LIFE11 ENV/IT/004

FINAL Report
Covering the project activities from 01/06/2012 to 31/12/2019

Reporting Date
31/12/2021

Interventi per il miglioramento delle acque e degli habitat nella Valle del Lambro (*Lambro vivo*)

Data Project

Project location	Municipalities of Inverigo, Nibionno, Merone and Veduggio con Colzano
Project start date:	01/06/2012
Project end date:	31/12/2017 **Extension date (amendment 3):** 31/12/2019
Total budget	€ 3,891,348 (Eligible € 1,575,192)
EC contribution:	€ 566,686
(%) of eligible costs	40.48

Data Beneficiary

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1. List of contents.

2. Executive Summary

2.1. List of key-words and abbreviations (when appropriate).

CDG ÷ Consiglio di gestione
FWS ÷ free water surface
FB ÷ facebook
DG RL ÷ Direzioni generali di Regione Lombardia
SII ÷ Servizio idrico integrato
AATO ÷ Autorità d'ambito territoriale ottimale
DRF ÷ Dipartimento di riqualificazione fluviale
PVL ÷ Parco Valle Lambro
RUP ÷ Responsabile Unico del Procedimento

2.2. General progress

During the period described in this final report all the actions were at most completed, with some limited readjustment regarding mainly some communication tasks.
As regards to the works they have been all closed, and all fully operating.
A synthesis of the state of the actions is provided below:

- ACTION A1 (*Kick off of the project and involvement of stakeholders)*: The action was completed in December 2013.
- ACTION B1 (*Creation and development of a model decision-making and participatory planning*): The action finally ended in April 2015 with the presentation of a final document of the Forum containing strategic lines of intervention on the basin of the River Lambro. The document was signed by 25 public authorities and associations.
- ACTION B2 (*Realization of filter ecosystems for the finishing of the water leaving the purifiers of Merone and Nibionno with phytodepuration techniques*): The filter ecosystem downstream Nibionno WWTP was completed in November 2016; in January 2017 began some complementary works, including the laying of informative panels; these ended in the month of February 2017, and actually the system is fully operating.

  The filter ecosystem downstream Merone WWTP was completed at the beginning of 2020 and it is actually operative.
- ACTION B3 (*Identification and reduction of polluting sources along some minor tributaries of the Lambro critical for the quality of the water in the municipality of Inverigo*): the Park illustrated the critical issues on the rivers to the responsible of Integrated Water Service (Municipality of Inverigo and Valbe services) and proposed an agreement for the management of sewage artifacts. The Park also managed the hydraulic arrangement on the two rivers (not financed with this project) that contributed to highlight these and others critical issues that have been taken in charge by the municipality;
- ACTIONS B4-B5-B6 (*Creation of filter ecosystems along some minor tributaries of the Lambro critical for the quality of the water in the municipality of Inverigo and Creation of wetlands along the Lambro auction in the municipalities of Nibionno and Inverigo*): The works began in March 2017 and ended between 2017 and 2018.

- ACTION B7 (*Renaturation of the final stretch of the Roggia Cavolto*): The works on the river began in March 2016 and ended in November of the same year. At the beginning of 2017 began the complementary works, including the laying of informative panels; these ended in the month of March 2017 so no developments are to be noted except for the complete and luxuriant vegetation of the river and banks.
- ACTION C1 (*Monitoring of stakeholder participation*): The presences at Forum evenings was noted, contributions were collected through the drafting of minutes and through the collection of presentations exhibited by Forum participants during the evenings. In addition, access to the website and blog was monitored. The action ended at the end of 2013.
- ACTIONS C2-C3: the activities of monitoring water quality and habitat and the drafting of a single annual report for the two actions have been going during the period ante operam, before the works started, and after they were finished.
- ACTION D1: it was designed and published a new website dedicated specifically to the project: www.lambrovivo.eu. The site provided all information and all materials related to the project.
- ACTION D2: a first series of temporary panel regarding the project of actions B2, B4-B5-B6, B7 were installed at the end of 2015. At the beginning of 2017 some definitive panels regarding the actions B2 (Nibionno) and B7 have been installed near the works realized. In the 2018 the last definitive panels have been realized illustrating the works and the final results and they were also installed.
- ACTION D3: one information brochure (brochure 4 flaps - 1000 copies) was realized and distributed in 8 points of public interest in the municipalities involved in the actions.
- ACTION D4: were made a total of 12 issues of the newsletter, which is distributed regularly from December 2013 to June 2016. A special number for the end of the works was distributed in March 2020. The newsletter was distributed to a mailing list that now counts about 300 addresses. It is also publicized on social groups of the project (FB, Twitter and Google+) and published on the site www.lambrovivo.eu.
- ACTION D5: currently we have a profile, a page and a group on FB, a profile and a page on Google+ and a Twitter account. All socials were updated with the news related to the project and synchronized with a dedicated application.
- ACTION D6: on November 15, 2014 was organized a conference in Sovico and on 7 March 2015 one in Monza. The 3rd of March 2019 a final conference has been organized at Merone WWTP.
- ACTION D7: the After LIFE+ Communication plan is a part of the present report (see *"technical part")*.
- ACTION D8: a Layman's report has been produced, distributed to the mailing list, published on the site www.lambrovivo.eu and on the social groups of the project (FB, Twitter and Google+).

2.3. Problems encountered

Short delays were accumulated in the early stages of some designs, while not planned expansions occurred in the request of some authorization and in the management of tenders. As for the authorizations in some cases some institutions have asked to express their outside the Services Conference to which had been regularly invited. As for the tender procedures it has been found in only one case they were much dilated, that of the actions B4-B5-B6, because of issues raised by competitors on the team required for the executive project.

A consistent delay was accumulated in the works of the action B2 – Merone; these have to be charged to the necessity of a 3rd and a 4th variant of the works that were produced very slowly and to the construction company that accumulated delays complaining about design shortcomings.

3. Introduction

3.1. Description of background, problem and objectives

The background is represented by a heavy artificialization of the riverbed, hydraulic safety interventions with a strong environmental impact, active or abandoned industrial areas insisting on the river belt, increasing urbanization of virgin areas with land consumption and compromise of environmental peculiarities such as springs, valleys, wooded areas. These aspects involve the impoverishment of biodiversity, the interruption of ecological gates and the trivialization of the landscape. In addition, but not less important, the chemical and microbiological quality of the water of the river that is, in its sublacual part, degraded.

The hypothesis that were demonstrated in this project are:

1) The possibility of matching purifiers systems with different degree of naturality and technologies or mechanization with the aim to empower the purification capacity of the sewerage system and the autodepuration of the river;
2) The necessity of empower also the biodiversity along the river, both in the bed (with defragmentation for the fishes) and in the banks (for all the other species);
3) The importance of sharing decisions with all the stakeholders involved.

To pursue this objectives different solutions were adopted:

a) Promote and support a permanent forum of the stakeholders;
b) Promote the design of green-blue infrastructures based on mixed techniques technological and naturalistic;
c) Promote an integrated and efficient approach to the problems about river water and biological quality.

The expected results in terms of environmental benefits are a more efficient system of depuration of the wastewater, an empowered capacity of autodepuration of the rivers, an improved resilience of the river systems and an increased awareness of all the stakeholders and decision maker in their role for the management of the river systems.

As to the expected longer term results of course EU will consider the effect of the climate change on the river systems and renew the impulse for the improvement of their situation and their defence and conservation as necessary components of our territories and the foundations of the same human survival, considering that this depend upon the water resources that in a perspective point of view will be more and more scarce and consequently of lower quality.

4. Administrative part

4.1. Description of the management system

Parco Regionale della Valle del Lambro, as project coordinator, was responsible for project management.

To absolve this role, the DRF has followed a common procedure for the development of implementation actions, which consisted of synthesis:

- organize preliminary meetings with the competent authorities either directly or indirectly to the development of a single action to illustrate the original idea and subsequently coordinator obtaining all opinions;
- organize open meetings with associations and communities, in order to promote and share the project idea for the action;
- converge observations received in all the meetings, to prepare a preliminary project already shared with a stakeholders;
- activate the process for the project development and its authorization process;
- supervise the progress of the procedures and encourage all the parties involved to respect the expected timing.

During the realization of the works the DRF supported the role of the Responsible for the Procedure (RUP) monitoring the progress by means of:

- meetings between the contractor, the Site Manager office and the Safety Manager;
- regular and frequent direct inspections on the construction site;
- relationship with the landowners.

4.2. Organization chart of the project team and the project management structure

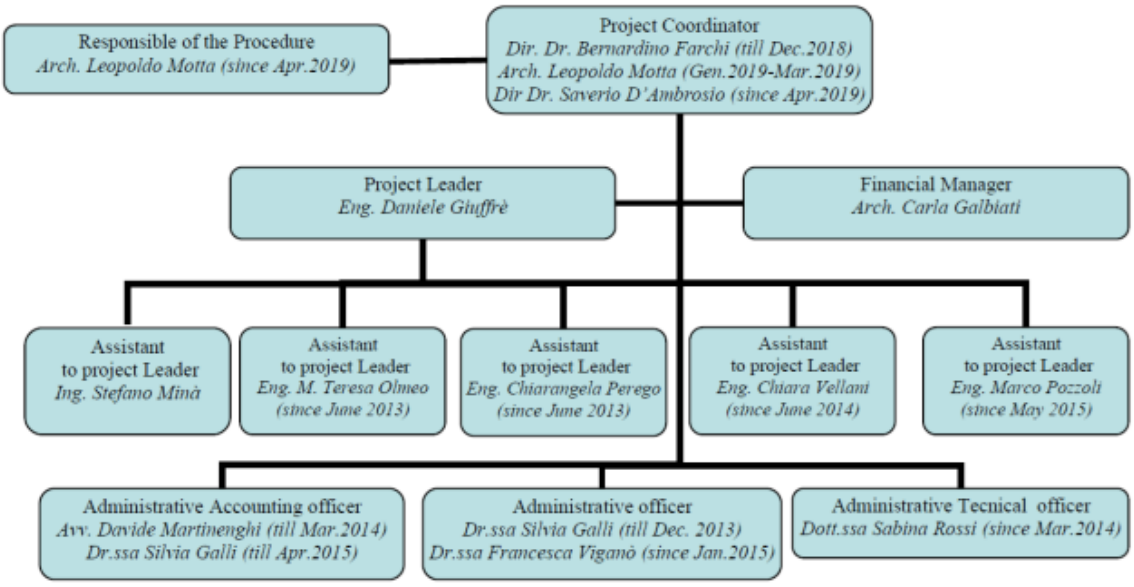
Some changes occurred during the project in the personnel composition of the team and in the external assistance, hereafter reported:

1) The Project Coordinator: there was a replacement in the final part of the project. The Director Dr. Bernardino Farchi retaired at the end of 2018 and was substituted ad interim by Arch. Leopoldo Motta from January 2019 to Mar.2019 and definitively by the new Director Dr. Saverio D'Ambrosio since April 2019. The Project Coordinator coordinated from the top all activities covering the role of Responsible for the Procedure (RUP) till the beginning of the 2019, then the two roles have been divided between two persons: the Director, that maintained the higher position, and the RUP, in the person of arch. Leopoldo Motta.
2) The Head of the Project: during all the project was Eng. Daniele Giuffré, the external technician responsible for coordinating at a technical-administrative level and arrange all the activities for the correct routing of procedures and compliance with the agreed timeframe;
3) The Financial Manager: during all the project was Arch. Carla Galbiati, the external technician responsible that managed all financial aspects of the project, from the cost estimate to their reporting, and coordinated the operational aspects of the administrative procedures.

4) <u>The assistants to the Head of the Project:</u> all external technician, at the beginning of the project there was only Eng. Stefano Minà, successively helped by Eng. Maria Teresa Olmeo and Chiarangela Perego (since 2013), Eng. Chiara Vellani (since 2014) and Eng. Marco Pozzoli (since 2015). They held operational roles related to:
   - Technical and administrative control of external projects;
   - Direct design;
   - Preparation of tender procedures;
   - Experiment tender procedures;
   - Timing and quality control;
   - Operational support to the outermost regions;
   - Communication and dissemination;
   - Monitoring of the progress of the works.

5) <u>Administrative personnel:</u> they played a supporting role in all these activities, but there were some replacement also in this case: Avv. Davide Martinenghi, Administrative Accounting officer, ceased to work in march 2014 and was substituted by Dr.ssa Silvia Galli, who, until then, was Administartive officer. Then Dr.ssa Silvia Galli ceased to work for the project in April 2015. In January 2015 Dr.ssa Francesca Viganò began working on the project, as administrative officer, till the end. Dr.ssa Sabina Rossi, as Administrative technical officer, starts working for the project since March 2014 until the end.

The management team has found a very flexible and efficient organizational mode based on a weekly meeting of about 1-2 hours aimed at coordination of short- and long-term activities, with the participation of the project leader and his assistants and the Financial Manager. In this meeting everyone represents the progress of all individual activities, the difficulties encountered are displayed and set out the next steps and how to perform the same.



4.3. Previous reports ad amendments

Until now have been sent the following documents:

- Inception Report – 30/03/2013;
- Progress Report 1 – 31/03/2014;
- Midterm Report – 31/10/2015;
- Progress Report 2 – 30/03/2017;
- Progress Report 3 – 30/09/2018.

At the end of 2013 a 2nd Amendment (the 1st was a formal one on some contractual details) was presented which provided in great synthesis, the entry of a co-financier (Cariplo Foundation) and 2 additional new actions (B6 and B7). The Amendment was accepted and the Progress Report 1 already contained the 2 new actions provided by the Amendment.

At the end of 2017 a 3rd Amendment was presented which provided a delay of two years for the completion of the works and the phase of monitoring post-operam, shifting the end of the project to 31/12/2019. The 3rd Amendment was accepted in December 2017.

4.4. Evaluation of the management system

The organization of the project management was quite good, as regards the efficiency of the working tools, the methods of carrying out the activities and the quality of the work of the people involved. Some delays were accumulated during the course of the project, that became important especially in one implementation action (B2 for Merone plant) and in some communication tasks. These delays didn't depend completely on the management system, but consistently on external actors, also impersonal: weather and climate, site managers, construction companies, testing commission, external assistants. Especially in the final year of the project also the apical reorganization of the Park contributed to produce a slowdown.

5. Technical part

5.1. Technical progress, per task

5.1.1. Action A1

Action A1 consisted in the identification and involvement of the stakeholders involved in the Park's proposal for interventions. This was started with an office job that established which local authorities could be affected by the construction of the participated model referred to in action B1. Therefore, all the Municipalities insisting on the water catchment area of the Lambro river have been identified, all the supra-municipal bodies (Provinces, Mountain Communities, Region), the Integrated Water Service Companies operating in the territory and all the known associations operating in the sectors of environmentalism, in the ecology, in the local cultural dissemination (so-called "Pro loco") and civil protection associations and groups.
The work of the A1 action managed to interest local administrations and associations historically linked to the park through paper invitations, via email, invitations to shared resources Dropbox® and FB group. There have also been requests for publication of the meetings on the institutional sites and on the billboards of the Municipalities. This contextual action to the convening of the sessions relating to Action B1, ended in 2013. The overall data of the subjects contacted are: 73 Municipalities, 32 Associations, 5 SII management companies, 2 DG RL, 3 AATO.

Action status:

Effective start	Effective end	Progress [%]
July 2012	December 2013	100%

Problems
The only problems occurred in the involvement of the AATO and the companies managing the SII, operating within the park boundaries, while on the contrary there was an active participation among the other interested stakeholders. To overcome this problem, during the final meetings of the Forum object of action B1 it was suggested in the continuation of the activity, which however leaves the present LIFE + project, to focus on the involvement of these entities through an action directly guided by the Region in the context of the River Agreement.

Time schedule
The action started in mid 2012 and ended in late 2013.

Objectives
The objectives envisaged by this action have been successfully achieved, thanks to the high number of stakeholders involved and interested in the Park's proposals for intervention.

Deliverables
07_A1_C1_Del07_Fascicolo informativo finale e relazione finale partecipazione stakeholders

5.1.2. Action B1

The action B1, begun in 2012 and completed in 2015, has developed mainly with live meetings to share proposals for the actions, suggested by the Park, with the stakeholders and incorporate their requests. The meetings were held initially at the headquarters of the Park and then became itinerant throughout the basin to better foster local participation. All materials and contributions of stakeholders were shared through specific resources such as Dropbox® and FB group. The materials produced during the action consist in 16 presentations (by the Park), 1 external technical input and 9 external contributions from Associations.

Figure 1 a) and b): some images from Lambro Forum

The final feedback show a total involvement of 24 municipal administrations, 26 associations, 3 Company SII, 2 DG RL. A total of 21 meetings have been held with an average of 21 appearances for each evening for a total of 474 overall attendance.
The action ended with the objective to prepare and share a document which could be signed by as many possible stakeholders. On 7 May 2014 the Park presented a first draft of the final document and in the fall of 2014 organized 4 meetings to which were invited only the most critical associations about the contents of the document, with whom a long and careful work of amendment correction and filing was done.
To complete this step on 15 April 2015 an evening was organized to present and sign the document. This was signed by 25 between organizations and associations including the LR, ATO Lecco, various municipalities, the majority of the involved Associations.

Action status:

Effective start	Effective end	Progress [%]
July 2012	April 2015	100%

Problems

The main problems encountered in this action were primarily a diffidence on the projects promoted by the Park by the associations present at the Forum probably caused by the Park past policy, which implemented or authorized some project in some way impactful for the river and its habitat. However, this diffidence has been partially overcome by most Associations, which suggested improvements on the projects proposed by the Park or alternatives ideas on specific actions.
In the final step of the action has emerged the blatant duplicity in the behavior of some Associations who initially pretended to give a positive contribution, but in the end refused to sign the final document they had helped to create and included the requests they submitted during the Forum. This behavior has finally shown their exclusive and peaceful intention dilatory and obstructionist.

Time schedule
The action began in mid-2012 and ended in April 2015.

Objectives
For this action the objectives expected have been successfully achieved.

