



Good Practice

Public-private partnership for financing mitigation plans: a case study in the Province of Forlì-Cesena (Italy)

The Province of Forlì-Cesena has been carrying out an experience of public-private partnership for financing mitigation plans related to hydraulic risk.

Thanks to the Extracting Activities Interregional Plan, some areas have been identified along the main rivers, which will be turned into detention basins after the extraction. According to this plan, the private subject that makes a profit from the exploitation of the area has the obligation to carry out final works allowing the extracting site to be turned into a detention basin at its own expenses.

Hydraulic risk in the Cesena area

The municipality of Cesena is located in the south-eastern tip of the Po Valley. It has a surface of 249.45 square kilometres (67% plain and 33% hills). With its 97,000 inhabitants, it is the most populated town within the Forlì-Cesena province, after Forlì.

The municipality of Cesena is run through by the river Savio. It has its rise in the Apennine Mountains, flows between the hills, runs in the plain and finally debouches into the sea.

During the last fifty years a great urbanization has taken place along the river, deteriorating the natural conditions of the river. This deterioration, together with other causes, altered the natural phenomena of erosion and sedimentation of the

river bed, and as a consequence the extreme conditions (floods and low water) worsened.

The table shows the major floods from 1937 to 1970 (rate of flow greater than 700 m³/s), registered near the town of Cesena, upstream. These phenomena came about either in spring or in the period between the end of autumn and the beginning of winter, with an average interval of six years, but with actual intervals of four to ten years.

Year	Month	Rate of Flow (m ³ /s)
1939	May	814
1943	November	700
1951	March	749
1961	December	702
1966	November	760

After 1970, four more floods happened (December 1982, November 1991, October 1992 and December 1992) with a rate of flow between 750 and 875 m³/s. These data show that the frequency of flooding increased and that floods are more likely to happen between autumn and winter. The value of the rate of flow is even more significant if we consider that the usual rate of

flow of the river Savio varies between a little more than 20 m³/s (March) and 1-2 m³/s (July and August).

The Regional Basin Authority wrote a Draft Plan concerning Hydro-geological Risk, which includes operations to define the areas subject to a greater risk of flooding and subsequent damage to people and things.

In the territory between the area north of Cesena and Borello some areas are classified as being high risk, while others as moderate risk.

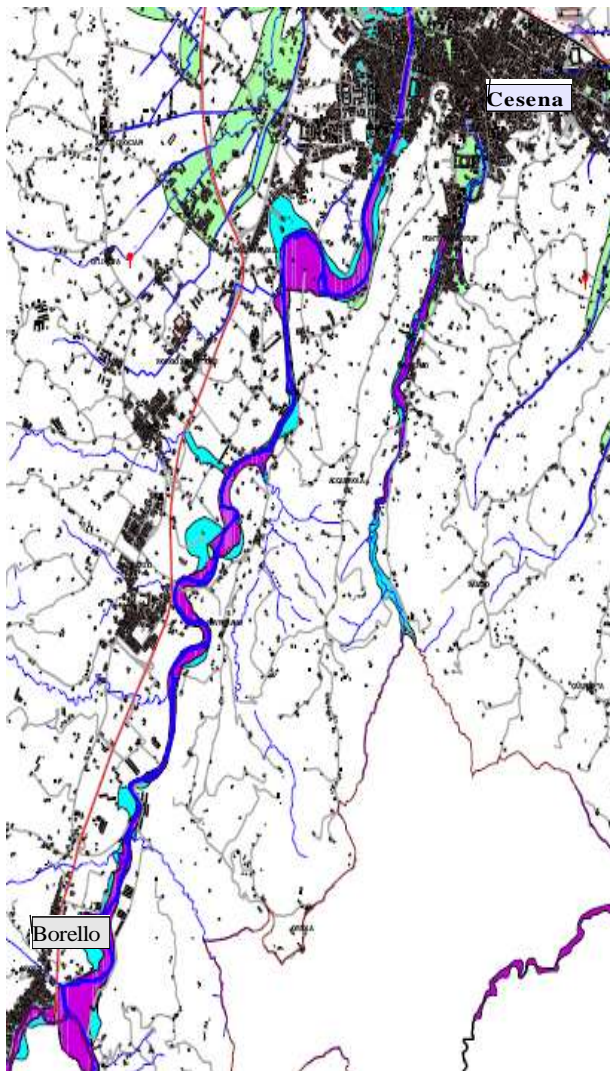


Fig 1 - River Savio between Cesena and Borello. The purple indicates the areas at high risk of flooding. The blue indicates the areas at moderate risk of flooding.

