

INTERREG V-A Italy-Croatia CBC Programme 2014-2020

Final Activity Report - LP

Standard+ Final Activity Report AdriaMORE project

1. Identification

Project title	Adriatic DSS exploitation for MOnitoring and Risk management of coastal Extreme weather and flooding		
Project acronym	AdriaMORE		
Project number	10044343		
Project duration	Start date	01/01/2018	Nr of months
	End date	30/09/2019	21
Programme priority	2 Safety and resilience		
Programme priority specific objective	2.2 - Increase the safety of the Programme area from natural and man-made disaster		
Reporting period	01.01.2019 - 30.09.2019		

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PART 1

A. PROJECT HIGHLIGHTS

Please provide a cumulative overview of the project's:

- **most significant achievements** were, above all, technical outputs of the AdriaMORE project, thanks to the valid scientific collaboration, among the others, with CETEMPS, CNR-ISMAR from Italy and Meteorological and Hydrological Service from Croatia. Technically speaking were the fully development of some components of the AdriaMORE integrated system to observe and forecast possible scenarios at high hydro-meteorological risk for civil protection purposes. Software developments, models implementation, testing on relevant case studies and sophisticated instrument's acquisition have been carried out in order to capitalizing the 2007-2013 IPA Adriatic CBC Programme-funded project ADRIARadNet. The latter developed a decision support system (DSS) to observe and forecast possible scenarios at high hydro-meteorological risk for civil protection purposes. Specifically a weather radar composite software able to ingest and process data from systems with different features has been developed and its assessment has been conducted on case studies utilizing Italian and Croatian radar data. A WEB interface has been arranged at <http://radar.aquila.infn.it/network/>, where the instantaneous rainfall estimates for the Croatian and Italian composites are displayed. Moreover a new version of the hydrological model (CHyM), to be used operationally for coastal flood prediction on the Pescara and Neretva river basins has been

designed. The new specific parameterization has been calibrated and tested over the two catchments, through the simulation of relevant case studies, characterized by intense winds and sea level rise. The CHyM model is able to read sea level measurements in input, to modify the friction of the river flow in the river outlet, enhancing the coastal flood prediction capability.

- **most interesting results:** among the other interesting results, concerning communication activities, AdriaMORE ran for the RegioStars Awards 2019 and was selected to be incorporated in the DG Region data base for its value as a best practice of EU regional policy. The DG Region database has demonstrated to be extremely useful as a show-case for the concerted and coordinated display of EU best practices, of which AdriaMORE is an excellent example in the field of scientific innovation.

Based on technical outputs, the initial activities for the integration in the DSS platform of the new developed components were particularly interesting, in detail the new types of data and applications to be integrated were defined and their conformity to the structure of the DSS management system was assessed. Finally, the methodology for carrying out the upcoming measurement campaigns in Italy and Croatia, where the entire new system will be tested, was discussed, in particular a work group was appointed and a list of available models and tools was drawn up. In addition, an air-sea coupled prediction system was built on the Adriatic area that, previously tested on two case studies, one for the Abruzzo Region and one for Croatia, is now working in operational mode on the website <http://oceanlab.univpm.it/>, allowing to forecast the most important meteorological and marine variables such as the 3h accumulated precipitation, the 2m air temperature, the 10m wind, the sea level and wave height. On this system a procedure that "ingests" (by means of the so-called 3D-Var variational assimilation technique) surface and radio sounding data available on the area covered by the domain was also developed.

- **biggest successes:** biggest success was to be able to close all project activities, from management to technical activities as well as financial progress, without encountering any technical or administrative problems, also thanks to the circular information among Managing Authority, LP and project partners. In addition, one of the biggest success has been the opportunity to procure a firefighting boat which will be used mainly for firefighting actions on the sea and coastal area. Because of her dimensions (9.80 meters) it is suitable for the interventions in case of pollution, not only for the installation of the floating dams, but also for quick interventions by chemical means during minor pollution of the sea surface. The firefighting boat can be used as well for urgent medical intervention, pumping the sea in case of possible ship damage as well as towing damaged ships and any other maritime accidents. Any intervention of the firefighting boat is more than justified since the goal is protection of human lives and valuable natural areas from fires and pollution. The firefighting boat is used for emergency intervention only and located at the isolated island Mljet on of the Croatia's most famous national parks visited by many tourists on boats and yachts from all over the world. The boat is owned by the Dubrovnik-Neretva Region and used by the Firefighting Association. All activities are exclusively related to public utilities or services of general economic interest.