Deliverables
08_B1_Del08_Fascicolo partecipativo e documenti raccolti

5.1.3. Action B2

The action involved the construction of two filter ecosystems for the finishing of the water leaving the purifiers of Merone and Nibionno with phytodepuration techniques.
The indicated action included a cognitive phase (investigation and characterization of the effluent leaving the treatment plant or other polluting sources to be treated and their persistence), an authorization phase (obtaining permits, concessions and availability of areas) and an operational phase (definitive, executive design).

As regards the **finishing system of the Merone treatment plant**, the action saw the delivery of the preliminary project in March 2013 and its approval with resolution of the CDG of the Park No. 16 of 26/04/2013. The preliminary project showed a primary free surface basin followed by a free surface system of purification as illustrated in the image below.

Figure 2: general plan of phytodepuration plant in Merone as to the preliminary project of March 2013

In order to make the community participate on the importance of action B2, an information evening was organized by the Park on 03/07/2013, within the Northern Lambro River Contract Forum, entitled "Presentation and discussion on techniques and possible applications of phytodepuration to improve the quality and habitat of rivers", prepared by IRIDRA. Specifically, another evening was organized on Merone's intervention, always within the Forum of the Northern Lambro River Contract, in which the preliminary project was presented on 07/18/2013. From this evening, the satisfaction of the Lombardy Region emerged for the innovation of the solution adopted and its relevance for the treatment of first and second rain water.

The project was also presented in the Lombardy Region on 20/11/2013 which made some observations and requests to be incorporated in the final design.

On 03/03/2014, the tender was launched for the assignment of the final design of the Merone finishing plant, which was then assigned to the company IRIDRA Srl in Florence. The final project was delivered at the end of September 2014. This reported a series of corrections and improvements compared to the solution proposed by the preliminary, whose main lines were confirmed, however, in particular:

- the necessity and the possibility of treating the overflow waters coming from the purifier's top spout was confirmed;

- the primary treatment (initially consisting of a free-hair homogenization tank) was replaced with a submerged system.

- a free flow secondary treatment phase was maintained which can also be fed by the treated wastewater from the purifier;

- an absolute novelty was introduced in the head of phytodepuration or an aeration system of the submerged phase of the primary treatment.

Compared to the solution proposed in the initial LIFE call, the surface went from 3000 m2 to about 7000 m2; this increase was made possible by making maximum use of the area made available by the management company of the Merone ASIL SpA treatment plant. Furthermore, at the express request of the treatment plant technicians, the system was intended for the treatment of the water touched at the head of the treatment plant rather than to those already purified; this is because the purifier already achieves very good yields while the touched waters are not subject to any type of treatment. The following page shows some design excerpts of the solution definitively adopted.

The solution proposed in the final project allowed to significantly increase the purification efficiency (as required by the Lombardy Region) avoiding the possibility of unwanted side effects such as the formation of unpleasant odors (as required by some local authorities).

The authorizations were requested on the final project at the Services Conference held on 18 December 2014. As a result of this, no provisions were made but rather it was clarified with extreme clarity that the management costs of the plant would have been covered in the future by the water service tariff.

The project is contained in the deliverable 12_B2_Del12_ProgettoDefinitivoMerone.

Figure 3: a) general plan of the interventions, b) sections of the submerged flow system and c) sections of the free water surface system as to the definitive project

Subsequently, the same designers proceeded with the drafting of the executive project (the announcement relating to the assignment of the final design provided for the possibility of also assigning the executive design, for which in any case the relative amount was below the

threshold). No substantial changes had to be found in the executive project compared to the final one. The executive project was therefore verified and validated in June 2015. It is contained in the deliverable 15_B2_Del15_ProgettoEsecutivoMerone.

The executive project was therefore put up as a tender at the end of July 2015. The tender was closed on 11 September 2015 and the evaluation phase of the offers started.
At the same time, an agreement was prepared and shared between ASIL, owner of the areas, and the park, creator of the work, for the management of the structure and the area. The Agreement was definitively signed in the month of July 2015.

At the end of July 2015 the tender for the work was issued. The call was closed on September 2015 and then the phase of evaluation of tenders was opened.

In January 2016 the works of the Merone purifier have been assigned to the company Di Piazza Vante s.r.l. who signed the contract on 16/03/2016. At the same time in July 2016 the negotiated procedure for the selection of the "Site Manager" was published. The call, to which were invited five engineering companies, was won by Aequa Engineering s.r.l.

On 10/03/2016 the "Site Manager", Eng. Giuseppe Baldo, proceeded to the partial delivery of work to the company Di Piazza Vante s.r.l., in order to start with the removal operations of the vegetation. The final delivery of the work took place on 13/10/2016.

In the month of June 2016 a 1st variation appraisal was authorized by the PVL for the works at Merone purifier. The variant has been requested as were necessary some further works for soil consolidation with regard to the tracks access to the site and an increase of the temporary structures for the support of the digging for the underground civil works.

In February 2017 a 2nd variant was required to perfect some details regard to the height and position of the solids separation system and the installation of the civil works. This has been authorized by the RUP in late February 2017.

In March 2017 the Park asked to ASIL, the Society that managed Merone WWTP, to indicate a person to enter in the testing Commission, and ASIL answered indicating eng. Giorgio Citterio, responsible of the same plant. His position was formalize at the beginning of 2020. In May 2017 the President of the testing commission was nominated in the person of eng. Enzo Calcaterra - STUDIOSPS S.R.L from Vimodrone (MI).

In November 2017 a 3rd variant was required to update and improve the electrical plant and compensate the operation of laying down the gravel in the basins. This has been authorized by the RUP in September 2018.

The plant was inaugurated on 3rd March 2019 (see images here and on the website).

Figures 4 – Inauguration of the plant, 3rd March 2019.

In August 2019 a 4th variant was required to compensate some improvements, small jobs and further testing. This has been approved by the Park in December 2019.

The works have been completed on January 10th 2020, as results from the Certificate of the Site Manager.

The works have been finally successfully tested on October 30th 2020, as results from the Certificate of the Testing Commission (see 25_B2_Del25 - Relazione fine lavori Merone).

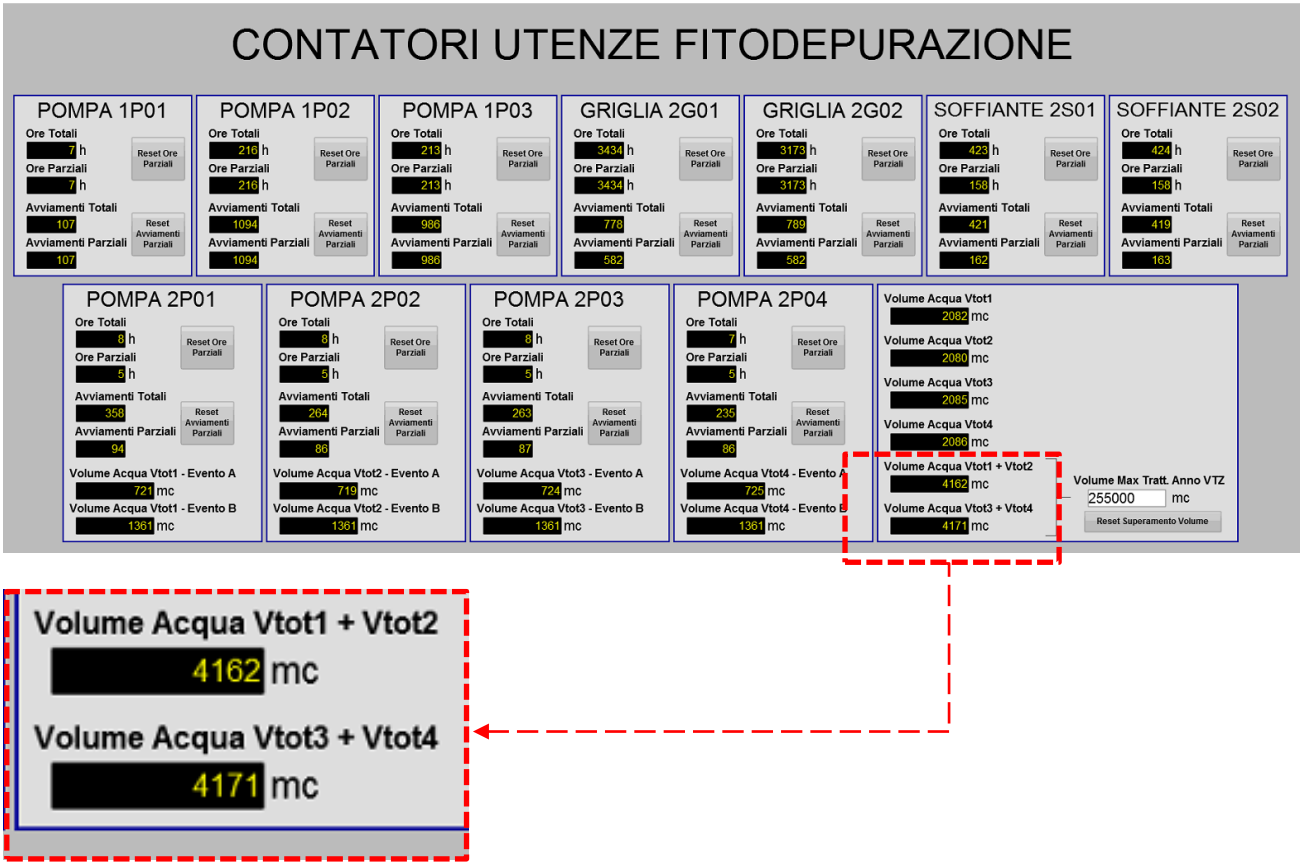
Below are reported some ortho images of Merone purifier before, during and after the works (roughly dated spring 2019) and therefore some images of the plant at present.

Figure 5 - Comparison between the ortho images of Merone purifier before, during and after the works.

After a period of testing the Constructed wetland plant for the treatment of combined sewer overflow at Merone WWTP is in full operation since 1st July 2021, when the last works on pre-treatment section have been completed.

The max volume per day to be treated is limited to 1000-2000 m3/day depending by the quality of the combined sewer overflow. This is in accordance with the start-up and commissioning strategy, which is based on incremental flows during the first year of operation in order to favour plant adaptation and bacterial community growth. Moreover it permits to check during the first events that the system is capable to operate in the correct way and to optimize his functioning checking the monitoring data and the trend of the main parameters on the SCADA system.

The first event has been registered on 26th July 2021; in total 7 events have been occurred until today, with a total of about 9000 m3 already treated, as recorded by the SCADA system.



Como Acqua is completing the set-up of the automatic sampler at the outlet in order to start with data collection from November 2021.

With regard to the **finishing system of Nibionno purifier**, after the sharing with the manager of the plant, an information meeting with the stakeholders was organized on 18/07/2013, inside the Forum.

The preliminary draft, delivered in May 2014, was approved by the CDG of the PVL on 10 June 2014. It was based on 2 basins put aside the actual Nibionno WWTP working in free flow where all the effluent of the WWTP would pass and be refined (see 10_B2_Del10_ProgettoPreliminareNibionno).

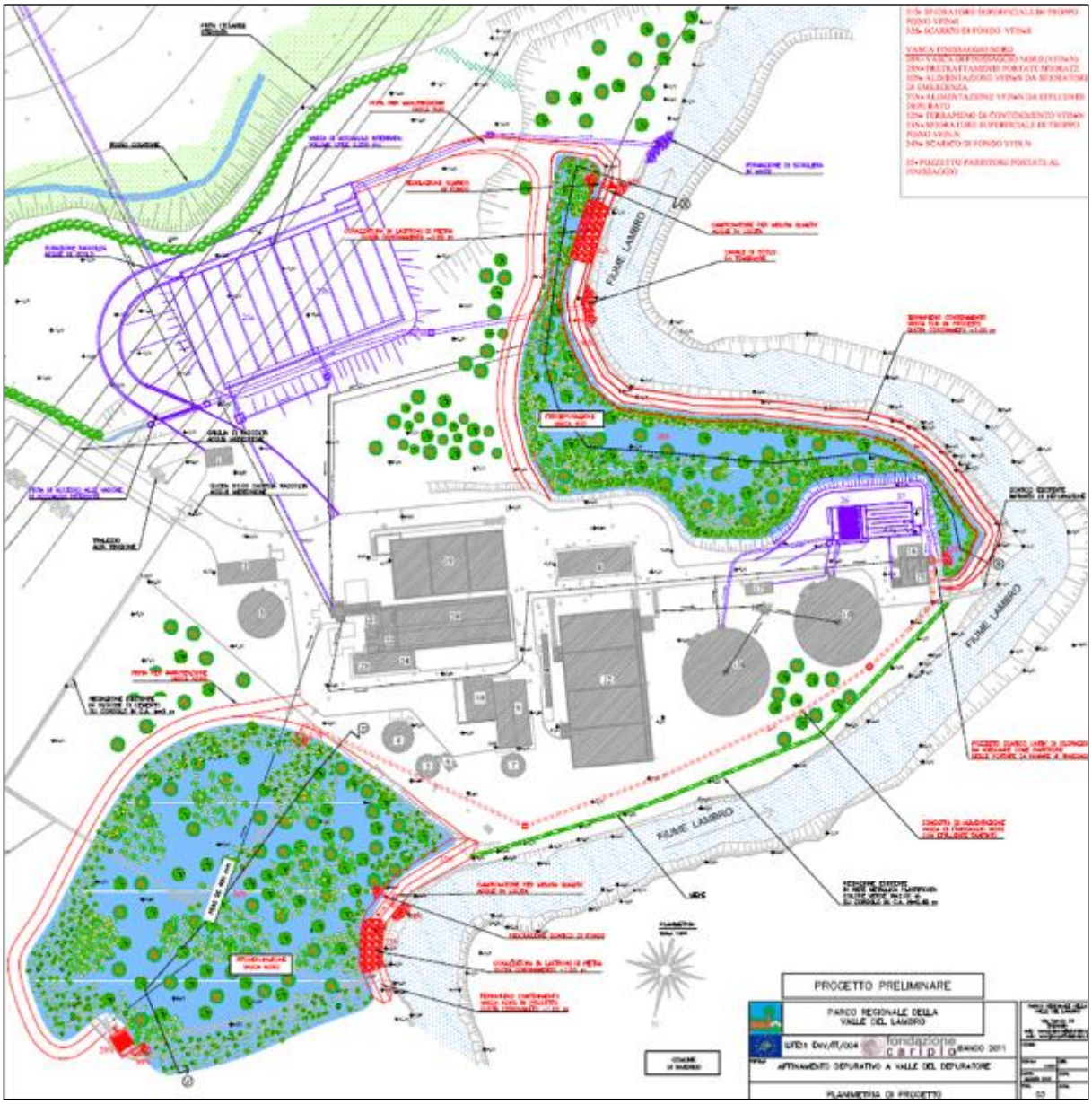


Figure 6 – Preliminary concept of Nibionno purifier.

The definitive draft, entrusted by the restricted procedure on 24/07/2014, was delivered at the end of November 2014. This draft follow essentially the preliminary with some improvements related to the geometry of the basins (see 13_B2_Del13_ProgettoDefinitivoNibionno).

On the definitive draft were required the expertise views at the Services Conference held on 18/12/2014. At the conference some observations were expressed especially from the WWP managers.

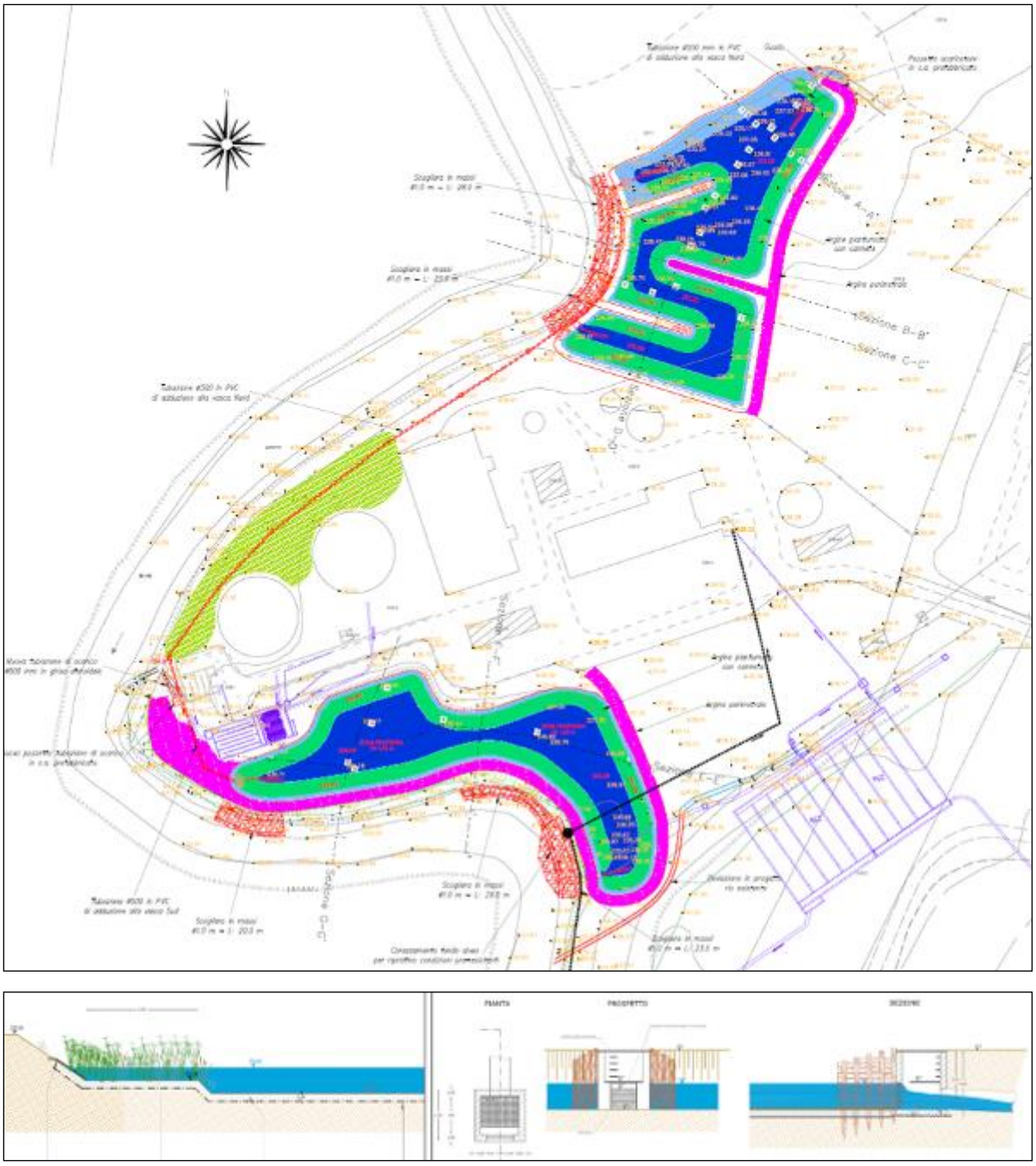


Figure 7: definitive draft: a) general plan and b) sections

Later the same team drew up the executive project (the assignment includes all phases of design from the definitive to the executive, also the Site Management and Safety Coordination) that was delivered in February 2015. In the executive project have been incorporated all the observations made by the operator of the treatment plant. The executive project was then verified and validated during the month of April 2015 (see 16_B2_Del16_ProgettoEsecutivoNibionno).