In the area taken into consideration, the mitigation operations aim at verifying erosion and sedimentation phenomena, at controlling outflows and containing floods through the implementation of existing river banks.

An effective action of environmental protection is carried out thanks to the stocking of water in temporary basins (detention basins) during heavy rains.

Installing detention basins can be difficult due to financial reasons, specifically the need to raise public money - which is less and less available - to logistic reasons, specifically because it is difficult to find areas wide enough in an urban context, and lastly because of administrative procedures in case the Public Administration needs to acquire a private area if the infrastructure is to be developed in non-public areas.

The Extracting Activities interregional Plan (P.I.A.E.)

In 2004 the Province of Forlì-Cesena approved the Extracting Activities Interregional Plan (P.I.A.E.) which governs the planning of extracting activities within the province.

The extracting activity is a strategic productive sector with a public interest. Therefore the first goal of the Plan is providing the area with the necessary raw materials which are needed to develop private and public works within the Province, so that the area can be self-sufficient. The Plan identifies suitable areas where a private subject can extract the inert material and then sell it.

According to the Regional Law 17/91 concerning the rules on extracting activities, which regulates the sector, the P.I.A.E. must include the criteria for the final destination of the quarries once the

extraction is over, in an attempt to restore the environment and implement the social and the public use of the area.

In relation to this, the P.I.A.E. was put down after a meeting with the rivers Authorities in order to find the best way to intervene in private areas to manage and contain the risks related to rivers. The P.I.A.E. identifies areas that, after the extractions, will be used to decrease the hydraulic risk and increase the regulations of the river rate of flow, following the directions of the Regional Water Authorities (Basin Authority and Basin Technical Service).

The private subject that makes a profit from the use of the area must carry out specific final works. That means making the extracting area suitable as a basin in order to restrain flooding water at its own expenses. This obligation is dealt with and enforced by the agreement entered by the public body (Municipality) and the private subject while defining the terms of the authorization.

The detention basin located in the extracting area in Palazzina (Cesena)

The P.I.A.E. identifies 7 areas suitable both for extracting inert materials and for hosting a detention basin.

Four of these areas are located upstream near Cesena and their total area, intended for mitigating hydraulic risk, is about 60 ha. These areas were identified thanks to a study conducted by the Basin Authority in cooperation with the University of Bologna.

The study showed that implementing those areas can significantly decrease the hydraulic risk. Each detention basin included in the project allows the peak of the flooding to decrease by a value between 15 and 60 m³/s (for an average 17%). In this way upstream Cesena the river Savio, also thanks to the detention basins, can ease the out-flow of the 200-year-recurring flood while guaranteeing safety except in cases of specific critical situations.

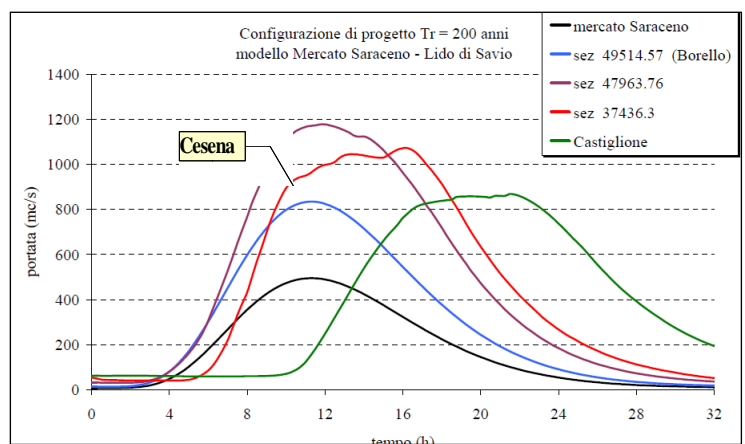
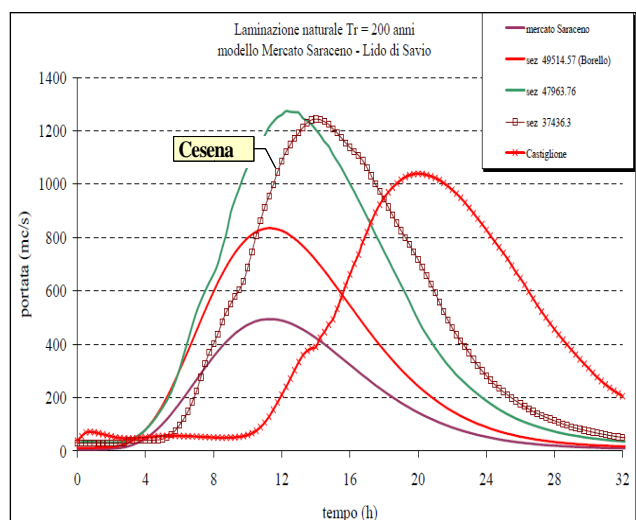


Fig 2 - Comparison between flooding peaks in specific traits of the river Savio in a 200-year-recurring flood. The image on top shows the natural configuration. The image below shows the configuration with the detention basin. The lines referring to Cesena are indicated.