- **main lessons learnt:** continue to work with a scientific and administrative partnership both Croatian and Italian, such as this project; this cohesive group has been collaborative and active and try to follow up as much as possible the activities carried out and capitalized, trying to structure new projects with long-term objectives.

B. PROJECT OUTPUTS AND RESULTS

According to the Section of the Report concerning output indicators (button Programme output indicator), please provide information about:

All outputs indicators were successfully achieved:

- 1) **Risk prevention and management. Population benefiting from flood protection measures:** Population of the involved territories benefiting from maritime environmental data implementation within the hydrological forecast for the prevention and mitigation of the flooding effects. The flooding along the Aterno-Pescara and Neretva rivers can cause coastal flooding and runoff of materials along the rivers

making the sea water around the coastline more turbid and polluted. Moreover other marine and coastal hazards can be triggered by meteorological events. Two of the main outputs foresee the reinforcing of the forecasting and monitoring system within the existing DSS by the integration of coastal remote sensing data and by the enhancing the hydro-meteorological information for coastal flooding forecast. Other three outputs are devoted to satellite monitoring of geomorphological parameters, to the implementation of a transport model and to the procurement of a firefighting boat. These outputs are strongly linked with the indicator and will bring actual and tangible result to Pescara and surroundings area population (about 140.000 inhabitants) as well as Dubrovnik and Neretva river basin population (about 60.000 inhabitants).

Tot: 200.000 inhabitants.

2) People reached by initiatives for increasing awareness. Public reached by AdriaMORE initiative for increasing awareness about: A number of initiatives aimed at increasing risk awareness about the natural and man-made disasters addressed by AdriaMORE as well as the enhanced skills and competencies derived by AdriaMORE outcomes among the partners, local community, target groups and policy makers have been planned in the contest of the communication activities within WP2. On the other hand in the framework of WP5 one output is devoted to promote toward stakeholders AdriaMORE technologies in Italy and Croatia by means two pilot actions. The total amount of public that ideally can be reached by AdriaMORE initiative for increasing awareness is about 1000. **Total 2000 instead of 1000 as an unexpected positive result.** These results were achieved thanks to extensive awareness-raising campaign and capitalization of project results through seminar and communication activities. Thanks to these actions number of civil protection representatives from Italian and Croatian municipalities (local level) were involved - each municipality has at least one person in charge of civil protection (i.e. hydrometeorological alerting system, fire brigade, mountain rescue service, other emergency services, Police Forces, Port Authorities and so on) (340 persons); the number of stakeholders involved through the international online/classroom scientific seminars organised by CETEMPS as the scientific partner of the LP (60 persons); number of stakeholders involved by means of web communication channels, namely number of Twitter followers, number of visitors of the partners' institutional websites, number of visitors of the Italy-Croatia Programme (at least 1.600 persons).

C. DURABILITY AND TRANSFERABILITY OF THE PROJECT AND ITS RESULTS

Please describe:

- **How the outputs and results will be maintained and developed further after project end.**

The durability and transferability of the results is guaranteed by the added value of the scientific results and also thanks to the involvement of the highest authorities in the public sector (civil protection, fire brigade) and the scientific sector (Universities and research centres) which, thanks to the project, have made available the results of the research and the means purchased for the warning and preventive alert actions.

