards and integration with the WATERCARE project/ 5. Cognitive framework; 5.1 Description of conceptual methodology and pressures (and impacts); 5.2 Site-specific assessment; 5.3 Pilot sites of the Watercare project and their characterization/ 6. Work methodology (WQIS): 6.1 Sampling systems and tools; 6.2 Points, periodicity and sampling frequency; 6.3 Indicators of microbial contamination/ 7. Management measures of bathing water (policy maker): 7.1 Current management; 7.2 Future Management Using the Alert Tool/ 8. Proposals for intervention on water infrastructures: 8.1 basins of first rain; 8.2 Collectors outside cliffs; 8.3 Splitting of the sewer networks; 8.4 Best practices/ 9. Territorial intervention proposals/ 10. Financial framework - WQIS costs/ 11. Publications of the watercare project/ 12. Conclusions.

Various partners were involved in writing the texts such as CNR-IRBIM (LP), PP3_Abruzzo Region, PP4_University of Urbino, PP5_Split Region - Dalmatia SDŽ, PP6_Dubrovnik Region - Neretva DNŽ and PP9_Croatian National Agency for Water Management - Croatian waters.

A first description of the European objectives (Agenda 2030 and European directives WFD and MSFD) and specific to the project, are followed by the descriptions of the characteristics of the pilot sites (bathing waters) that suffer interference and microbiological contamination by occasional discharge, due to the increasingly intense rainfalls following climate change, by the sewer networks and rivers and streams along the coast.

The WQIS system and the FOM have been described, which must collect information to support the decisions that the public administrations must adopt to activate the actions to protect bathers from the microbiological health risk that occurs on such occasions. The most effective infrastructural interventions that can allow the mitigation or elimination of these micro-biological impacts are then described.

In the case of the Italian coast, some examples of application of the WQIS-FOM are described, the financial framework necessary for the realization of the system, the publications that the project has created and the final framework to eliminate or mitigate the impacts and the recovery times of the compliance conditions.