Recently the administrative procedure to grant the authorization to extract and build the first basin “La Palazzina” was carried out. The area spreads over 12.36 ha currently destined to farming.

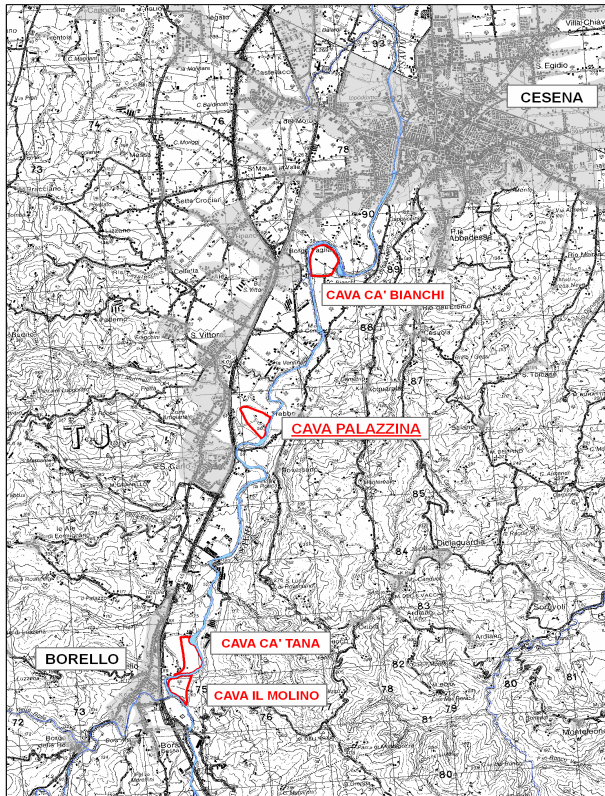


Fig 3 - The extracting area "Palazzina"

Considering the conditions of the project of that area, which refer to a 30-year-recurring flood – which is a relatively frequent event, but already likely to cause specific problems – the decrease of the flood peak is by about 42 m³/s (from 901 m³/s to 859 m³/s) with a decrease of the flood of about 17 cm near urban Cesena. The project includes the excavation of an area of 9.4 ha and the construction of a bank on the side of the river which will contain the excessive water during the flooding process.

The bank has a height of about 51.50 meters above sea level with a shorter trait of about 47.70 m with spillway function that allows the flooding moving along the river to enter into the detention basin, decrease the river level and reduce the flood level.

Past the spillway, downstream, the basin is emptied so that all the water stored can be returned to the river Savio bed after the flood.

The **volume** obtained is about **600,000 m³** with a useful volume of about 400,000 m³ since an amount of water is permanently kept to create a pool supplied with ground water.

The **amount of gravel** the subject can sell is **about 400,000 m³**. The remaining material (about 200,000 m³) is used for the construction of the river bank.

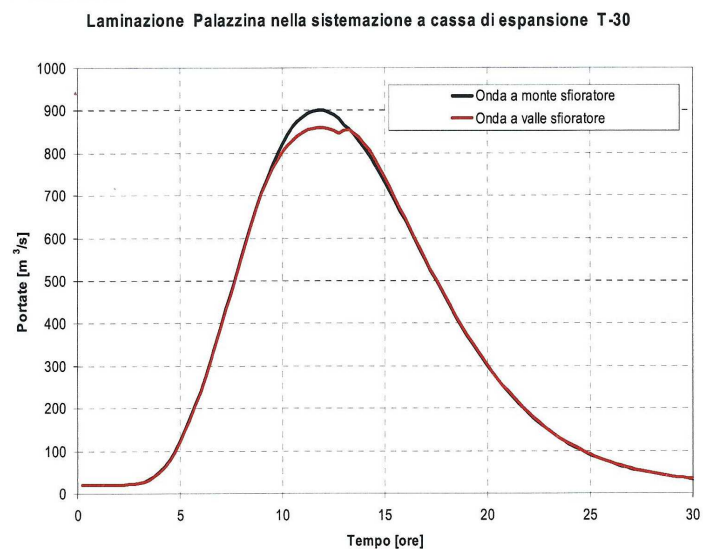


Fig 4 - Process of stopping the flood peak in a 30-year-recurring flood (with detention basin). The black indicates the flood peak right upstream the basin and the red indicates the flood peak right downstream the basin.