- **How availability of project results and outputs for general public and other stakeholders has been ensured during the project life and eventually after the project end.**

The project results and outputs for general public and other stakeholders has been ensured during the project life and after the project end thanks to Programme website and others dissemination tools like:

- Social media, in particular Twitter, which allowed us to provide updating on the project in real time and to disseminate the content to over 3,000 entities, be them experts, students, institutions at all levels, and so forth. Using a concise and simple language represented the best way to communicate such a highly technical project also to the general public;
- CETEMPS online seminars ensured large diffusion of the technical and scientific content of the project to the members of the international scientific communities dealing with hydrogeology and meteorology issues, thus fostering discussion on how to possibly capitalize the AdriaMORE system also in contexts beyond the Abruzzo and the Dubrovnik-Neretva regions, as well as how to integrate and enhance the developed system also in view of implementing a future potential EU project;
- The press conferences organized together with the Steering Committee meetings were extremely useful to share ideas with the stakeholders operating in the project sector (civil protection, local

authorities, sectoral experts). The latter contributed to the discussion by sharing their knowledge and perspectives on the current situations concerning the involved territories. Their contribution demonstrated to be extremely relevant for further development of AdriaMORE outputs in light of exploiting its results in a wider territory and adopting a common instrument to tackle extreme weather events;

- Much content on the progress of the project and its technical achievements was also disseminated via the dedicated page on Italy-Croatia Programme web site. This is extremely important to keep the project “alive” also after its end. The dedicated page plays the role of repository where all the content produced during the project life cycle is contained, in order to keep track of all the steps undertaken by the partnership along the project life span and to provide a general information container to use as a reference for the stakeholders and all those interested in AdriaMORE in the following years;

A. CAPITALISATION OF RESULTS

Please provide information about capitalisation:

Only for Standard+: Was the project able to capitalise the results of the previous funded project? Which was the added value of capitalisation? What improvements to the already tested solutions was the project be able to deliver?

All the capitalization activities foreseen by the project have been carried out, providing the scientific and technical tools for provide support to maritime navigation, air traffic control and urban water management authorities in the Adriatic coastal areas whereas its outputs will be available to all citizens through the improved DSS. All The extension of the previously developed Adriatic-Ionian-MyDewetra DSS through the development of the AdriaMORE module aim at building a joint hydro-meteorological and costal-maritime monitoring and forecasting system for the Italian and Croatian coastlines in presence of flooding and extreme weather hazards. Specifically a weather radar composite software able to ingest and process data from systems with different features has been developed and its assessment has been conducted on case studies utilizing Italian and Croatian radar data. A WEB interface has been arranged at <http://radar.aquila.infn.it/network/>, where the instantaneous rainfall estimates for the Croatian and Italian composites are displayed.

Moreover a new version of the hydological model (CHyM), to be used operationally for coastal flood prediction on the Pescara and Neretva river basins has been designed. The new specific parameterization has been calibrated and tested over the two catchments ,through the simulation of relevant case studies, characterized by intense winds and sea level rise. The CHyM model is able to read sea level measurements in input, to modify the friction of the river flow in the river outlet, enhancing the coastal flood prediction capability. In addition, an air-sea coupled prediction system was built on the Adriatic area that, previously tested on two case studies, one for the Abruzzi Region and one for Croatia, is now working in operational mode on the website <http://oceanlab.univpm.it/>, allowing to forecast the most important meteorological and marine variables such as the 3h accumulated precipitation, the 2m air temperature, the 10m wind, the sea level and wave height. On this system a procedure that "ingests" (by means of the so-called 3D-Var variational assimilation technique) surface and radio sounding data available on the area covered by the domain was also developed.

Furthermore, the initial activities for the integration in the DSS platform of the new developed components were carried out, in particular the new types of data and applications to be integrated were defined and their conformity to the structure of the DSS management system was assessed. Finally, the methodology for carrying out the upcoming measurement campaigns in Italy and Croatia, where the entire new system will be tested, was discussed, in particular a work group was appointed and a list of available models and tools was drawn up.

Furthermore, the purchase of the fire-fighting boat to respond to events in the Croatian area, represents a concrete added value compared to the activities carried out and capitalized

For all: Was the project able to capitalise or influence future calls or projects? Please specify main results or output to be consider for future capitalisation action.