At the beginning of May 2015 the tender for the works was issued. The call was closed on 11/06/2015 and immediately opened the evaluation phase of the tenders. In October 2015 the works of the Nibionno purifier have been assigned to DELTAMBIENTE Soc. Coop. Agr.

In the month of June 2015 an agreement between Valbe SERVICES SPA, owner of the areas, and the PVL, realizer of the works, for the management the structures and the area was signed.

On 29/03/2016, the Site Manager delivered the works to DELTAMBIENTE Soc. Coop. Agr.

In the month of July 2016 PVL authorized a variation for the works. The variant was requested to realize some works of accomodation and securing to the maintenance track, some operations in the areas of south basin and the substitution of a pipe in accordance with the plant managers.

In November 2016, the Site Manager declared the end of the work, in the respect of the contractual times (see 22_B2_Del22 – RelazioneFineLavoriNibionno).

Later, in January 2017, some completion works were requested and executed in the area of Nibionno purifier. In particular a new fence was posed in place of the older one and were installed two boards for new informative panels. In February 2018 some other completion works concerning the fence and the 2° monitoring cabin were assigned and executed.

Actually the system is fully operational and since the work finished the manager is collecting some quality data on the effluent.

Below is reported a comparison between the ortho images of Nibionno purifier after the works and today where is evident the vegetation spreading from the banks toward the center of the basins.

Figure 8 - Comparison between the ortho images of Nibionno purifier after the works and today.

Figures 9 –Vegetation of the south basin at Nibionno purifier today .

Figures 10 - Vegetation of the north basin at Nibionno purifier today.

Action status:

Effective start	Effective end	Progress [%]
July 2012	January 2020	100%

Problems

Some unexpected problems arose during the authorization phase of the project of Merone, causing a delay of about a month of the publication of the tender. A second problem was the completion of the procedures and the checks. The first aspect was exacerbated by a significant amount of offers received (44 for Nibionno) and numerous cases to check on the administrative and legal aspects.

As regards the purifier of Merone some problems have occurred connected to execution of the works that led to the request of four variants, with a necessary increase of the realization times. The last variant dealt with improvements, small jobs and further testing.

Both Nibionno and Merone system are now fully operative.

Time schedule

The action began in mid-2012 and ended in January 2020. In particular the work of the Nibionno purifier was completed at the beginning of 2017 (also considering some additional works) while for Merone ended in January 2020.

Objectives

As for the water quality we must observe two different situations.

In the case of Merone the plant at the current is operative and the comparison between the Ante Operam and the Post Operam situation in fact of course do not see the effect of this plant but shows a certain stability in all the values (for further information see the deliverable C2-3_Del25_ConfrontoAnteePostOperam).

The project was included in the European project MULTISOURCE (ModULar Tools for Integrating enhanced natural treatment Solutions in Urban water CyclEs), a research project founded by European Community under H2020-SC5-2018-2019-2020 (Greening the economy in line with the Sustainable Development Goals).

IRIDRA, which designed and followed the start-up of the system, is partner of the project and responsible of the activity on Merone CW. The contract (Grant Agreement 10100352) was signed in May 2021; the project kick-off was on June 2021 and will end in May 2025.

The project coordinator is INRAE (Francia) and there are 20 partners from 9 different countries and 3 different continents (EU, America and Asia). The 2 italian partners are IRIDRA and Città Metropolitana of Milan; Lombardia Region and Milan Polytechnic support the project too.

The main goal of Multisource is to facilitate the planning of Nature Based Solutions in urban context, promoting a water cycle sustainable management; 7 large scale NBSs will be monitored for the whole project duration considering different type of wastewater. Merone CW is one of them, targeted to study combined sewer overflow treatment, quantifying performances and individuating solutions to optimize removal rate and energy consumption.

Aarhus Universitet (Denmark) coordinates the monitoring activities, which provide to integrate the monitoring data collected by Como Acqua with additional monitoring funded by Multisource. The parameter that will be monitored are the following:

a) Biological parameters (BOD5, COD, N, P, TSS)
b) Phisical/chemical parameters (temperature, DO, Eh, conducibility)
c) Other pollutants (metals, IPA)
d) Emergent contaminants
e) Microbiological parameters
f) Within the Multisource project, n°2 COD continuos sensors will be installed at the inlet and outlet of the wetland.

In the case of Nibionno there are more data concerning both the monitoring on Lambro river and the self-monitoring made by the WWTP itself. The first data say that the river water quality is even a little worse (scarce-sufficient against sufficient-good) while the second say that the pools have an evident efficiency on the removal of ammonia NH_4 (about 30%), nitrate NO_3 (about 10%), phosphorus P (2%) and Escherichia Coli (20%). BOD and COD are on the contrary increased and this is probably due to the net biomass production internal to the basins.

As for the habitat quality also it is necessary to distinguish the two cases.

In the case of Merone the transformation of the area caused of course a negative impact on the ornithic community both in the reproductive and wintering period. The species were therefore forced to move to the nearby woods.

As for the amphibians in the free flow pools to phytodepuration numerous individuals of green frog have always been observed but no ovation; in this case the presence of ovature cannot be excluded as the pools were covered with dense floating vegetation consisting mainly of duckweed.
As for the odonates at the moment there are no substantial changes between the ante and post operam situation. The interventions have created new environments potentially suitable for some species of odonates but at the moment they do not yet have the suitable characteristics for this taxa.
As to the fishes a qualitative deterioration over time of the structure of community, it is believed, not so much to the qualitative state of the water body, but much more likely the progressive presence of the Siluro fish in the Lambro river, with a community that was initially established from a few individuals and adults only, over the years it has become increasingly abundant and structured, that is, with presence of young people of the year surveyed during monitoring. This figure penalized the final score in the calculation of the ISECI index that passes from sufficient-good to sufficient-scarce.

In the case of Nibionno the transformation of the area brought in the ornithic community the greatest increase compared to the situation before the interventions; during the ante operam censuses, in fact, the area was the poorest in absolute number of species among all those investigated. In this case, the interventions have significantly increased the diversification of the environments and consequently the habitats available for new species, creating a strong positive influence on the ornithic community. The importance of the area is demonstrated not only by the number but also by the species that are the most demanding from an ecological point of view and indicators of good quality in the woodland and peri-river habitats. This allows us to indicate these areas as the best in terms of ecological value following the interventions carried out.
As for the amphibians the interventions have shown to have already after the first years a positive impact on the area. In the space of a couple of years, in fact, numerous individuals of different species of Frogs have used the new wetlands created for reproduction.
As for the odonates the interventions have shown to have a greater positive impact on them. The area is in fact the one with the largest relative number of species: 11 species in 2017 and 14 species in 2018. This result differs significantly from what was recorded during the ante operam censuses when the area with the least number of species was found (only 2 species that also adapt to the most polluted environments: Calopteryx splendes and Platycnemis pennipes). The construction of the two phytodepuration areas has therefore created suitable environments for their reproduction.
As to the fishes also in this case a negative trend is common to the whole stretch of the Lambro river involved in the monitoring. The causes are not to be found in a qualitative deterioration of the waters or the river habitat, even if they are such aspects play a role, but in the presence of numerous allochthonous species that are occupying the niches ecological present. In a however already fragile system, allochthonous species are a non problem negligible. In particular, the presence of catfish has become increasingly frequent in recent years and homogeneous in the emissary Lambro. In calculating the ISECI index its presence is already a factor in itself of qualitative decline which further worsens if the population is structured and it passes from sufficient to scarce.

Deliverables
10_B2_Del10_ProgettoPreliminareNibionno
12_B2_Del12_ProgettoDefinitivoMerone
13_B2_Del13_ProgettoDefinitivoNibionno
15_B2_Del15_ProgettoEsecutivoMerone

16_B2_Del16_ProgettoEsecutivoNibionno
22_B2_Del22 – RelazioneFineLavoriNibionno
25_B2_Del25 - Relazione fine lavori Merone

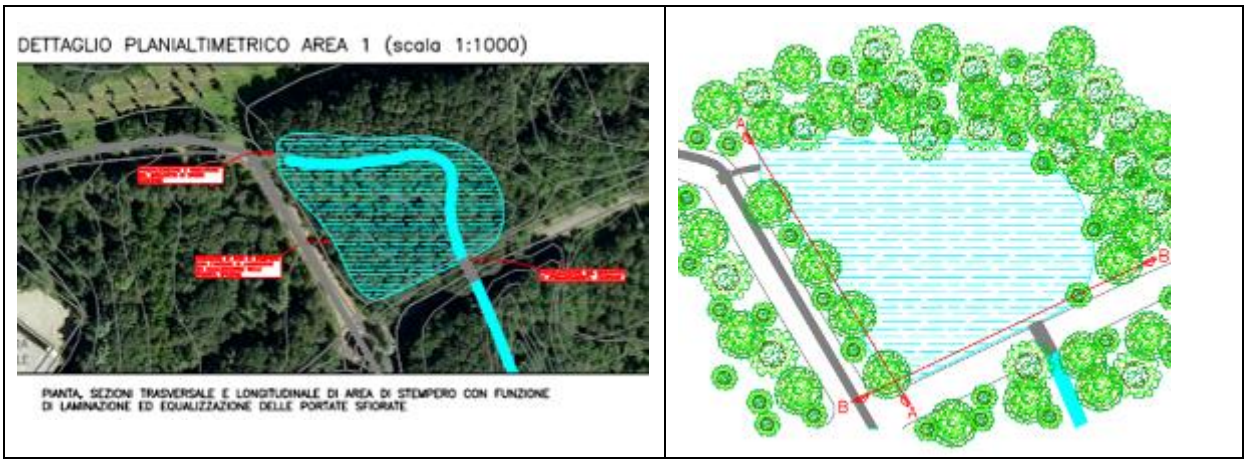
5.1.4. Action B3

The first phase led to the identification of sources of pollution along the Orrido di Inverigo and Roggia di Villa Romano; then the action passed to the implementation phase.

As regards to Orrido di Inverigo river the "Final report of the phase-finding" showed as the only critical element is represented by the spillway upstream to the hydrographic network (see 04_B3_Del04_Relazione finale fase conoscitiva).

Figure 11 a) e b): spillways upstream Orrido river

The preliminary draft on action B4 provided for the maintenance of the spillway and the creation of phytodepuration area immediately downstream of this but this met a strong opposition, therefore it was decided to revise it and the PVL was able to obtain additional financing by Lombardy Region directed to the renaturation of the river and the elimination of persistent drains on it.



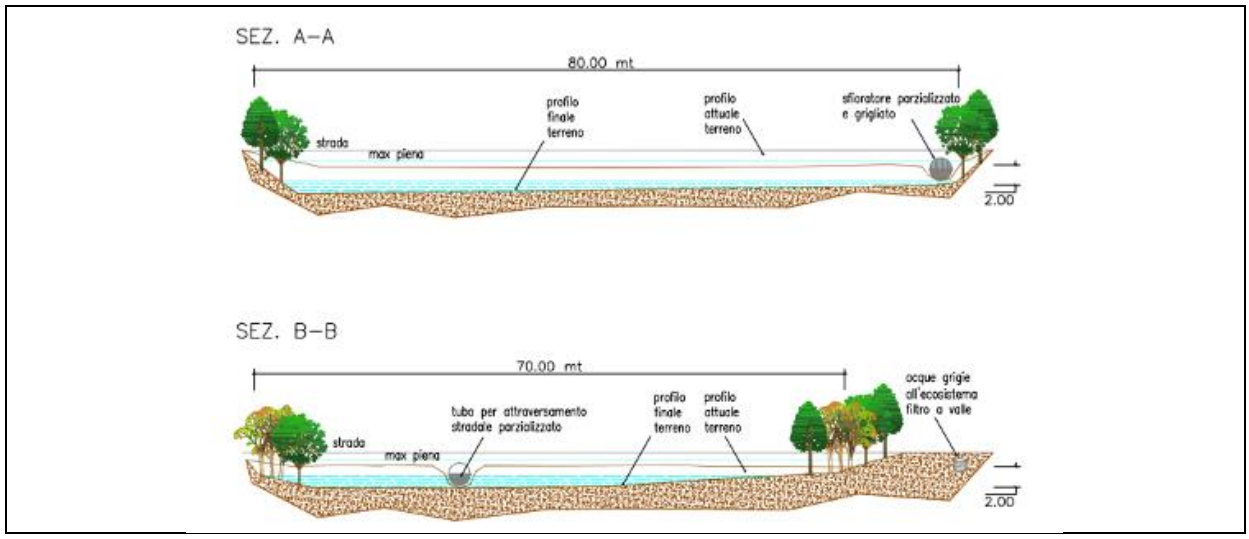


Figure 12: draft of the 1st version of the preliminary project on the Orrido river

The 2nd version of the preliminary draft of this action was delivered in July 2015. This action, which is not covered by financing LIFE11 ENV/IT/004, allows the complete disposal of the head spillway on Orrido river, provides a continuous intake of good quality water, and connects to the sewerage some houses that today delivers directly into the river.

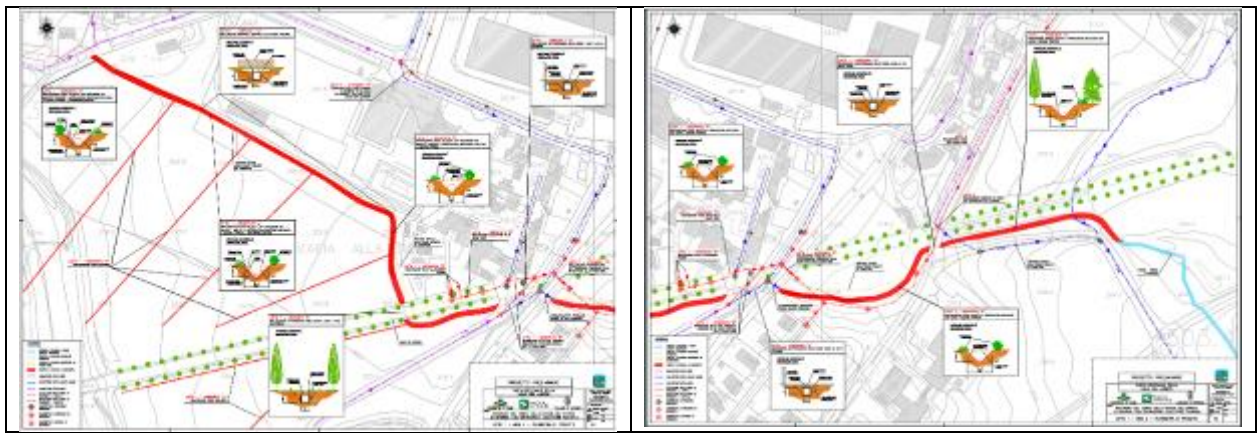


Figure 13: draft of the 2nd version of the preliminary project on the Orrido river

As regards to Villa Romanò river the "Final report of the phase-finding" showed the presence of four spillways, numbered, on the municipal cartography, with progressive 5 to 8. Following further study carried out with the technical of the Municipality it was pointed out as the main problems are due to spillway 5 and 6, while there are no particular problems on others two. On first the Municipality would carried out a recent maintenance that would have temporarily solved the criticality.

At the beginning it was proposed to municipality of current operator of the sewage system, and Valbe Services Srl, operator of main pipe and purifier of Nibionno, an Operational Programme of the Maintenance (POM - Programma Operativo delle Manutenzioni). In the document were proposed some operational and management solutions for the maintenance of the efficiency of the sewerage works that have showed the main troubles, including the frequency and the ownership of these operations. They didn't accept to undersign this document but accepted to implement its contents.

In 2017 another sewage discharge was found on the south stream of the river. The Municipality convoked the inhabitants involved and asked them to produce their private sewerage to obliged them to connect to the main pipe to WWTP. This work is still ongoing.

Although no Operational Programme of the Maintenance has been undersigned, in the summer 2017 a continuous collaboration started between Inverigo Municipality, current operator of the sewage system, Valbe Services Srl, operator of the main pipe to Nibionno WWTP and the DRF of the Park with the aim to survey the water quality of the river and the behavior of the spillways, keep them in efficiency and solve the remaining situations of pollution affecting the river.
Although many actions have to be undertaken on the river to reach a satisfying chemical and ecological quality, first of all a real separation of black and white waters upstream in the sewerage, actions that need some investments and specific actions to be taken in charge by the manager of the SII, this action was proclaimed ended with the results, certainly not definitive but surely positive, to direct a spotlight on the problem of this river and search some solutions to the troubles discovered (see 18_B3_Del18_Relazione finale fase operative).

Action status:

Effective start	Effective end	Progress [%]
October 2012	July 2017	100%

Problems
Many delays occurs in this action: the actors involved (Municipality of Inverigo and Valbe Services SPA) needed to define their limits of competence on the spillway artifacts; there was a turnover in the technical staff of the municipality of Inverigo that deals with sewerage and it was therefore necessary to wait for the settling due to this rotation; a new point of discharge was founded during the works in the summer of 2017 and the Operational Programme of the Maintenance was not accepted by the actors.
In spite of everything it is worth to underline that Municipality of Inverigo and Valbe Services SPA gave all the support they were able to give compatibly with their economic availabilities and with the uncertainty about the Integrated Water System during these years in Como Province.