The administrative procedure and the parties involved

The administrative procedures involve the following steps and parties, both private and public:

Evaluating and planning of the area for territorial safety (P.I.A.E.)

In this phase the Province consulted with the Regional Water Authorities (Basin Authority and Basin Technical Service) to verify the territorial safety characteristics of the area, in accordance with the studies by Water Authorities and the regional plans concerning hydraulic risk. During this process the Municipality of Cesena was consulted in order to define how the project would be carried out and managed. Also the private owner of the land was involved to verify whether he was willing to give consent for the private area to be used for public purposes. Furthermore, ARPA – Regional Environmental Protection Agency was involved to evaluate the environmental compatibility and sustainability of the project.

Evaluating and planning of the area for territorial safety (Extracting Activities Municipality Plan)

In this phase the Municipality of Cesena put into effect norms and regulations for the actual carrying out of the project in accordance with the arrangements made with the owner of the land and the private subject who will carry out the extracting activities.

During this phase the Province assumed a coordinating role by making sure that the municipal plan was consistent with the regional plan.

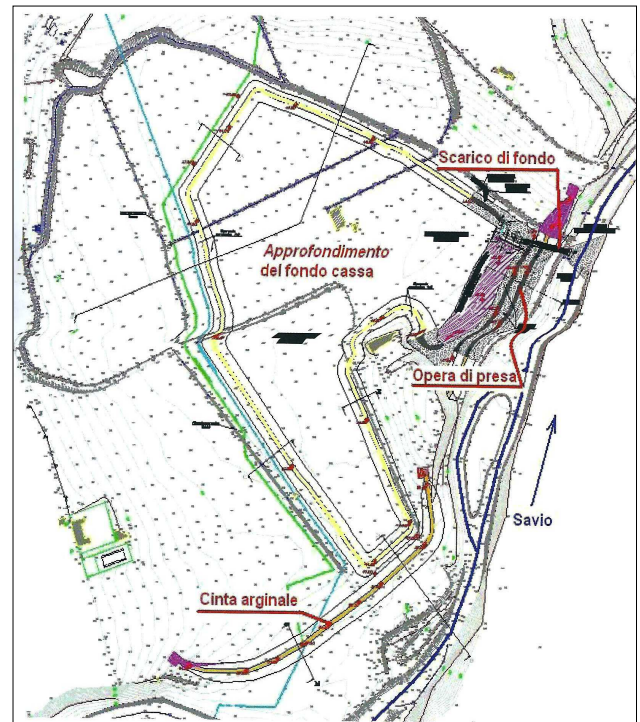


Fig 5 - Scheme of the detention basin in its final configuration.

Drafting of the farming, layout and detention basin project

The private subject interested in extracting activities has drafted a farming plan, in accordance with hydro geological risk evaluations, suitable to the basin construction and installation. In order to carry out extractions complying with hydraulic safety, the private subject has cooperated with the regional Basin Technical Service to identify the conditions for building the basin and its features (spillway, outflow module, etc.).

Because in the area there are some important infrastructures (e.g. waterworks and gas pipeline), the respective Authorities were consulted in order to avoid any risks.

Authorizing the extracting activities and construction of the basin

The private subject made a request to the Municipality in order to obtain the authorization for extracting and constructing the detention basin. To obtain the authorization, more Bodies and Authorities had to be consulted and more steps had to be taken.

- The regional Basin Technical Service had to agree with the hydraulic project;
- The Province had to give consent for the plan after verifying that it complies with the Provincial plan;
- The Authorities related to other infrastructures (waterworks, gas pipeline...) had to be consulted to avoid any interferences with such facilities;
- The Municipality had to evaluate the environmental impact of the project, after consulting with the ARPA – Regional Environmental Protection Agency.

Furthermore, an agreement was entered by the Municipality, the regional Basin Technical Service and the private subject to specify how to carry out the extraction and construct the basin.