The AdriaMORE integrated system will provide support to maritime navigation, air traffic control and urban water management authorities in the Adriatic coastal areas whereas its outputs will be available to all citizens through the improved DSS. Technological transfer, DSS platform and DSS management, in addition to the fire ship already purchased, will be capitalized to address a Strategic project on pilot actions concerning data setting and including a wider area of experimentation, given the importance of environmental monitoring for risk prevention.

D. PARTNERSHIP COOPERATION

Please provide an assessment of the participation and involvement of the partners in the project, answering the following questions:

- **Were all the Partners active?:** All partners have been active and proactive
- **Were they all able to attract other local/regional actors and to involve them in the project activities?:** Yes, they are
- **What was the added value given by the CB cooperation?** The total collaboration among project partners and involving all possible institutions from the countries of Italy and Croatia, with total synergy, collaboration, loyalty and with the spirit of giving the maximum, each for their own skills and working together.
- **Which were the main problems encountered?** None
- **Was the project able to create links with other projects?** No
- **Will the PPs cooperate in future even without funding (if yes explain the main aims of this cooperation)?** This possibility has not emerged during the short life of the project but it is not excluded that it could happen in the future.

E. TARGET GROUPS INVOLVEMENT

Please list the main target groups that benefited from the project’s achievements as inserted in the relevant Report Section in SIU (button Target groups) and provide further details on how they were able to make use of the outputs/ results of the project.

The target groups involved in the project partnership were the following:

Target group	Target value	Target reached	Comments
General public	1000,00	2840,00	The involvement of the target group "General public" was far exceeded by far in relation to the assumed target value, thanks to a challenging awareness-raising campaign through social media and the use of media such as the Programme's website, the Abruzzo Region's regional and Brussels-based website, YouTube channels and press releases. Those who became aware of the results of the project were interested in understanding how they

			could be used concretely.
Local, regional and national public authorities and related entities	10,00	15,00	This target group also exceeded expectations. The involvement of this type of target group was made possible above all thanks to the organization of events in the program, such as the Kick Off meeting, Steering Committee, conferences and press releases. The local, regional and national authorities became aware of the progress of the project results and showed interest in using them for extreme weather event prevention activities in their respective territories.
Regional and local development agencies, environmental agencies and regional associations	6,00	6,00	This specific target group is in line with the project and has been reached thanks to the seminars organized by the technical partner of the Abruzzo Region, CETEMPS, and the dissemination events organized by the individual partners.
Emergency services and coast guard centres	2,00	2,00	This specific target group is in line with the project. The result has been achieved thanks to the activation of the tender for the purchase of the fire-fighting vessel and the competent bodies will use the purchased goods thanks to the funds of the Programme, in case of need.
Universities and research institutes	8,00	5,00	This specific target group is undersized compared to the project expectations because, despite the commitment of the whole project

			partnership, it was not easy to convey the added value that European projects are able to bring, in terms of scientific and concrete results.
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F. CONTRIBUTION TO EUSAIR

Please provide a description of the project contribution to the EUSAIR in terms of synergy with the Strategy's pillars and alignment of implemented project's activities with the Action Plans and labelled projects.

As foreseen by the Application Form, during all project life, it contributes to improve the environmental quality over the ecotonal coastline environment, vulnerable to the weather hazards, coherently with the strategies of Pillar 3, Topic 1 and in line with this principle, all project activities are carried out, being this attention an horizontal issue taken into consideration for all project activities and not only for one semester.

G. CONTRIBUTION TO HORIZONTAL PRINCIPLES

Please provide a description of the project contribution to the horizontal principles of equality between men and women, non-discrimination and sustainable development.