Time schedule
The action started in October 2012. The ordinary and extraordinary maintenance of the spillways artifacts started in the summer of 2017 after which the action was considered closed.

Objectives
The objective of identifying the sources of pollution has been achieved.
The objective of removal of polluting sources and consequently of improving water quality and habitat had a contribution from this project but has not been completely solved.
As indicated by the monitoring final relation the quality in the station "Romanò monte" passes from sufficient to sufficient-scarce. This is due to the presence of wastewater in the water body (see post-operating hydrobiological surveys, year 2019), which they could also derive from flood drains located upstream, and this would also justify the trend swing of the detected concentrations. In order to obtain effective results and improve the ecological conditions of the water body, it is the commitment of the competent municipal administrations and the integrated water service manager is fundamental by territory: only the elimination of these discharges can allow the qualitative recovery of the canal. The data collected in 5 years of monitoring, not only of water chemistry but also of macrobenthic

fauna, they tell us that the negative impact caused by this pressure factor is higher to the natural self-purifying capacity of the canal, preventing its qualitative recovery.
The partial or complete dismission of the spillways artifacts, that should be of course the most useful actions, was not an objective of this action, but it is strongly recommended and this action strongly contributed to underline the aspects to be considered to maintain a sufficient quality and to improve it in the future.
During the period of the project a long and complex reform was put on field by the interested Entities and at the end of this period, in the 2020, the competence on the sewerage system will pass finally from the Municipality of Inverigo to the Provincial Society for the Integrated Water System (SII), a structure that shall dedicate more professionality, fundings and technicians to face and solve the troubles about the efficiency of the sewerage system.
All the results of this project will be presented to the technician (most also known) of the new Society, called "Como Acqua" and in the future some further and ambitious actions will be proposed.

Deliverables
04_B3_Del04_Relazione finale fase conoscitiva
18_B3_Del18_Relazione finale fase operativa

5.1.5. Action B4

The B4 action provided the construction of two filter ecosystems on two tributaries of Lambro: the Villa Romano river and Orrido of Inverigo river. The aim of this action was the removal of pollutants in the waters due to the presence of spillway.

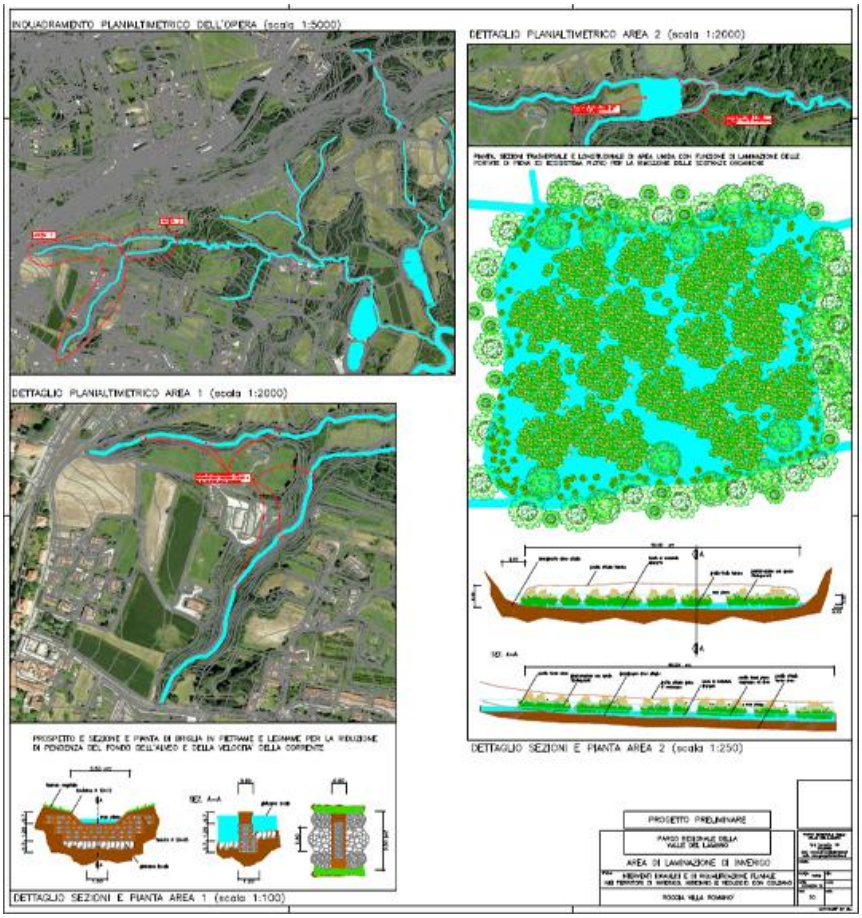


Figure 14: Original preliminary draft for action B4

The action was in the preliminary draft “Area di laminazione di Inverigo – Interventi idraulici e di riqualificazione fluviale nei territori di Inverigo, Nibionno e Veduggio con Colzano”, drawn up at the end of 2012, submitted, in December 2012, to the Lombardy Region and approved by PVL with CDG’s Resolution n. 7 in 05.03.2013. It was also presented to Inverigo Mayor and, in the meeting of 05.16.2013, to the community of Inverigo. On 06.05.2013 was presented to the Forum, at which attended the local stakeholders (see 06_B4-5-6_Del06).

On 27.3.2014 the tender for the assignment of the definitive project of "INTERVENTI AMBIENTALI compresi nei lavori denominati Area di laminazione di Inverigo: interventi di riqualificazione fluviale nei territori di Inverigo, Nibionno e Veduggio con Colzano” was called and action B4 was included in it. The definitive project, which includes all B4, B5 and B6 action, was delivered in November 2014 and tested for validation in the months of November and December 2014 (see 14_B4-5-6_Del14_ProgettoDefinitivoInverigo).
It has been clarified that in the project are present some works that are not included in the project LIFE: these works are well highlighted and the related costs have not been calculated in the costs relating to the LIFE project. In particular the parts that relate to the action B4 insist on the so called “area F” and “G”.
As for the action B4 the definitive project includes some important changes compared to the preliminary and respect the concept shown in the LIFE notice. These changes have been introduced as a result of a comparison with the designers who have decided to prefer some solutions rather than others. The main changes were described in the preceeding reports ad reported in the image below.

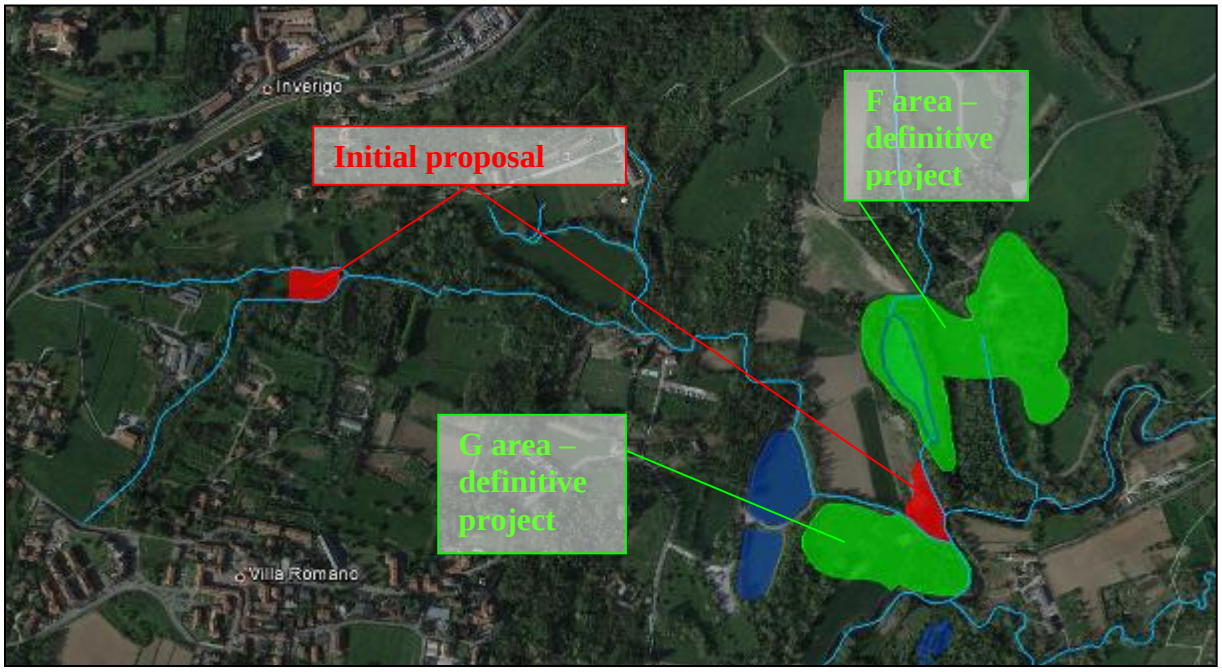


Figure 15: Comparison between original B4 action (in red) and the definitive project (in green)

The actions planned in the definitive planning occupy a larger area than those provided in the preliminary design and occupy areas that initially had not been taken into consideration. It should be noted, however, that despite these changes the project pursues the same objectives initially declared and indeed brings some improvements because, compared to an intervention locally milder, it was possible to extend the actions on a larger surface.

The project was then submitted to regulatory approvals during the Services Conference held om 23/12/2014, during which no observations were made. On 31/12/2014 was issued the call of tender for integrated contract (executive project and work). The call was closed in early April 2015, and was immediately open the evaluation phase of the tenders. In January 2016 the tender has been assigned to the ATI ADRIACOS Srl – Nagostinis Srl – BB Service Srl, who signed the contract on 21/10/2016.
At the same time the contract for the Site Manager and Safety Coordination have been assigned, awarded respectively on 9/02/2016 to Studio Rosso Ingegneri Associati (Torino), and on 1/03/2016 to Ing. Cristian Conti.

On 23/12/2016 the designers delivered the executive draft. The executive project does not introduce substantial differences compared to the definitive draft as for B4 action. Below are reported some images of the executive project (for the complete design see 21_B4-5-6_Del21_Progetto Esecutivo Opere Ambientali).

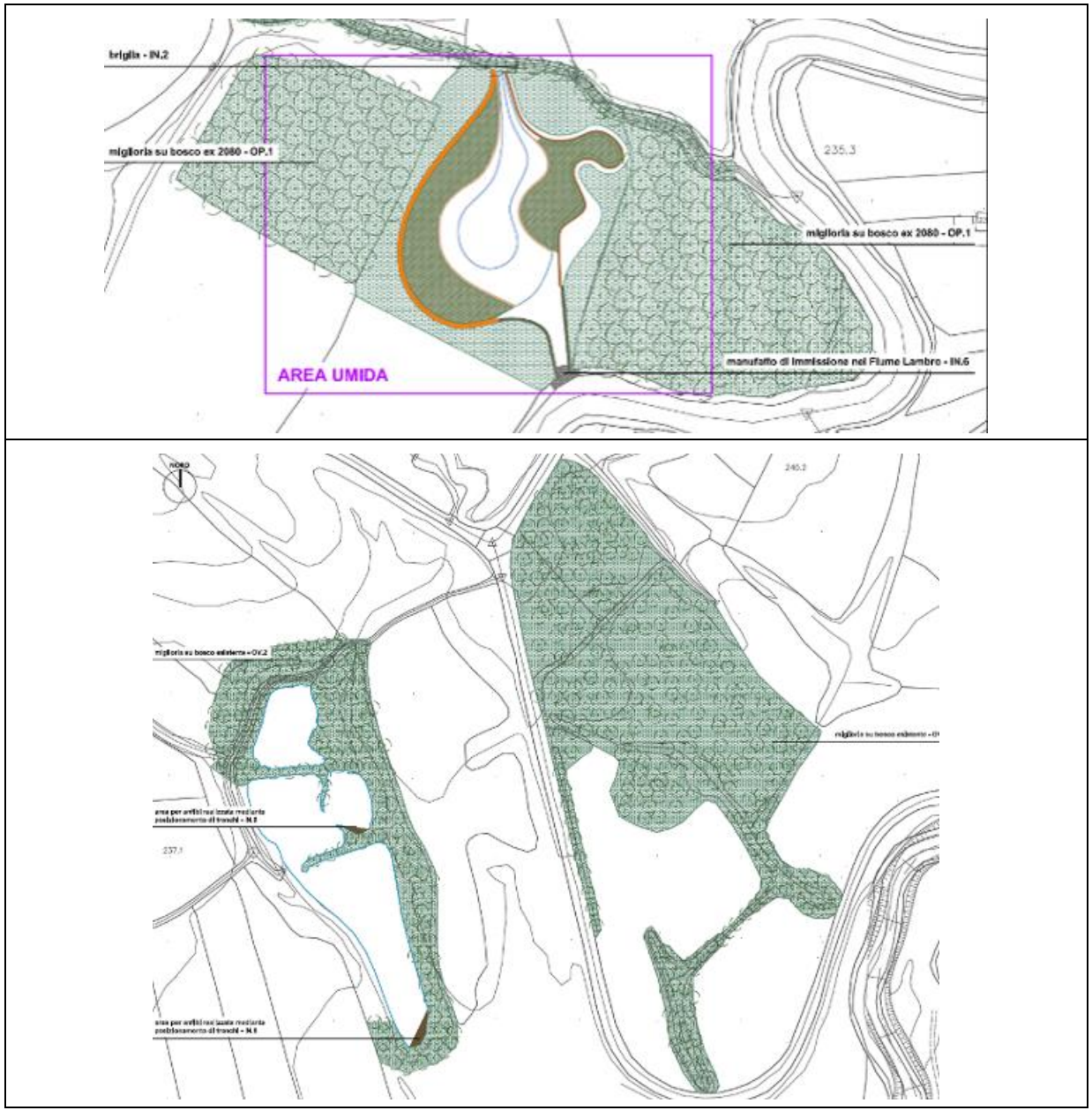


Figure 16: a) general plan of G area and b) of F area, all relatives to B4 action

As for the availability of the areas were instructed Studio Mariani Corbetta and Arch. Maria Bossi to undertake contacts with the owners concerned. Overall they were contacted about twenty owners. It has been possible to sign several temporary occupation agreement, not onerous, for almost all of the owners except for an area for which will be signed a decree of servants that will be formalized and notified in March 2017.

On 22/02/2017 the Site Manager delivered partially the works to the company awarded.

The works started in October 2017 and ended in May 2018 (see 24_B4-5-6_Del24 - Relazione fine lavori).

Below is reported a comparison between the ortho images of the area before and after the works.

Figure 17: Comparison by ortho images of the wetland a) before and b) after the works, fully vegetated.

Below are reported some images of the area fully vegetated.

Figure 18: a) general image of the wetland; b) detail; c) main emissary from the wetland; d) secondary emissary to the forest

After the works it has been found that the water was not contained in the area previously excavated but overflowed into the near grassland and wood. This situation gave origin to two new wet areas: a marsh and a wet forest. The water in excess in fact take a secondary emissary and comes to Lambro by another way indicated in the next figure. The result is to have 2 new natural extra areas respect to what expected, with a doubling of the wet habitat.
As for the progress of the works is it to notice that 2 variants have been requested and approved, the second involving the B4 area, and 4 additional works, one interesting the B4 area.

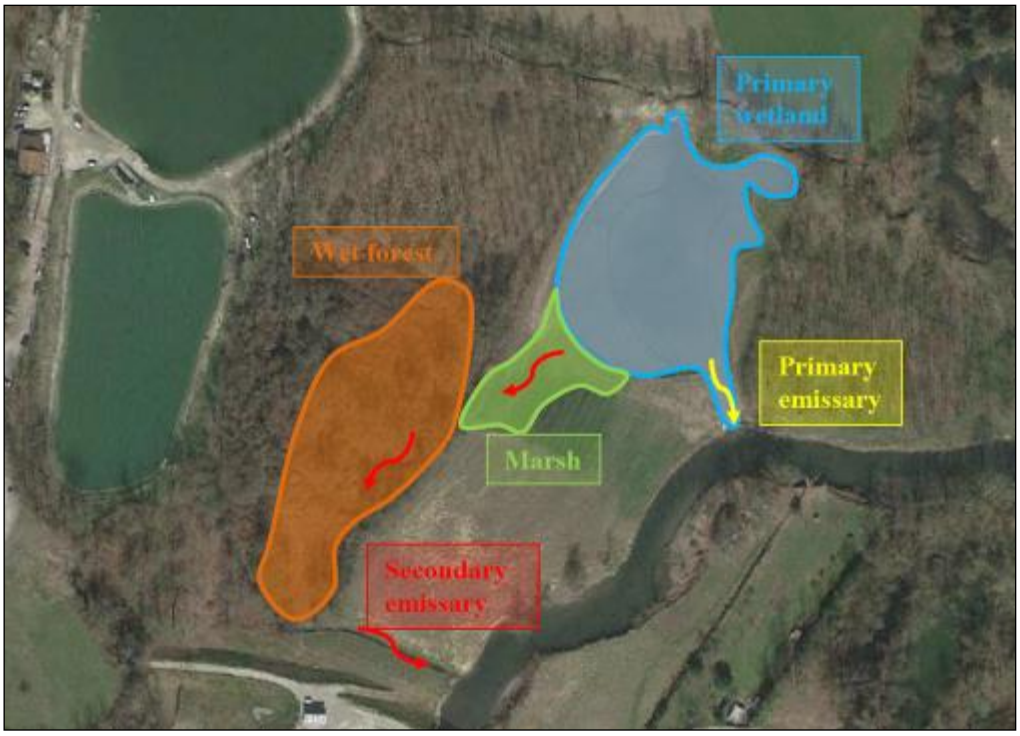


Figure 19: Scheme of the new wet areas not expected at the beginning of the project

In the next image is represented the situation of the marsh today. The primary wetland is on the right and the wet forest on the left.

Figure 20: Vegetation of the marsh in B4 area today. The water goes from the right to the left.

Actually the marsh, the wet forest and the secondary emissary have been populated by typha latifolia, duckweed and swamp cane.
Also at the end of the works it has been necessary to provide a reinforcement to the right bank downstream the main emissary that was involved into a serious problem of regressive erosion. The additional works consisted in a clogged cliff 20 m long and 3 m high planted with willow cuttings. In the image below the vegetation covered almost completely the rocks.