The main duties of the private subject are:

- Digging and restoring the environment in the excavation area;
- Constructing river banks prepared for the installation of the spillway;
- Constructing outflow features;
- Regulating the rate of flow of the surface waters as well as the underground waters outside the basin;
- Planning and constructing access ways such as roads, bike lanes, etc within the basin and outside;

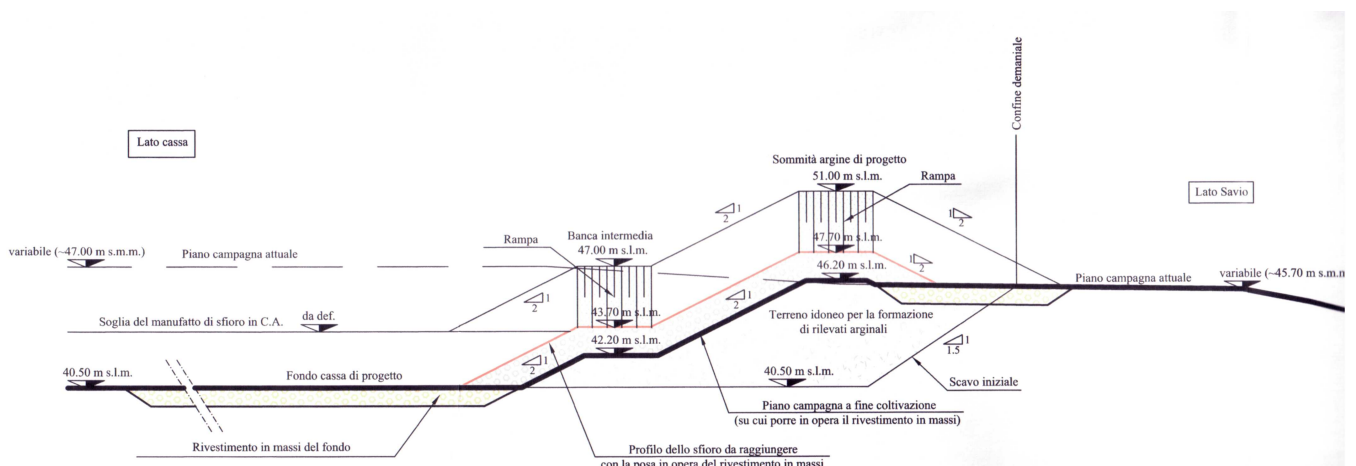
The duties of the Water Authority are:

- Completion of the spillway and installation of large rocks along the river Savio banks (river side);
- Construction of the river banks in third-party's property.

The agreement states that, in order to guarantee that the work is done correctly, the Water Authority assumes a control task during the works, together with the municipality.

It also states that after the extraction is complete, the area becomes property of the Water Authority, which must complete the work and becomes responsible for the management and the maintenance of the area.

Fig 6 - Section of the spillway of the basin.



Lesson learnt

The innovative way in which public and private interests met, thanks to the P.I.A.E., led to the achievement of important goals, as far as both territorial safety and extracting activities are concerned.

Thanks to the public-private partnership, it has been possible to overcome the main economic difficulties for the construction of the detention basins (funding, expropriation of private areas, etc). The final destination of the area for public use, after the extracting activities are complete, makes the planning of such activities more sustainable and affordable.

The coexistence of extracting activities and safety-interventions on rivers helps to reach the goal of limiting the consumption of resources and land by rationalizing the use of both natural resources and public money.

The Province of Forlì-Cesena experience led to a change in the Regional legislation (modification of the regional law L.R.17/91 on July, 2011), specifically the introduction of article 19bis on norms for a rational use of the resources, which dictates that the draft of the extracting activities planning must be the most important thing to be considered by the regional Basin Technical Service when considering implementing pools for hydraulic needs.

To achieve the goals mentioned above, the Water Authority can enter program agreements with Municipalities and Provinces. On the basis of the preliminary basin project, the planning tools concerning extracting activities are modified incorporating the amounts of gravel included in the P.I.A.E., which are a priority over needs not related to construction of public works.

The agreement entered, while requesting the authorization, includes the final works to be carried out in the extracting site, in accordance with what was established in the basin project, including the conveyance of the area to the Water Authority at no costs.



Fig 7 - Rendering of the area after the completion of the project.



The MiSRaR project

The MiSRaR project is about Mitigation of Spatial Relevant Risks in European Regions and Towns. The project is a cooperation between seven partners in six EU member states:

- the Safety Region South-Holland South, The Netherlands (lead partner)*
- the city of Tallinn, Estonia*
- the region of Epirus, Greece*
- the province of Forlì-Cesena, Italy*
- the municipality of Aveiro, Portugal*
- the municipality of Mirandela, Portugal*
- the Euro Perspectives Foundation (EPF), Bulgaria.*

The goal of the project is to exchange knowledge and experiences on risk mitigation in spatial policies. The project will result in a handbook in which the lessons on the mitigation process are described and the good practices from the partners are presented. The Risk Assessment and Mapping Guidelines for Disaster Management of the European Commission will be implemented in the handbook. The MiSRaR project is cofinanced by the European Regional Development Fund and made possible by the INTERREG IVC programme.

www.misrar.eu

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