Throughout the duration of the project, about horizontal principles, all recommendations were followed in term of non-discrimination and equality for the selection of project team members. Project team of all project partners is balanced in terms of gender. Selections were based on public procurement documents that have respected principle of non-discrimination. About the organisation of green and inclusive events (for instance during all Steering), they are arranged paying attention to accessibility for all participants and the venue adapted for people with reduced mobility. Food, drinks and catering for the organization of project meeting was organized taking into consideration all indications given in Factsheet n.6

H. COMMUNICATION ACTIVITIES

Please refer to the *Final Communication Report template* and provide a summary on the main achievements trying also to identify which were the most successful communication tools in reaching general public/decision makers/other target groups.

LP team members worked hard on the communication activities during all project life, informing the general public and main target groups on the project aims. The AdriaMORE project objectives and activities status were disseminated through web news and social networking in Italian, Croatian and English languages, to capitalize all main results. Content can be easily retrieved through the main public search engines (e.g. Google search). Each event was disseminate thanks press conferences. Below are the main outputs

- 1 Communication Plan;
- 5 press conferences;
- 4 dedicated web pages on the partners' institutional websites;
- 14 web contents (5 news, 6 events, 3 scientific articles) on AdriaMORE dedicated page in the Italy-Croatia Programme website;
- 2 brochures (English, Italian and Croatian);
- 2 flyers;
- 2 participations in international conferences on hydrometereology (attendance of CETEMPS);
- 11 scientific on-line seminars;
- 2 social media used (Twitter and YouTube);
- 3 newsletters;
- 2 project videos;
- 1 publication in a relevant EU magazine

- 15 TV appearances;
- 28 articles on media.

All the official events foreseen by Application Form have been realized (kick off meeting and Final Conference organized by the LP were held in Pescara respectively in September 18th; one in Dubrovnik in November 5th-7th and one in Venice on April 2nd 2019). Also on July 18, 2019 in Pescara was organized a press conference by CNR-ISMAR – this event was foreseen to be held in Venice on the occasion of the third Steering Committee on April 2nd but it was decided to involve the Municipality of Pescara, a direct beneficiary of the project, for better capitalization – and the second one on September 18 organized by the Lead Partner on the occasion of the 4th Steering Committee, in order to inform the public and regional authorities on the project goals and impact on the territory safety, as well as on the relevance of the AdriaMORE integrated system for the regions involved. The Mayor of Pescara, the municipal Councillor in charge of Civil Protection and representatives of civil protection in general attended the public event and gave extremely profitable contributions to the entire project. Announcements about the event were given by the local and regional TV broadcasting. We would like to emphasize that the project and Programme logos have been used in all communication and advertisement material issued, in order to increase visibility of the project and to facilitate the branding of communication products. Furthermore, the Abruzzo Region collaborated with the JS on populating AdriaMORE dedicated page on the Italy-Croatia Programme website, and updated it with news and events until the end of the project.

PART 2

A. TYPES OF ACTIONS ADDRESSED (as defined in the Cooperation Programme)

Select, within the Specific Objective's types of actions, the one addressed by the Project

<i>Specific Objectives</i>	<i>Types of action</i>	<i>Please tick the most relevant one within the SO addressed by your project</i>
2.2 Increase the safety of the Programme area from natural and man-made disaster	<i>Actions aimed at improving monitoring of risks</i>	X
	<i>Activities aimed at increasing the management capacity of / prompt response to disasters</i>	X

B. TYPES OF OUTPUTS PRODUCED

Specify the types of outputs generated by the project and provide a brief description

- **monitoring systems:**

- *One satellite monitoring of geomorphological and bio-geochemical parameters (named GBSatAdria).* In the month of June, the Pescara discharge timeseries at the river mouth has been provided for all case studies performed in WP4.2, together with another period (7-17/07/2017) characterized by no heavy precipitation. Moreover, wind speed measurements at the "Pescara Marina" weather station have been provided for the same case studies. Discharge timeseries were extracted from ChyM simulation forced with observed rain gauges data.
- *One radar network mosaic data SW to enhance the monitoring coastal flood:* the software CRAMS (Cetemps Radar Advanced Mosaic Software), developed in the previous period, has been further tested utilizing new case studies. The radar data flow towards the CETEMPS, has been implemented operationally with the development of an automatic procedure that allows to receive the data available in real time to be displayed. These data can be both volumetric and products. The WEB interface has been arranged at <http://radar.aquila.infn.it/network/>, here you can find the instantaneous rainfall estimates (SRI product) for the Croatian and Italian composites. The Italian maps are updated every 10 minutes, the Croatian ones every 15 minutes following the scanning frequencies set by the individual administrations involved.
- *One wind profiler to enhance the observation system as well as the assimilation techniques:* A wind profiler was installed at GMP Dubrovnik weather station together with DHMZ staff. The installation