Figure 21: Reinforcement of the right banks downstream the main emissary of the wetland in area B4

Action status:

Effective start	Effective end	Progress [%]
October 2012	September 2018	100%

Problems

The main problems that occurred were the interface with the professionals responsible of the definitive project and the increases due to the tendering procedures. On the first point it must be observed that the design team, chosen by an open procedure with the most economically advantageous tender, was very helpful at the beginning and in appearances, but in the end produced a different project from the preliminary indications more than what had been granted by the Contracting Authority.

It also shown remarkable unwillingness to produce necessary documents for the tender, despite what was clearly indicated in the contract. Finally there was also significant unavailability with the validation team.

As it regards the valuation procedures of tenders is observed that were made a number of observations regarding the professional expertise required for the team for the executive design and have been proposed some complaints by some excluded.

Very much time was lost in dealing with landowners in the definition of the agreements, in particular for the areas interested in action B4 where the only owner, a real estate company, gave very little or no feedback for months. The final solution agreed was the forced temporary occupation of the lands that was notified by a decree of servants formalized and notified in March 2017.

Time schedule

The works were successfully ended.

Objectives

As for the water quality we must observe that recognizing the effects of the creation of the wetland on the load of pollutants is not easy with the data available because the topic would require much more detailed studies and investigations that would imply knowledge of the loads entering the wet area (quantity and quality of the water) and the capacity of the itself, on the basis of its construction characteristics (planimetric development, altimetric development, hydraulic characteristics, type of vegetation, etc.) to cut them down.

It is also necessary to consider that the wetland ecosystem typically includes various components autotrophic (primary producers, e.g. plants) and heterotrophic (consumers, e.g. microbes, animals). Generally the areas humid systems are more autotrophic than heterotrophic, with the result of a surplus of material carbon that deposits or is exported downstream to the adjacent ecosystem (Mitch and Gosselink, 1993).
This net production results in a release of particulate or dissolved biomass in the water column wetland, and can be measured in non-zero levels of BOD5, TSS, TN and TP. It is possible that the natural processes that take place in constructed wetlands cause concentrations of background which, for some constituents, may be even greater than the input ones, especially for low input values. Knowledge of these background concentrations is therefore very important for make assessments regarding its purification capacity. Furthermore it is necessary to understand that since processes are related to environmental factors (such as seasonal temperature changes and changes in plant community), a certain degree of variability in the quality of the effluent is natural (ANPA, 2002. Lines guide for the reconstruction of wetlands for the treatment of surface waters. Manuals and guidelines 9/2002).
For all this, it is objectively difficult to express merit assessments based on data from the post operation monitoring.

As for the habitat quality the interventions that have shown to have a positive impact on a part of the ornithic community. In particular, the positive impact is recorded for the breeding species which, in addition to increasing in number, are also species of conservation interest and indicators of good quality of habitats. The impact was less marked but still positive for wintering species.
As for the amphibians the interventions have shown to have already after the first years a positive impact on amphibians. In the space of a couple of years, in fact, numerous individuals of different species of Frogs have used the new wetlands created for reproduction.
As for the odonates positive impacts are highlighted which over the years will certainly increase its potential. At the moment it was possible to collect significant data only for 2019 as the interventions ended in the winter of 2017-2018.

Deliverables
06_B4-5-6_Del06
14_B4-5-6_Del14_ProgettoDefinitivoInverigo
21_B4-5-6_Del21_Progetto Esecutivo Opere Ambientali
24_B4-5-6_Del24 - Relazione fine lavori

5.1.6. Action B5

The B5 action initially provided the construction of a wetland along the Lambro river upstream of the Provincial Como - Bergamo by expanding an area of a noose and creating an oxbow lake on the left bank. The objective of this action was the expansion of wetlands for the settlement of amphibians and fish reproduction.

The preliminary design is reported below.

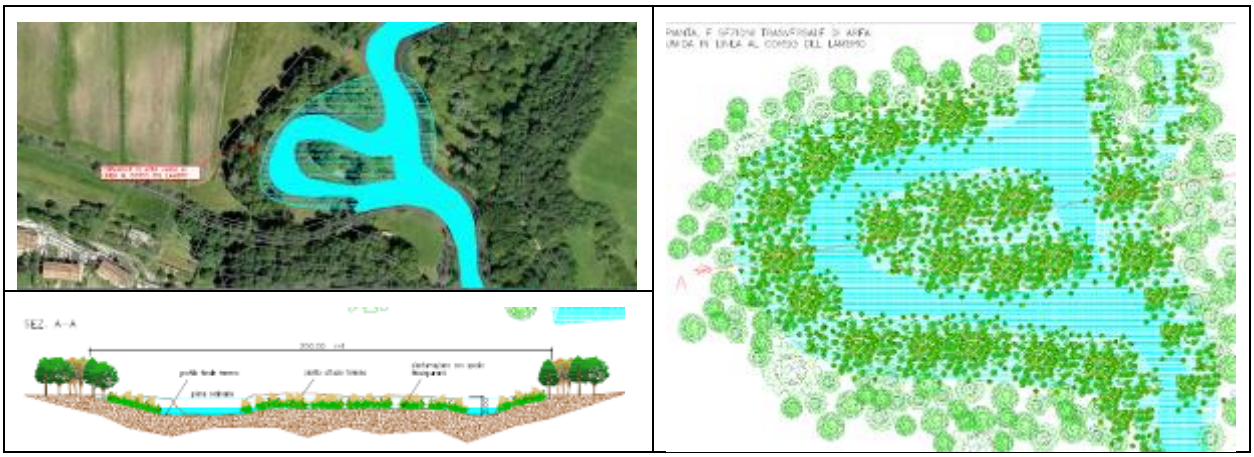


Figure 22: draft of the preliminary project for the B5 action

Since the B5 action is contained in the same process that also contains the B4 and B6 actions, the authorization process is exactly the one already described for the B4 action as well as the check of the availability of the areas.
It has been clarified that in the project are present some works that are not included in the project LIFE: these works are well highlighted and the related costs have not been calculated in the costs relating to the LIFE project. In particular the parts that relate to the action B5 insist on the so called "area A".
As for the action B5 the definitive project includes a number of important changes compared to the preliminary to the concept shown in the LIFE notice. These changes have been introduced as a result of a comparison with the designers who have decided to prefer some solutions rather than others.

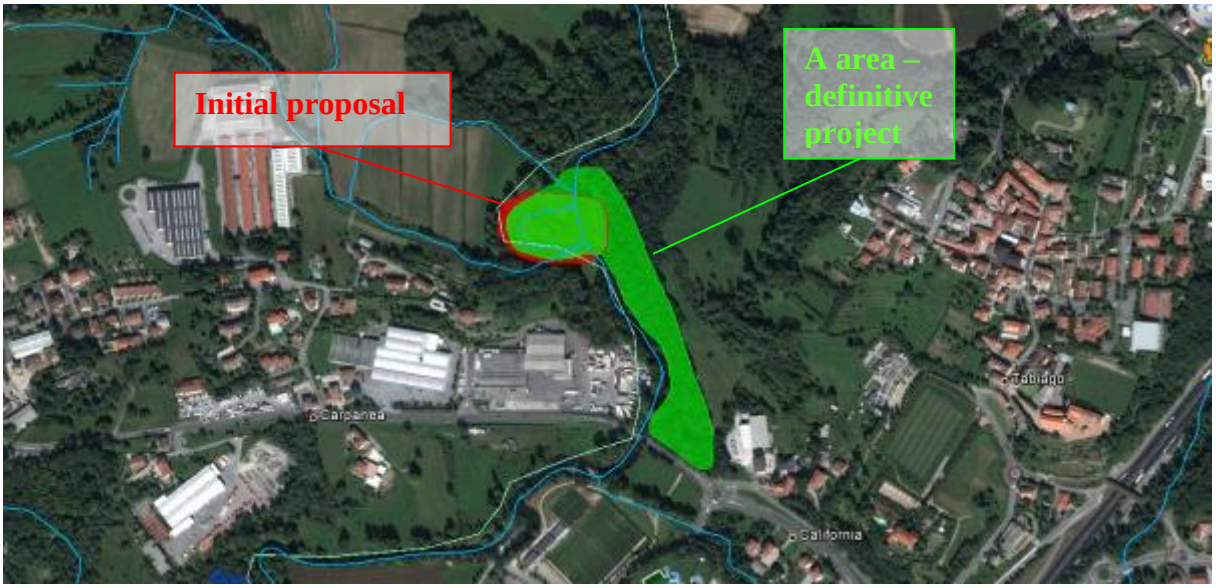


Figure 23: Comparison between original B5 action (in red) and the definitive project (in green)

The actions planned in the definitive project occupy a larger area than those provided in the preliminary design and occupy areas that initially had not been taken into consideration. It should be noted, however, that these changes continue to pursue the same objectives initially declared and indeed are an improvement because, compared to an intervention locally milder, it was possible to extend the actions on a larger surface.

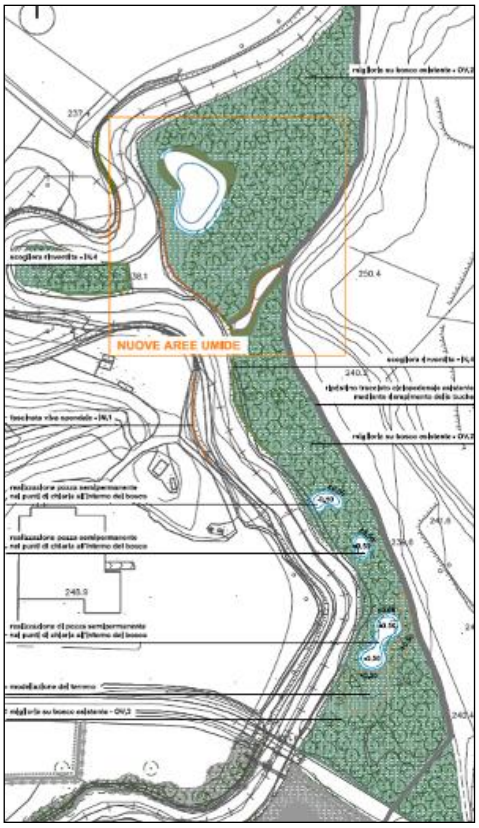


Figure 24: general plan of B5 action in the executive project

Also for the B5 action the executive project made no changes compared to the definitive.
The works started in March 2017 and ended in May 2017 with some successive additional works.
The works were tested and definitively accepted in March 2020.
As for the progress of the works is it to notice that 2 variants have been requested and approved and 4 additional works have been necessary. The 2 variants interested both B5 (also called area A) and B6 areas (also called areas B, C and D). The same thing for the additional works.
In the images below is represented the situation after the works were finished.

Figure 25: Temporary wetland in area B5

Action status:

Effective start	Effective end	Progress [%]
October 2012	May 2017	100%

Problems

For general problems refer to what is already noted for the B4 action.

Some doubts have been reported by the European Commission about the success of this action due to the lack of water into the ponds. As stated before one of the main differences between the preliminary and the definitive project was exactly the alimentation of the ponds: depending directly from Lambro river in the first case; depending on groundwater, rainfalls and sources in the second case. This was a precise choice taken between the two phases of the project in order to guarantee water of good quality into the ponds, better than the one coming from Lambro river. Obviously the reverse of the medal would have been the minor and not continuous presence of water into the ponds. And in fact the pools are all dry during the summer and the winter (except for some day after hard rainfall or snowfall) and frequently full of water during the wet seasons, spring and fall, when traditionally the provision of rainfall at this latitude is larger. It is an evidence that their function has been turned into a new one, more suited to the reproduction of some species like amphibians and aquatic insects (dragonfly) and no more for fishes. As will be discussed in the final chapter dedicated to the conclusions, this action changed its face but its environmental value of course did not decrease.

Time schedule
The works were successfully ended.

Objectives
As for the habitat quality monitoring of nesting birds shows an increase in the species that frequent the area in the reproductive period after the interventions; in particular, in 2013 there were 15 species detected, unlike the 24 in 2017 and the 26 species in 2018 (excluding the big and big canapies that do not nest in our latitudes and therefore their presence is attributable to individuals still in migration). It should be noted that the increase also affected species of conservation importance such as the kingfisher, a species listed in Annex I of the Birds Directive (Directive 2009/147 / EC) and considered in an "inadequate" state of conservation of the population such as the woodpecker black, and the cuckoo, which is in a bad state of conservation. In addition, the species linked to good quality woodland environments such as titmouse, nuthatch and common vines have increased.
The results obtained indicate that the interventions, even if they provided for the cutting of mature trees in order to create puddles, did not have a negative impact but on the contrary the area took on a greater degree of naturalness which allowed the colonization of different species.

As for the bats, analyzing the data collected there is a gradual increase in contacts up to 2015. From 2017, the increase becomes significant, demonstrating greater activity of the various species in the trophic activity carried out in the area. In particular, it is worth noting the considerable number of Myotis contacts that feed on the surface of the water of the Lambro river.2013 is the year with the least number of species detected while it remains fairly constant in the remaining years. The only new species that has been registered in both years of post-operam detection is the common Serotino. The species is considered for the Italian Red List and IUCN as "at least risk" (IUCN, 2010; EUROBATS, 2010; Bulgarini et al., 1998) and in Lombardy it is not among the priority species for conservation (DGR n. 7 / 4345 of April 20, 2001).

As for the amphibians the interventions have created new environments suitable for the reproduction of amphibians, but it will be necessary to continue monitoring the presence of water to evaluate the effective effectiveness of the interventions.
As for the odonates the data collected shows an increase in the species that frequent the area in the post operam phase compared to the ante operam one. The construction of the pools has allowed the colonization of new species that prefer still waters such as Ceriagrion tenellum, Libellula depressa and Pyrrosoma nymphula.

Deliverables
06_B4-5-6_Del06
14_B4-5-6_Del14_ProgettoDefinitivoInverigo
21_B4-5-6_Del21_Progetto Esecutivo Opere Ambientali
24_B4-5-6_Del24 - Relazione fine lavori

5.1.7. Action B6

B6 action was introduced with the Amendment presented in December 2013 and initially provided the construction of a wetland along the Lambro downstream of the Provincial Como - Bergamo by expanding riverbed in the right bank. The objective of this action is also in this case the expansion of wetlands for the settlement of amphibians and fish reproduction.

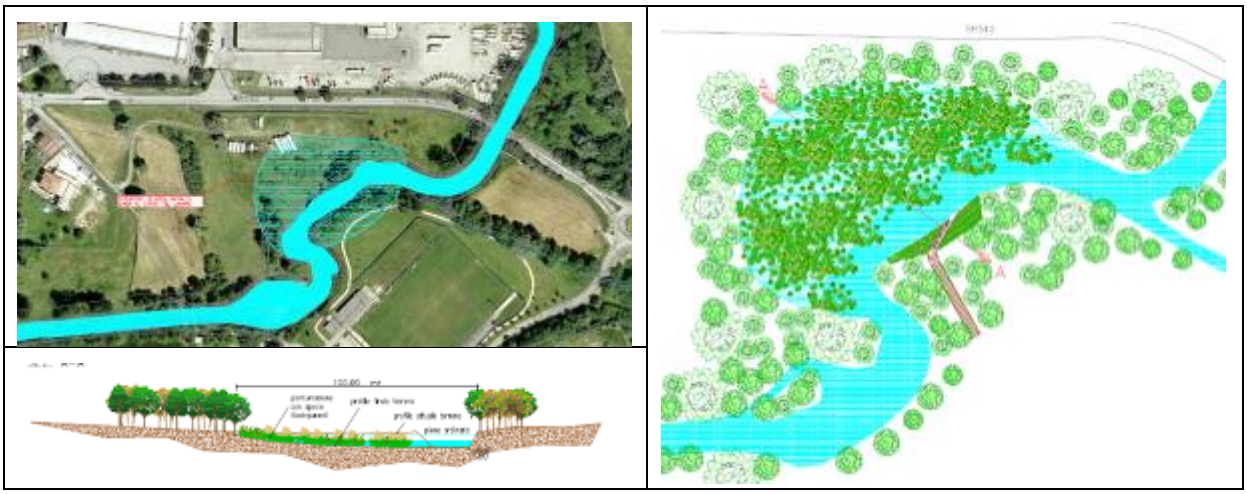


Figure 26: draft of the preliminary project for the B6 action

The action is contained in the preliminary draft "Area di laminazione di Inverigo – Interventi idraulici e di riqualificazione fluviale nei territori di Inverigo, Nibionno e Veduggio con Colzano", drawn up at the end of 2012 and submitted, in December 2012, the Lombardy Region. Also with Resolution n. 7 of 05.03.2013 of the CDG it was approved by PVL.
Since the B6 action is contained in the same process that also contains the B4 and B6 actions the authorization process is exactly the one already described for the B4 action as well as the check of the availability of the areas.
It is clarified that in the project are present some works that are not included in the project LIFE: these works are well highlighted and the related costs have not been calculated in the costs relating to the LIFE project. In particular the parts that relate to the action B5 insist on the so called "area B,C and D".

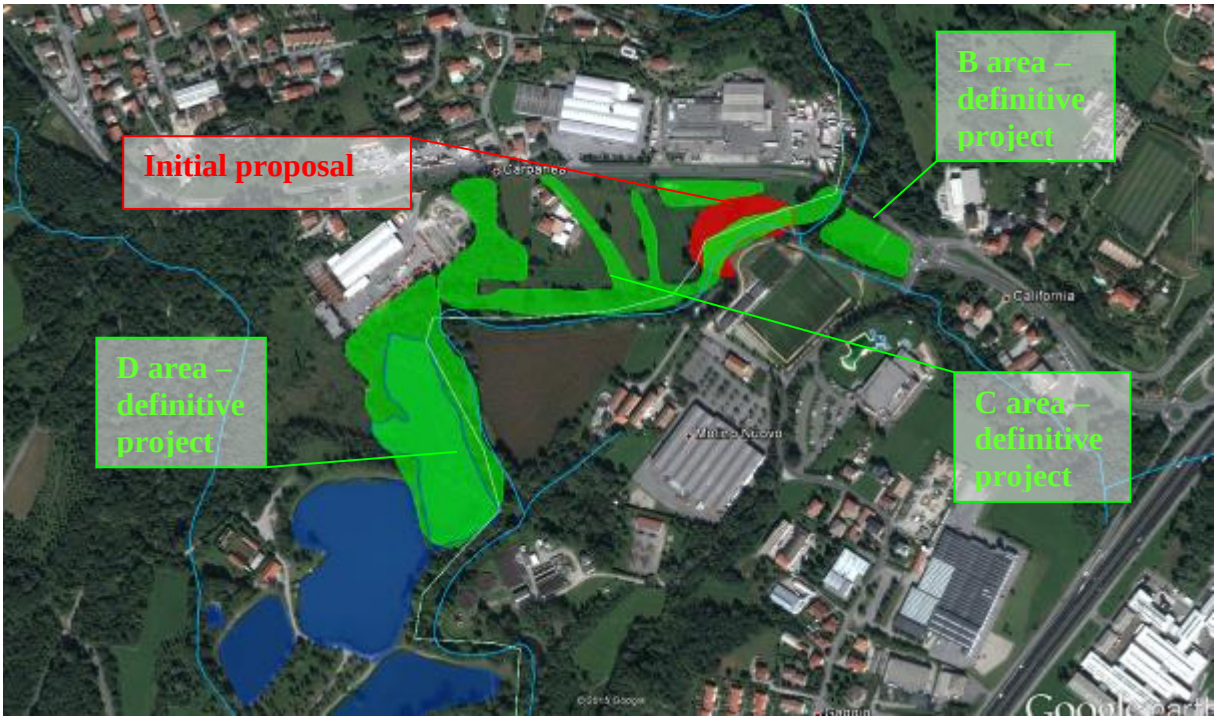


Figure 27: Comparison between original B6 action (in red) and the definitive project (in green)

As for the action B5 the definitive project includes a number of important changes compared to the preliminary and the concept shown in the LIFE notice. These changes have been introduced as a result of a comparison with the designers who have decided to prefer some solutions rather than others and especially as a result of comparison with some owners who are firmly opposed to the proposed solution, requiring a less invasive action.
The actions planned in the definitive planning occupy a larger area than those provided in the preliminary design and occupy areas that initially had not been taken into consideration. It should be noted, however, that these changes continue to pursue the same objectives initially declared and indeed are an improvement because, compared to an intervention locally milder, it was possible to extend the actions on a larger surface.

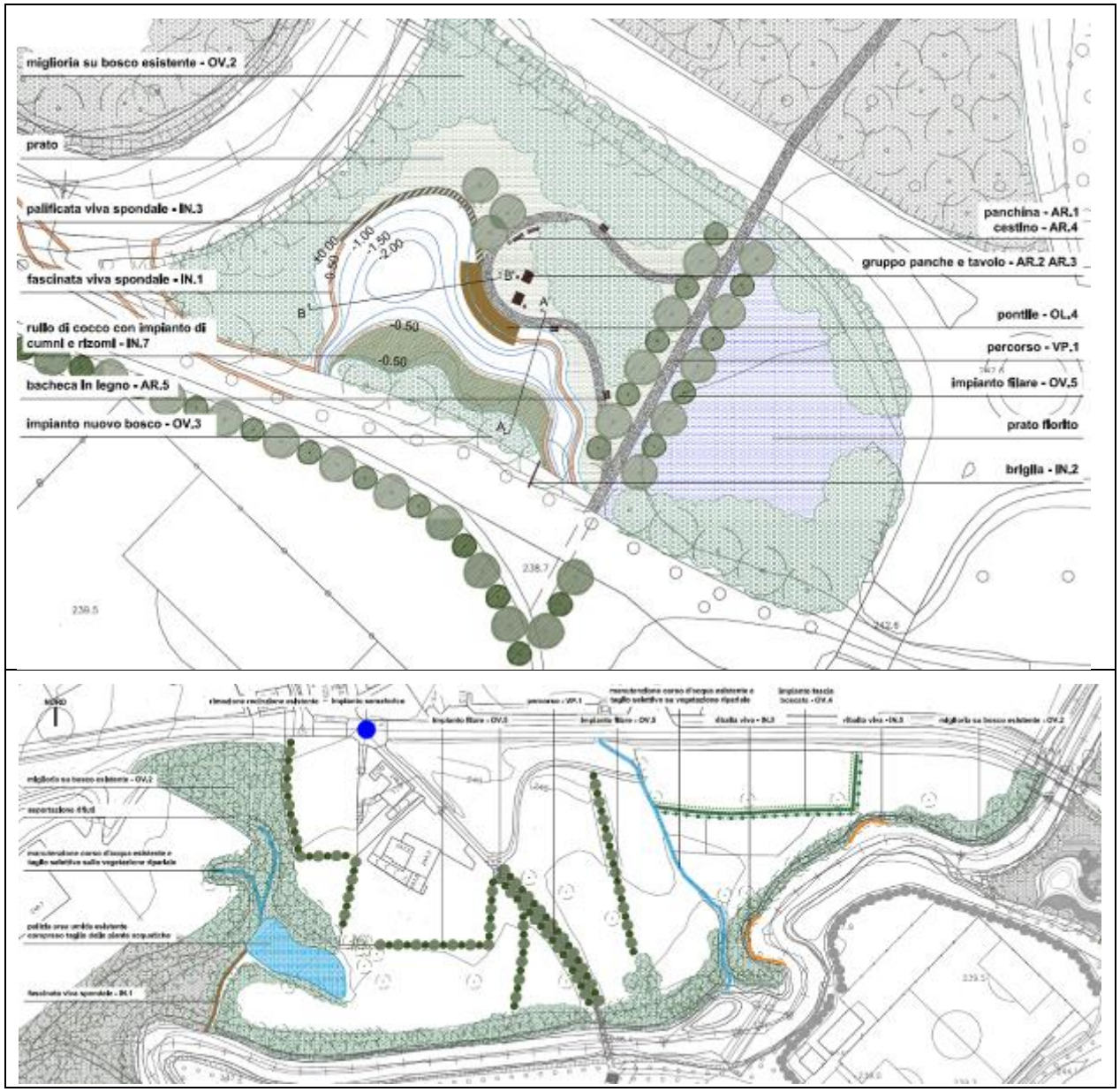


Figure 28: general plan of B6 action in the executive project: a) B area; b) C area

The executive project, as regards to the action B6, brought changes only in the area D. In particular, it was planned a forest improvement on a narrower area compared to the definitive project, but with a greater extension and there are improvements on both banks of the Lambro; it was also no longer planned the amphibians area. All these changes were due to the

unavailability of the owner to take action on major portions of the property. On the contrary others new owners showed a certain willingness to accommodate further processing on their land. Below is the comparison between the two project plans.

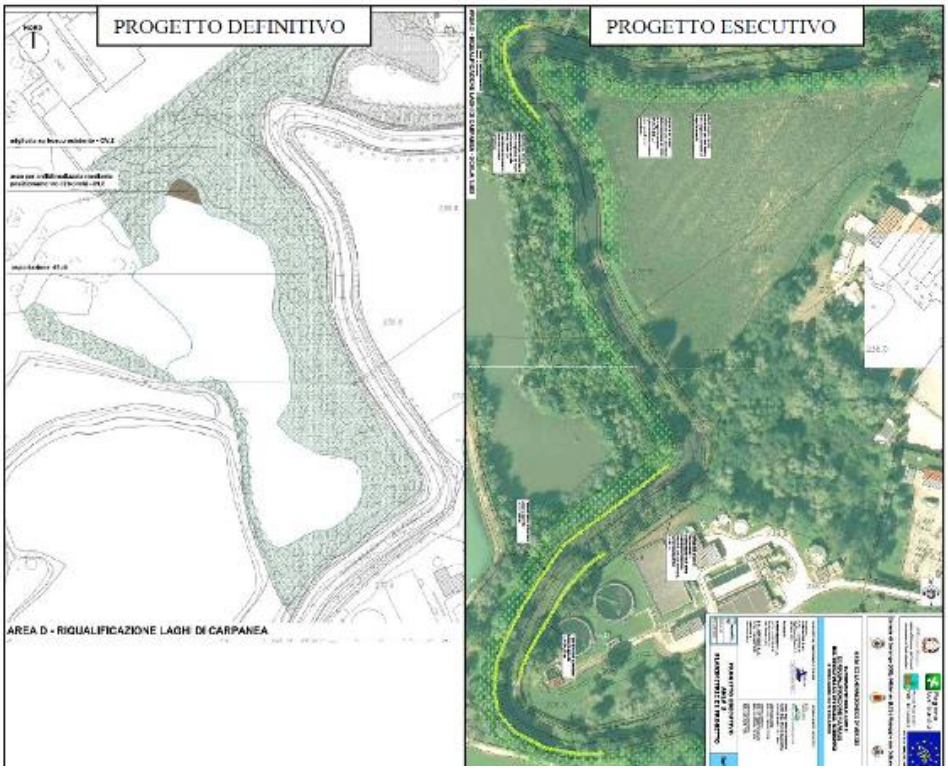


Figure 29: comparison between definitive and executive project for B6 action in D area

The works started in March 2017 and ended in September 2017 with some successive additional works.
The works were tested and definitively accepted in March 2020.
As for the progress of the works is it to notice that 2 variants have been requested and approved and 4 additional works have been necessary. The 2 variants interested both B5 (also called area A) and B6 areas (also called areas B, C and D). The same thing for the additional works.
Below two ortho images explain the state of the art and then some images representing the situation during the first spring after the works finished.

Figure 30: Comparison between the ortho images of the wetland before and after the works

Figures 31: Wetland in area B6 and tree-lined track

Figures 32: Tree-lined track in area B6 and banks vegetated with hygrophile plants

It is no notice that during the works one additional wetland on the right bank was implemented blocking a little stream few metres downstream the main one fed by a wellspring. The results of this occasional action is presented in the image below.

Figure 33: New wetland on the right bank of Lambro river

As for the progress of the works is it to notice that 2 variants have been requested and approved and 4 additional works have been necessary. The 2 variants interested both B5 (also called area A) and B6 areas (also called areas B, C and D). The same thing for the additional works.

Action status:

Effective start	Effective end	Progress [%]
October 2012	September 2017	100%

Problems

For general problems refer to what is already noted for the B4 action.
As before noticed the unavailability of the owner to take action on major portions of the property in D area obliged the Park to spread the action along the river instead of concentrate on the lake. So it was planned a forest improvement on a narrower area compared to the definitive project, but with a greater extension and there were improvements on both banks of the Lambro.

In the final phase actions B5 and B6, initially very similar, assumed different configurations in consideration of the choices made during the definitive and executive project.
In fact all the ponds in the B6 action (3 in total) are continuously fed, even in dry season, because their tributaries have water during all the year. This fact allows to maintain the ponds full all the year.

Time schedule

The works were successfully ended.

Objectives

As for the habitat quality the monitoring of nesting birds seems to highlight an increase in the species that frequent the area in the reproductive period after the interventions since in 2013 there were 11 species detected in 2017 15 and in 2018 12. No particular modifications have been noted in nocturnal and wintering birds.

As for the bats there is a gradual increase in contacts up to 2017. In 2018 the increase becomes significant demonstrating greater activity of the various species in the trophic activity carried out in the area. The greatest contribution to this increase is due to individuals belonging to the Myotis genus that feed on the surface of the water of the Lambro river, making repeated passages. Also in this case 2013 is the year with the least number of species detected while it remains fairly constant in the remaining years.
After the interventions, two new species were detected in both years: the Bat of Savi and the common Serotino. Both species are considered for the Italian Red List and IUCN as "at least risk" (IUCN, 2010; EUROBATS, 2010; Bulgarini et al., 1998) and in Lombardy they are not among the priority species for conservation (DGR n. 7/4345 of 20 April 2001).
Finally, in 2015 an individual belonging to the genus Plecotus was registered; to this genus belong two species which are impossible to determine without social appeal.
However, the fact that it was no longer surveyed does not allow us to highlight any new attendance of the species in the study area.

As for the amphibians the intervention has created a new environment potentially suitable for some species of amphibians but at the moment it does not yet seem a suitable habitat for this taxa. The reasons could be manifold, including the possible entry of fish up the Lambro that could feed on the laid eggs. To understand the actual positive impact on amphibians, further monitoring is therefore necessary in the coming years.

As for the odonates from the data collected, there are no substantial changes between the ante and post operam situation. Although the creation of the wetland should have significantly increased the number of species present as a lotic type environment (Lambro River and irrigation ditches), a lentic ecosystem has also been added, creating suitable habitats for the reproduction of species with needs. different ecological. As for amphibians, also in this case, the intervention has created a new environment potentially suitable for some species of odonates but at the moment it does not yet seem a suitable habitat for this taxa. To understand the effective positive impact on odonates, further monitoring is therefore necessary in the coming years.

Deliverables

06_B4-5-6_Del06
14_B4-5-6_Del14_ProgettoDefinitivoInverigo
21_B4-5-6_Del21_Progetto Esecutivo Opere Ambientali
24_B4-5-6_Del24 - Relazione fine lavori

5.1.8. Action B7

Description

The B7 action was introduced with the Amendment presented in December 2013 and provides for river restoration actions in the final section of Roggia Cavolto, between the Lake of Baggero and the bridge of Battisti road in the City of Merone. Specifically were planned

actions for river habitat improvement, renaturation of the river, creation of alternative routes of river and actions for the phytoremediation of water.

A first proposal for action B7 was submitted on 11.09.2013, inside the Forum.

The preliminary draft was presented in October 2014 and approved by the CDG of PVL on November 12, 2014 . This included, in short, the restoration of the banks with bioengineering elements, the reprofiling of the river bottom with creation of fish ladders and path (see 11_B7_Del11_ProgettoPreliminareCavolto).

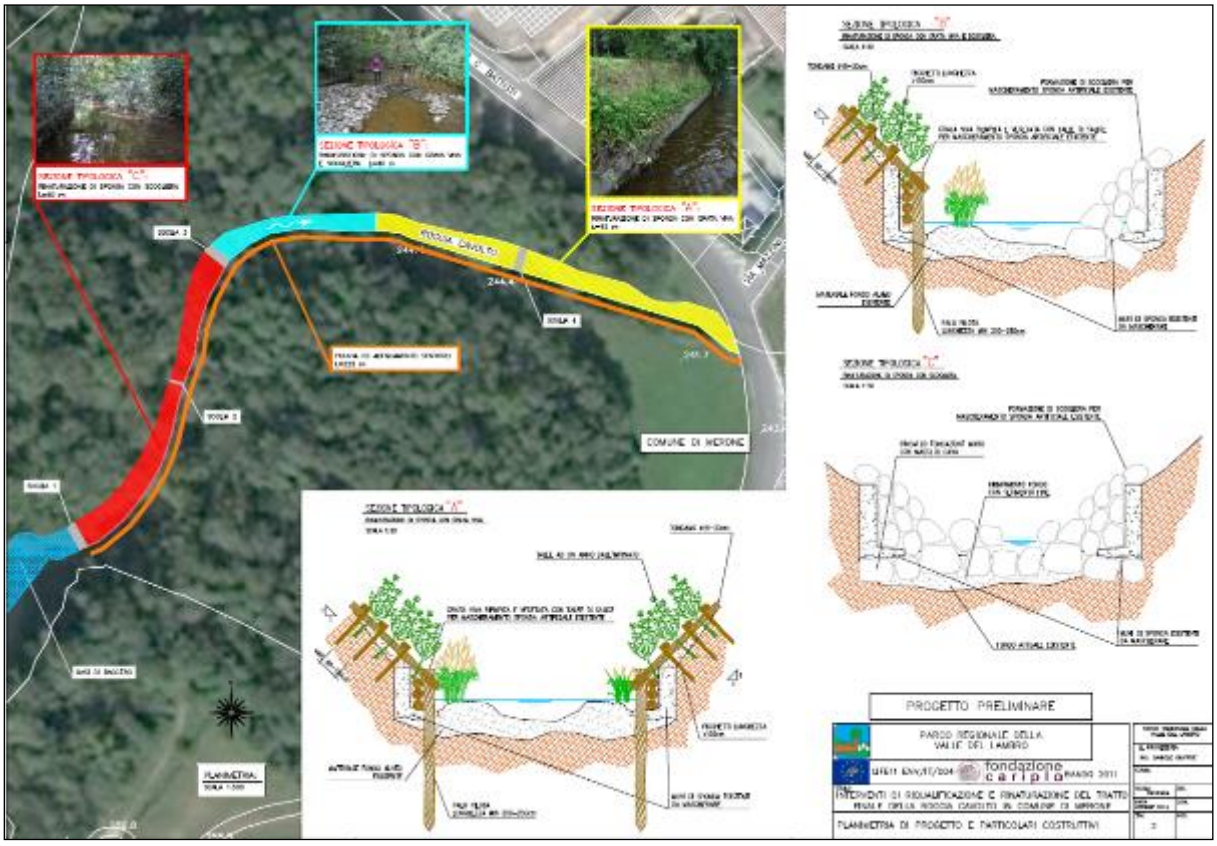


Figure 34: Preliminary draft of B7 action

There have been changes between the first proposal and the preliminary draft that mitigated the intervention maintain its objectives. In particular the original proposal provided for the complete removal of all artificializations on river banks and the bottom, but the designers, both in the preliminary and in the definitive-executive phase, have considered this unsafe for the stability of the banks and preferred the hiding of them.

The definitive-executive project, entrusted on 12/12/2014, was delivered in March 2015 and did not foresee any major changes compared to the preliminary draft (see 17_B7_Del17_ProgettoDefEseCavolto).