lasted from 21 to 29 May 2019. A training has been done by supplier for a number of DHMZ technical staff. Currently, wind speed and direction data are available each 10 minutes up to about 5 kilometers above ground. These data are, since 28 May 2019, operationally available to all AdriaMORE PPs as well as to World Meteorological Organization (WMO) members via WMO and EUMETNET telecommunication lines in BUFR format. Maintenance of the wind profiler will be done by DHMZ. CETEMP and DHMZ made application of WRF-Adria atmospheric model for weather forecasting case studies with and without wind profiler data. A comparison between existing reanalysis data and wind profiler data has been performed.

- *Reinforcing of the monitoring system within the existing DSS by the integration of coastal remote sensing data, derived from ground, boat and satellite systems as described in WP3:* has been devoted at the integration into MyDewetra of sensors data. The new observation dataset is composed by Wind Intensity and Direction profiles from wind profiler, Composite Radar products, Chlorophyll and suspended Particulate maps from satellite.

- *PAI and PAC: pilot action around the Pescara river estuary coastline area and pilot action around the Neretva river estuary coastline area:* two pilot actions have been conducted, with evident transnational dimension, in order to test the overall observation and forecast chain. About pilot action around the Pescara river, within the preparation activities a working group was appointed, composed by delegates of CETEMPS and CNR-ISMAR (PP3) and the list of the resources for the PAI campaign has been defined in terms of available numerical models and instruments as well as their accessibility. Among the Intensive Observation Periods (IOPs) collected during the PAI Campaign was selected one relevant case study that affected the Pescara coastal area happened between May 12 and 14, 2019 and that had the greatest effects on the last day when a discharge peak involved the area of Pescara river. This case study has been chosen because of the density of observations but also for their severity and the hydro-geological/economic effects on the territory involved in. The event has been analysed from both observing and modelling points of view, moreover the numerical model simulations of transport and dispersion in the Pescara river mouth by using meteo-hydrological forcing's has been carried out. In the case of pilot action around the Neretva river estuary coastline area focussing at Dubrovnik a working group was appointed composed by delegates of CETEMPS and Meteorological and hydrological service of Croatia (PP2). In addition, the list of the resources for the PAC campaign has been defined in terms of available numerical models and instruments as well as their accessibility. In order to overcome the objective foreseen for this action, the CETEMPS Meteorological Model WRFAdria has been updated to a new version where the data of the wind profiler, located at Dubrovnik, have been assimilated, adapted and calibrated over the target basin on case studies basis. Moreover, the AdriaMORE new version of the CHyM hydrological model has been tested in order to predict the hydro-meteorological identified events during the PAC. One case study, which had some effects near the estuary of the Neretva river, occurred on June 1, 2019 was chosen for PAC purpose.

- **platform**

- *A new hydrological model software adapted for coastal flooding forecast prevention:* the utilization and pre-processing of wind profiler. Data installed at the end of May 2019 in the area of Dubrovnik were used by the WRF meteorological model in the 3DVAR assimilation procedure for coastal surveillance, previously tested on a case study of the summer campaign. The data are in BUFR format and are obtained every 15 minutes. The above mentioned format has to be converted in the LITTLE_R format, a report-based ASCII format, before the ingestion into the assimilation procedure.