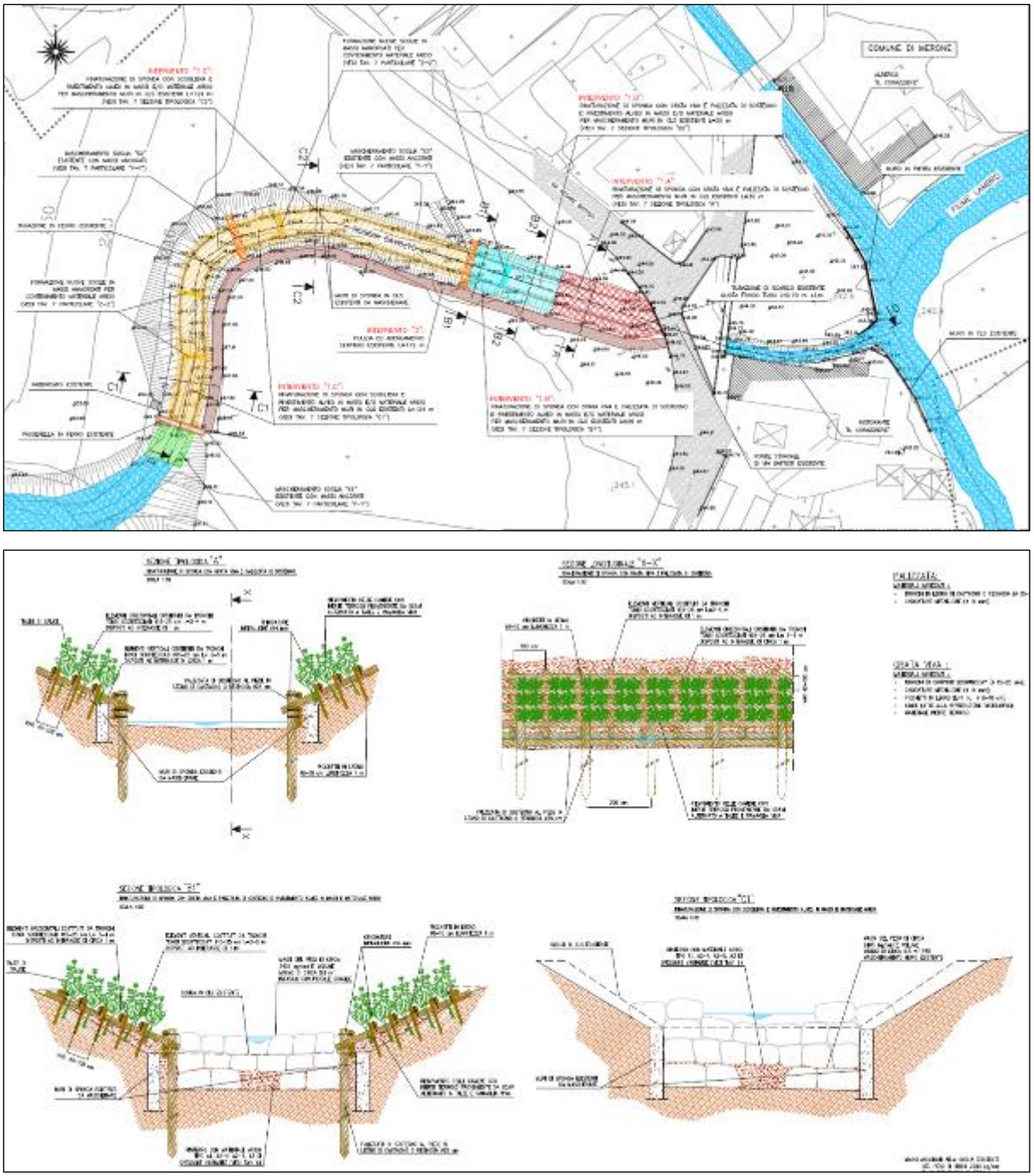


Figure 35: Definitive-executive draft of B7 action

The project has been validated on 4/05/2015, approved by the Board of the Park on 5/05/2015. It was submitted to the Services Conference on 3/06/2015 and, after the hydraulic authorization received by the City of Merone, it was issued the call of tender on 3/07/2015. The call was closed on 3/08/2015, and was immediately open the evaluation phase of the tenders. In january 2016 the tender has been assigned to Costruzioni Cerri srl (Sondrio), who signed the contract on 16/03/2016.

In April 2015 it was also assigned the contract for the Safety Coordination to the surveyor Gianmario Mauri (Monza).

On 29/03/2016, the Site Manager proceeded to the delivery of the work at Costruzioni Cerri srl and on November 2016 it was declared the end of the work, respecting the contractual times (see 20_B7_Del20_Relazione fine lavori).

Later, in January 2017, a completion works on Cavolto river started; in particular several aquatic plants were planted for the improvement of water quality, some boards for new informative panels were laid and some parts of a fence have been replaced.

Below some images of Cavolto river and Baggero lakes (where some additional works have been made) in the current date.

Figure 36: Beginning of Cavolto river in the first revegetation season.

Figure 37: Middle part of Cavolto river in the first revegetation season.

Figure 38: Final part of Cavolto river in the first revegetation season.

It is evident that all the habitat interested in the works are fully vegetated and also in the central part of the river some spontaneous hygrophile plants are growing.

Action status:

Effective start	Effective end	Progress [%]
October 2012	September 2017	100%

Problems

The design process was very fast. The only reason to slow down, resolved in two weeks, was the hydraulic authorization request to the municipality of Merone.
Even the works had no particular problems.

Time schedule

The works were successfully ended.

Objectives

As for the habitat quality monitoring of nesting birds seems to highlight an increase in the species that frequent the area in the reproductive period after the interventions; in particular,

in 2013 there were 14 species detected as in 2017 while in 2018 there were 19. The increase has affected in particular species related to good quality woodland environments, such as nuthatch and common vines, or in any case to mature woods such as the oriole and the jay. Note that these species, however, nest in the nearby woods of the Baggero Oasis and not directly on the Roggia Cavolto; the increase is therefore due to an increase in the general naturalness of the extended area rather than an effect of the interventions.
To note the presence of gray heron that probably now finds a better environment to feed.
Compared to 2013, however, no kingfishers (present on the lakes of the Baggero Oasis and not linked to the environment of the Roggia), little martin, flycatcher and plaice (more related to urban and agricultural environments) were no longer registered.
It cannot be said that the interventions had a positive influence on the nesting ornithic community of the area.
The interventions did not make changes also to the area's nocturnal bird of prey community but wintering birds shows a significant increase in the species that frequent the area in winter after the interventions carried out; in particular in 2013-2014 there were 7 species detected, unlike the 14 of 2017-2018 and the 16 of 2018-2019.
The species that colonized the area are mostly species related to forest environments. Some of these very common such as wood pigeon, wren and robin, while others related to good quality woodland environments such as nuthatch and common creeper, the latter detected only once in 2017-2018. There are no species detected ante operam and no longer detected after the interventions.
In general, the interventions had a positive influence on the ornithic community of the area.

As for the bats since 2017, post operam situation, the increase becomes significant demonstrating greater activity of the various species in the trophic activity carried out in the area. In particular, it is in 2017 that the numbers of contacts are very high due to the increase in the trophic activity of individuals of Dwarf Bat and the appearance of a new species, previously never registered, belonging to the genus Myotis. In addition to the Myotis, there is another species that has been detected in both years of post-operam detection: the common Serotino. The species is considered for the Italian Red List and IUCN as "at least risk" (IUCN, 2010; EUROBATS, 2010; Bulgarini et al., 1998) and in Lombardy it is not among the priority species for conservation (DGR n. 7 / 4345 of April 20, 2001). The species of the genus Myotis, on the other hand, although with obvious differences, are often relatively demanding and generally linked to aquatic habitats, habitats where they are found most frequently. Its appearance consequently constitutes an important element for assessing the impact of interventions on this taxa. Finally, in 2014, an individual from Leisler's Nottola was registered during a single outing. Given the detection period and the phenology of the species, however, the individual may already be migrating to the wintering areas and therefore not regularly frequent the area. In fact, in the following years the species was no longer detected.
In general, the interventions had a positive influence on the bats community of the area.

As for the amphibians the interventions have created new environments suitable for the reproduction of amphibians, but it will be necessary to continue monitoring the presence of water to evaluate the effective effectiveness of the interventions.
As for the odonates the data collected shows an increase in the species that frequent the area in the post operam phase compared to the ante operam one. The construction of the pools has allowed the colonization of new species that prefer still waters such as Ceriagrion tenellum, Libellula depressa and Pyrrosoma nymphula.

After the interventions, the water body no longer has longitudinal interruptions thanks to the elimination of the bridle, and the upstream-downstream connection has been fully re-established, allowing migration also of the less mobility species such as Cobite, Alborella and

Gobione, previously confined in the stretch medium-low of the canal and then surveyed, in the post operam, even in the most upstream sections (see Yearly Report 2019). The structure of the fish community, always qualitatively good, has thus become more homogeneous along the entire stretch, colonizing permanently also upstream mesohabitat and not remaining confined downstream.

Also the defragmentation works in the riverbed and the planting of the banks have significantly improved the river functionality of Zone 2 which reaches a good level of functionality. A sash was formed uninterrupted primary perifluvial along both sides and the elimination of the bridle has improved the hydromorphology of the canal and favored the movement of the fish fauna leading to a high suitability fish.

Figure 39: Ninphea and swamp cane in the first Baggero lake, upstream Cavolto river (addictional works)

Deliverables

11_B7_Del11_ProgettoPreliminareCavolto
17_B7_Del17_ProgettoDefEseCavolto
20_B7_Del20_Relazione fine lavori

5.1.9. Action C1

Description

The action of monitoring the stakeholders has developed partly in parallel with the action B1 and concerned:

- checking of the presences at the forum through the participation signature sheets;
- annotation of the contributions from the participants through drafting of minutes;
- presentations made by participants at the forum.

Beyond that access to the website were also monitored while no further contributions on the blog arrived (see 01_C1_Del01_Relazione iniziale sulla partecipazione degli stakeholders).
This action, being closely linked to the action B1, can be considered completed in 2013 and one only final report of involvement of stakeholders was produced (see 07_A1_C1_Del07_Fascicolo informativo finale e relazione finale partecipazione stakeholders).

Action status:

Effective start	Effective end	Progress [%]
October 2012	December 2013	100%

Problems

The main problems were seen in the involvement and monitoring of the virtual forum on the blog; this obstacle was overcome when started the weekly meetings of the Forum.

Time schedule

The action began late 2012 and ended in the end of 2013.

Objectives

For this action it is believed that the objectives have all been achieved.

Deliverables

01_C1_Del01_Relazione iniziale sulla partecipazione degli stakeholders
07_A1_C1_Del07_Fascicolo informativo finale e relazione finale partecipazione stakeholders

5.1.10. Action C2-C3

Description

The monitoring phase called "ante operam" started in 2012 (see 02_C2-3_Del02_Relazione iniziale monitoraggio acque ed habitat and 03_C2-3_Del03_Relazione monitoraggio acque ed habitat 2012) and ended in accordance with the monitoring plan presented in deliverable C2-3_Del02.

The monitoring was organized by identifying for each area of intervention the survey stations, located in strategic points considered for the study and knowledge of the current status of the aquatic ecosystem and the subsequent assessment of the effects of the works. The surveys have been observed during the year 2013. The number of points, their location and the measured parameters are included in the document "Relazione monitoraggio acque ed habitat 2013" (see 05_C2-3_Del05_Relazione monitoraggio acque ed habitat 2013).

The monitoring confirmed data collected in recent years that describe a quality of the water in slow improvement in time and however at a sufficient level. The analysis confirmed the spatial deterioration of water quality caused by purifier discharges, while for secondary

tributaries has been confirmed the presence of substances introduced by spillways of the sewage system.

Because of the delays of the works it has been decided to extend some surveys even in 2015, in particular those relating to water quality. The monitoring of 2014 showed a considerable improvement of the physico-chemical state of the water, but this fast change is probably due to the considerable rainfall occurred during the year and to the consequent dilution effects and run-off. This led to an improvement of the chemical quality of the water, but not necessarily to an improvement in organic quality that lingered at previous levels, although disappeared some effects related to anaerobic conditions and the granulometry of the bottom and banks became more varied. Confirmed the worsening of the water quality at the discharge of purifier: the upstream station of Merone purifier increased the level of quality while the downstream station is at the same level as in 2013. More details are provided in the document "Relazione monitoraggio acque ed habitat 2014" (see Deliverable 09_C2-3_Del09_Relazione monitoraggio acque ed habitat 2014).

The monitoring of 2014 show an improvement for three of the monitored stations. In particular there has been an improvement in the quality of water at Nibionno purifier that went from sufficient level sufficient to good level, while at Merone purifier and the Cavolto water quality remained at the same level as in 2014. Finally, there have been improvements with regard the water of Orrido di Inverigo that in 2015 reached a high level of water quality. More details are provided in the document "Relazione monitoraggio acque ed habitat 2015" (Deliverable 19_C2-3_Del19_Relazione monitoraggio acque ed habitat 2015).

The habitat quality monitoring was developed with similar methodology to that of water quality. The investigations were conducted for each area of actions, localized in strategic points for the study and for the knowledge of the current state of the habitat and the subsequent assessment of the effects of the works.

For the year 2014 the surveys showed in the area of Merone purifier the presence of indicator species of good quality of forest and perifluvial habitats. Among all surveyed areas this has the best ecological value.
Even the Area 2 (loop upstream of SP 32, so called "area A", involved in action B5) hosts a good number of species; also in this case the species are indicators of good quality of habitats. To signal the presence of *Ardea alba* and *Ardea cinerea* that found in this area a great area to feed.
Area 4 (Cavolto, action B7) was one of the best in the breeding season, but in the winter does not have the optimal characteristics for wintering species not linked to urban areas.
In addition all three areas are significant for bats; in these areas the species surveyed are able to find food and to hunt. Species connected to forest environments find also shelters for use in various biological stages of their lives and especially in the period of migration.
More details are provided in the document "Relazione monitoraggio acque ed habitat 2014".

In 2015 only bats were surveyed. The results confirm the situation of 2014 with a greater number of registered individuals. More details are provided in the document "Relazione monitoraggio acque ed habitat 2015".
During the works the monitoring phase in the respective areas was suspended.
The "post operam" phase started for the first areas were finished in 2018 and ended at the end of 2019 (see Deliverable 23_C2-3_Del23_Relazione finale monitoraggio acque ed habitat).

The actions carried out thanks to the Life project have certainly brought about an environmental improvement of the river system of both the Lambro and the smaller waterways involved.

Some of these interventions aimed at upgrading the river corridor by operating mainly on the increase and improvement of the river functionality of the river banks (actions B5-B6).
Others support the two treatment plants present in the Lambro section involved in the project, at the end of the water quality improvement (actions B2). The same purpose is the construction of the wetland on the roggia of Villa Romanò (action B4).
Finally, the defragmentation works on the Cavolto canal (action B7) made it possible to restore the river continuum.
The data of the monitoring carried out, compared in the previous chapter, however, do not seem completely highlight it.
In this regard it is necessary to underline that to obtain a tangible improvement in a system however compromised as that of the Lambro, the times cannot be short. Many of the works planned and implemented have not yet entered into operation or are, but only recently.
Certainly the collaboration of the bodies responsible for the management of the wastewater is necessary to correct it collection and maintenance of the sewer network.
Only synergistic and continuous action over time will lead to concrete results.
The Parco del Valle del Lambro with this project but also with others it is implementing in the area, such as the containment of the torpedo, is working to achieve this goal.

Action status:

Effective start	Effective end	Progress [%]
October 2012	December 2019	100%

Problems
The only problems were due to the delay of the realization of the works that brought to the consequent delay of the phase of monitoring.

Time schedule
The timing of the "ante operam" phase had a delay linked to the realization of the work. It was decided to continue with the "ante operam" phase even in the year 2015, while in 2016 there was a pause of the monitoring because all areas were affected by the construction sites.
Post-operam monitoring started at the beginning of 2018 and continued in 2019.

Objectives
The objectives has been achieved for all the areas except for B2 Action – Merone where a monitoring phase with the system fully operative has not been made.

Deliverables
02_C2-3_Del02_Relazione iniziale monitoraggio acque ed habitat
03_C2-3_Del03_Relazione monitoraggio acque ed habitat 2012
05_C2-3_Del05_Relazione monitoraggio acque ed habitat 2013
09_C2-3_Del09_Relazione monitoraggio acque ed habitat 2014
19_C2-3_Del19_Relazione monitoraggio acque ed habitat 2015
23_C2-3_Del23_Relazione finale monitoraggio acque ed habitat

5.2. Dissemination actions

5.2.1. Action D1

Description

The D1 action provide the creation of a website dedicated to the LIFE11 ENV/IT/004 project. Up to May 2014, we used an existing domain (www.progettolambro.it) on which some pages were devoted to the publication of LIFE documents.
Since May 2014 all contents of Lambrovivo project have been reported on a new website www.lambrovivo.eu created specifically for the project.
The website is regularly updated with the main design steps, technical publications, newsletters, news on events and other useful content. On the site shows the logo of the project and the LIFE logo.
It's shows an image of the homepage.

Figure 40 –Homepage of website "Lambrovivo"

Action status:

Effective start	Effective end	Progress [%]
April 2012	December 2021	100%

Problems

There were no particular problems for D1 action.

Time schedule

The development of the D1 respects TIMETABLE shown on Amendment 2013 LIFE11 ENV / IT / 004.

Objectives

The website www.progettolambro.it counted more than 3.000 visitors. Up to now the website www.lambrovivo.eu has counted more than 5,000 visitors.

Annexes

D1 - website

5.2.2. Action D2

Description

The D2 action provides the construction of informative panels to illustrate the project and the expected results.

Some panels of all action implemented have been made, some for outdoor laying and some for indoor laying.

In particular were made:

- ACTION B2: n.2 outside panels e 4 indoor panels;
- ACTION B4: n.2 outside panels e 2 indoor panels;
- ACTION B5: n.1 outside panels e 2 indoor panels
- ACTION B6: n.1 outside panels e 3 indoor panels;
- ACTION B7: n.1 outside panels e 1 indoor panels.

Some temporary panels were installed in the month of October 2015 near the areas of action to illustrate the project; the indoor panels will be placed in spaces made available by the PVL and the Municipalities concerned. It has requested the landscape authorization for laying the boards (see Deliverable D2_all03 attached to MIDTERM Report). The authorization was received on 16/04/2015 (see Deliverable D2_all04 attached to MIDTERM Report).

All the panels were already exposed temporarily to Agrinatura Exhibition at Lariofiere (Erba) from 1 to 3 May 2015 (see Annex D2_all05 attached to MIDTERM Report).

At the beginning of 2017 some definitive panels regarding the actions B2 (Nibionno) and B7 have been installed near the works realized. In the 2018 the last definitive panels have been realized illustrating the works and the final results and they are in course of installation.

Below are shown some pictures of the panels.