- *A newly numerical weather prediction model improved by assimilating coastal monitoring data, coupled with the wave model:* The waveheight module developed been tested in other two case studies with different hydrometeorological forcing, in the Pescara basin. The discharge peak occurred in 24th December 2010 has been simulated: this case study was very important, as no rainfall occurred over the catchment and the river water level increment in the canal port was totally due to the marine ingression. The new parameterization has been also tested in case of moderate peak flow, during the event of 28th November 2018. The CHyM model has also been tested over the Neretva river mouth and a significant case study has been simulated for 1st-3rd December 2010, according to the indication received from the Croatian partner DHMZ, that furnished both sea level and rain gauges measurements. For this case study, rainfall field has been rebuilt also by using satellite rainfall estimations.

- *Implementation of a modelling framework for Eulerian and Lagrangian simulations in coastal areas and open sea (named FlowAdria); evaluation of transport and dispersion processes relevant to the marine bio-physical environment:* the WRF-SWAN coupled model (<http://oceanlab.univpm.it> link) has been tested on a Croatian case study occurred on 24-25 September 2018.

- *Improvement of the forecast module within the existing DSS enhancing the hydro meteorological information and integrating a numerical modelling of tracer transport in coastal areas and open sea:* it has been devoted at the integration into MyDewetra of forecast data developed under WP4 actions 4.1, 4.2 and 4.3. The new forecasting dataset is composed by Hydrological forecast from CHyM model and WRF-SWAN model forecast products.

● **new ferry boat:**

- *One firefighting boat to face fire hazard and pollution at the sea and in coastline:* The AdriaMORE project provided the opportunity to procure a firefighting boat which will be used mainly for firefighting actions on the sea and coastal area. Because of her dimensions (9.80 meters) she is suitable for the interventions in case of pollution, not only for the installation of the floating dams, but also for quick interventions by chemical means during minor pollution of the sea surface. The firefighting boat can be used as well for urgent medical intervention, pumping the sea in case of possible ship damage as well as towing damaged ships and any other maritime accidents. Any intervention of the firefighting boat will be more than justified since the goal is protection of human lives and valuable natural areas from fires and pollution.

C. TYPOLOGY OF IMPACTS

Please indicate what type of impact(s) your project has had. You can choose more than one answer. For each tangible impact selected, please provide a concrete example from your project, where possible supported by quantitative information.

TANGIBLE IMPACTS

Tangible impacts	Example/ quantitative information
Improved access to services	Improved access to services is guaranteed as a consequence of the purchase of the fire-fighting boat, which makes the emergency service accessible in case of need. In addition to this, the installation of wind monitoring equipment also makes data monitoring more accessible, and therefore, as a consequence, the processing of data necessary for emergency intervention.
Reduced environmental impact	As a result of (Man-made, natural) risk reduction. If extreme events are not prevented and monitored, the consequence of their magnitude can generate significant environmental impacts.
(Man-made, natural) risk reduction	Data processing, monitoring of information and fine-tuning of the results of the pilot actions on the Pescara bank and the mouth of the Neretva river, from important results in terms of natural risk prevention, in terms of timeliness of action and their effectiveness.

INTANGIBLE IMPACTS

Intangible impacts	Example/ quantitative information
Building institutional capacity	This capacity has been developed thanks to the excellent synergy between those who managed the Italy Croatia Programme, and thanks to the good

	and efficient relationship between the LP and the project partners. Dictating time with precision, communicating frequently, assigning precise tasks and involving capable working groups, has made the institutions involved more capable in the operational synergy.
Raising awareness	In terms of raising awareness the results were satisfactory, especially with regard to the results achieved by the involvement of the "general public" target groups of 2840 people; and regional, national and local authorities and institutions 21 in all.
Improving social cohesion	the improvement of social cohesion there has been in terms of excellent project partnership collaboration and making known, through all communication channels of the countries involved and at international level, the success of the results from the technical, administrative and financial point of view and involving local communities (University, emergency service, general public, etc.).
Leveraging synergies	Synergies have been exploited to the maximum, involving research bodies with high added value such as CETEMPS, in addition to those of the project partnership, and involving the public and private sectors in the tenders carried out (for the organization of events; for the purchase of the fire-fighting ship; etc.).