Figure 41 – Temporary panels to illustrate works in progress

Figure 42 – Definitive panels to illustrate the works after their end

Action status:

Effective start	Effective end	Progress [%]
October 2013	December 2021	100%

Problems

There were no particular problems for D2 action.

Time schedule

The D2 action is delayed respect to the TIMETABLE shown on Amendment 2013 LIFE11 ENV/IT/004.

Others supports for some new panels were laid in the areas B7 and B2 Nibionno, in areas B4-B5-B6 and B2 Merone. The panels are in course of installation and the action will finish at the end of 2018.

Objectives

The aim of attracting the attention of citizens on current projects to be realized was reached; to demonstrate this are reported some vandalism on the installed panels expressed in protest sentences overwritten regarding the illustrated works, especially in the points more crowded.

Annexes

D2 - Billboards

5.2.3. Action D3

Description

It was produced 1000 copies of brochure containing a summary of Lambrovivo project (see Annex D3_all01 attached to MIDTERM Report), distributed in the following location:

Inverigo:
City hall – Via Enrico Fermi, 1
Library - Via Carlo Bianchi

Nibionno:
City hall – Piazza Caduti, 2
Library – Via Fiume, 2
Swimming pool – Via Gaggio, 1

Merone:
City hall – Via Appiani, 22
Library – Via Isacco, 1

Triuggio:
City hall – Via Vittorio Veneto, 15
Field office of PVL– Viale Susani, 52

The brochures were also distributed at the stand of the PVL to "Agrinatura" Exhibition which was held at Lariofiere (Erba) from 1 to 3 May 2015. (see Annex D3_all02 attached to MIDTERM Report)
The distribution went on until exhaustion of copies.
The next report to the layman will directly "Layman's report" of D8 action.
The brochures have been printed on recycled paper and showed the project logo and the LIFE logo.

Action status:

Effective start	Effective end	Progress [%]
February 2015	October 2017	100%

Problems

There were no problems for D3 action.

Time schedule

The D3 action is delayed respect to the TIMETABLE shown on Amendment 2013 LIFE11 ENV/IT/004. It was decided to make a single brochure to be distributed at the location indicated and that the next publication will be the Layman's report.

Objectives

The objectives will be achieved at the end of the action.

Annexes

D3 - Layman's report_2015

Figura 43: Front and rear of the pamphlet printed on recycled paper and distributed

5.2.4. Action D4

Description

The D4 action provides the creation of a newsletter to be distributed to a mailing list.

The mailing list has already been created through the A1 and B1actions and today has nearly 300 addresses: the contacts of the Municipalities involved by the projects, the Associations, Civil Defence Associations, some Water Services Companies, the ATO involved and many other followers.

The mailing list is managed with a Google Group (Forum Lambro Settentrionale) that allows to send to the same addresses both direct messages and email.

Since 2012 were published 14 newsletters that from 2015 have semi-annual frequency. All newsletter published from 2015 are attached. (Annexes D4_all03 attached to PROGRESS Report_2)
The newsletters show the project logo and the LIFE logo.
Since june 2016 no newsletter were produced. The newsletter was distributed to a mailing list that now counts about 300 addresses. It is also publicized on social groups of the project (FB, Twitter and Google+) and published on the site www.lambrovivo.eu

Action status:

Effective start	Effective end	Progress [%]
October 2012	December 2019	100%

Problems
There were no problems for D4 action.

Time schedule
Publishing had a stop during the last period. The next number will be a special one about the works and their progress.

Objectives
The mailing list had about 300 contacts.

Annexes
D4 – Newsletter

5.2.5. Action D5

Description
The D5 action provides the creation of a blog to have direct contact with the stakeolders.
Initially it had been activated a traditional blog at www.progettolambro.it domain. This blog has been abandoned due to hacker attacks and low attendance.

Subsequently, the following channels have been activated

On Facebook:

- a page on Lambrovivo project https://www.facebook.com/lambrovivo) with 237 like;
- a group on Lambrovivo (https://www.facebook.com/groups/forumlambro/) with 147 members.

On Google+:

- a profile on Lambrovivo project (https://plus.google.com/u/1/115962849021387044760/posts) with 34 followers (views no more available);
- a page on Lambrovivo project (https://plus.google.com/u/1/b/105048334229606485379/105048334229606485379/posts) with 9 followers (views no more available);

On Twitter is active a Lambrovivo profile (@Lambrovivo) with 36 follower and 47 tweet.

All pages on FB, Google+ and Twitter are synchronized with the Hootsuite® that lets post messages on multiple platforms.
All pages show the project logo and the LIFE logo.

Action status:

Effective start	Effective end	Progress [%]
October 2012	December 2019	100%

Problems

The publication on the social network has encouraged greater participation and involvement.

Time schedule

The development of the D5 respects TIMETABLE shown in the 3rd Amendment to the original agreement.

Objectives

The objectives will be achieved at the end of the project. the results are satisfactory:

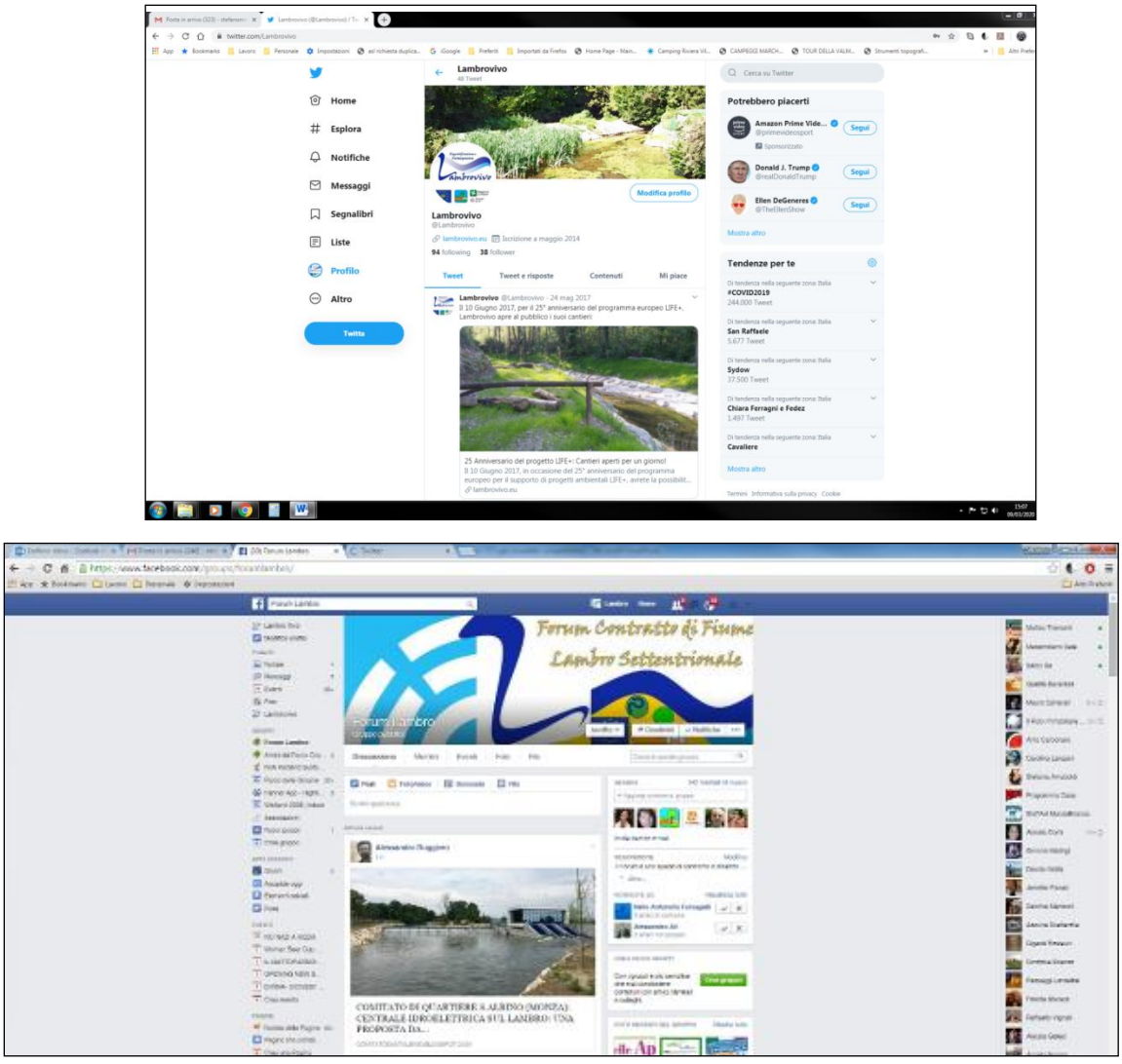


Figure 44: the main social used for dissemination: a) Twitter; b) FB group "Forum Lambro Settentrionale"

Annexes
D5 - Forum & blog

5.2.6. Action D6

Description
The D6 action provides the organization of workshops and informational meetings for the LIFE project by the coordination staff.

On 3/07/2013 was organized an evening on the subject of constructed wetlands. During the event Mr. Conte of IRIDRA Company Srl explained a presentation entitled "Presentazione e discussione sulle tecniche e le possibili applicazioni della fitodepurazione per il miglioramento della qualità delle acque e dell'habitat dei fiumi".

On 15/11/2014 was held a conference at the library of Sovico (Viale Brianza 4), organized by PVL and the Association "Amici del Lambro di Sovico" entitled *"Lambro 2.0: recuperare acque di buona qualità ripartendo dal sistema fognario"*. Participated as speakers: Eleonora Bettenzoli (AEEGSI), Elena Arena (UATO Lecco), Marta Giavarini (UATO Como), Marco Lacalamita (UATO Monza), Viviane Iacone (Lombardy Region), Stefano Minà (PVL) and other parties involved in the management of water services .

On 7/03/2015 was held a conference at the Urban Center of Monza organized by the PVL and Legambiente (Monza) entitled *"Lambro pulito Lambro sicuro: sicurezza idraulica e qualità delle acque del fiume".* The topic of the conference was the hydraulic safety and environmental quality of the Lambro river. Participated as speakers Mario Clerici (Lombardy Region), Stefano Minà (PVL), Marco Lacalamita (UATO Monza), Valeria Marchesi (ARPA), Dario Fossati (Lombardy Region), Gaetano Lamontagna (AIPO), Francesco Nicolodi (AIPIN), Damiano di Simine (Legambiente Lombardia), Atos Scandellari (Legambiente Monza).

Figure 45: two meetings organized by PVL: a) Sovico (november 2014); b) Monza (March 2015)

Action status:

Effective start	Effective end	Progress [%]
January 2013	December 2019	100%

Problems
There were no particular problems in developing the action D6.

Time schedule
The development of action D6 meets the timelines stated in TIMETABLE shown in the 3rd Amendment to the original agreement.

Objectives
The objective of dissemination has been successfully achieved.

Annexes
D6 - Meetings and Networking

5.2.7. Action D7

The afterLIFE programme is reported as a Deliverable and published on the website.

Action status:

Effective start	Effective end	Progress [%]
March 2020	December 2021	100%

Deliverables
26_D7_Del26 - After LIFE+ plan

5.2.8. Action D8

It was produced a brochure containing a summary of Lambrovivo project, only in digital version, published on the website and distributed on all the socials and by mean of the newsletter. It is also reported as a Deliverable.

Action status:

Effective start	Effective end	Progress [%]
March 2020	December 2021	100%

Deliverables
27_D8_Del27 - Layman's report

5.3. Evaluation of project implementation

In this section we evaluate the following aspects of the project:

5.3.1. Methodology applied

The approach of the participated design is of course positive but very complex and hard to bring on and must be conducted with experience to lead in certain times to a result. The penalty is the loss of funds and the aggravation of environmental problems.

The delays accumulated in some works were due partly to the complexity of the Italian law on public works, partly to the discontinuity in the management system of the Park, partly to the lack of interlocutors on the management of the sewerage system.

In general, considering the total cost of the project and the quite-good results obtained, we can conclude that Lambrovivo was a successful project, although the point of view of its final rendering may in some ways appear quite different from the initial proposal.

5.3.2. Results

The Lambro vivo project has been recognized by many as a wide-ranging intervention, in terms of time and resources, which simultaneously involved several areas of the park considered to have low environmental potential. There are no comparable interventions in the history of the park in terms of the amount financed and the size of the areas involved. Also from the point of view of the image rendered to the citizens, the perception was that of a great renewal and interventions of great visibility, especially in some points, such as B5 and B6 areas, the most frequented ones.

The project looked at from the point of view of its final rendering may in some ways appear quite different from the initial proposal. This is only an apparent difference.

The evolution in fact that the project had both in its discussion phase with the stakeholders and in the subsequent project phases and in the actual realization certainly changed some even substantial details of the interventions but did not in fact upset the overall structure and above all the impact that these actions wanted to induce in the environment in which they were located. Indeed, it can be said that thanks to the contribution of all the actors involved, the actions have been made somewhat more realistic and incisive.

The same consideration can be made also for the interventions that have arisen in the meantime as a corollary of the Lambrovivo project born initially under certain premises and then evolved towards solutions or adjustments that have only improved its effectiveness or impact on the territory.

The Maastricht Treaty (1992) introduced the "subsidiarity principle", on the basis of which it was hoped that individual citizens and groups could actively participate in decisions affecting their lives. In the international context, the participation of the community and social groups is one of the priority objectives of the United Nations Agenda 21 and Healthy Cities programs. In Italy the experiences of participatory planning have spread and consolidated following, above all, some national regulations (Law 285/97 and Law 328/00) that address different social subjects (municipal services, ASL, schools, private social, etc.) to enter into partnerships to address specific problems in the areas of common belonging. Some regions have also equipped themselves with specific tools to increase citizens' participation in public life (in Tuscany the LR 69/2007, in Emilia-Romagna the DL 115/2010). These regulatory guidelines urge the overcoming of the traditional conception of planning that starts from the

top which, being too specialized and sectorial, has proved insufficient to face the recent changes in social reality: reduction of public resources, growing demand of citizens to control the work and work of the governors, complexity of the problems to be addressed.

The participation process in planning and designing works and interventions is not always easy or fruitful and also on this occasion it was possible to experiment on a large scale that the expectations of the territory are the most varied and the participants' approach to these processes can be from very negative to very positive. The result is always a subtle balance between the needs that have been brought forward by the proposer (often according to a top-bottom scheme) and the requests that are brought forward by the actors called to participate in the process even if they prove to be technically difficult to implement.

In the case of the Lambrovivo project, the proposals, which started from a level of design previous to the preliminary one in many cases, were first of all submitted to the evaluation of the Forum of associations and bodies that carried out a first skimming and correction of both the objectives and methods for their pursuit. Subsequently the design process imposed further corrections dictated above all by the diversification of the technicians who were called to design the subsequent phases, therefore by the limits imposed by the overall economic framework of the project and finally by the prescriptions that were provided by the bodies appointed to authorize for the various wait for the planned works. Not least the relationship with the owners of the land affected by the interventions and the subsequent construction of the works often required further adaptations which ultimately led to the final result.

In any case, whatever the path that took the project during its life, it can be observed today that it is practically concluded that with respect to the objectives it initially set, in fact, types of intervention characterized by various nuances and gradations in a sort of sample that can be made available to the bodies responsible for planning and designing environmental interventions for their subsequent adoption and further experimentation.

Action B2M carried out at the Merone treatment plant is undoubtedly the one most suited to the theme of water quality and less to that of the quality of the environment and this feature is also enhanced by the level of mechanization and plant engineering that was required to achieve it.

Action B2 carried out at the Nibionno purifier and certainly mainly suited to the quality of the water but it already represents a step towards greater naturalness at the expense of the efficiency of purification performance, obviously.

The combination of actions B3 and B4 represents the attempt to alternatively address a problem of pollution of the secondary water network which ultimately demonstrated its limitations in the part relating to the improvement of water quality but also an exceptional power instead in the diversification of habitats which were previously extremely trivial.

Actions B5 and B6 represented a collection of multi-objective proposals in which the quality of the water was not even considered, although it could receive an indirect minimum benefit, and instead also in this case great potential was discovered and highlighted by ecological point of view and citizenship usability.

Finally, the action of B7 can be considered a valid although perfectible experiment of defragmentation of a water body for the purpose of its functionality for the viability of the fish fauna and in general for the requalification of extremely artificial bodies of water.

If we consider that as a corollary of all this great experiment, a first attempt at participation born within the process of river contracts and upstream a serious plan for monitoring the

effects induced on water bodies and fauna by the interventions are placed upstream. Overall judgment that can be given on the project is positive.

5.3.3. Visibility

The visibility of the project is testified by the contacts on the social channels and by the reports and observations made by various users about the areas of intervention.

5.3.4. Effectiveness of the dissemination

Considering that all the channels (digital and not) were adopted to disseminate the contents and the progress of the project we cannot say which of them was the most efficient. Probably different ways reached different target in terms of age and digital abilities. The results of the dissemination is reported in the previous paragraphs.

5.4. Analysis of long-term benefits

In this section are discussed the following points.

5.4.1. Environmental benefits

As regards to the action B2 for Nibionno treatment system it is to note that the basins are fully vegetated and populated by some species of birds (ducks and coots), dragonflies and also nutrias. The monitoring system (one sampler for each basin) are collecting data and a series of at least 2 years will be available at the end of the monitoring period allowing to compare the quality of the effluent from the WWP and the quality of the water after the natural treatment. So from the environmental point of view surely the impact is very positive, as to the water quality only the results from the monitoring will allow to give certain informations.

As regard to Merone treatment system it is out of doubt that the implementation of the works caused a negative impact on the habitat that is not completely recovered by the planting of the submerged flow basins. A positive impact can be appreciated in the final part of the system, the free surface flow basin that are constantly fed with water.

Of course at the moment the final impact on the habitat will be appreciated only after the full vegetation of the basins, as well as the improvement of the downstream water quality will be appreciated only a certain period of time after it started plenty its operation in 2021.

As for B3 action the collaboration between Inverigo municipality, the Park and Valbe servizi, the manager of the WWP of Nibionno, led to a more frequent maintenance of the spillways that brought to a more regular functioning although their activation during storm events leads to significant temporary decrease of the water quality. Also the habitat quality, thanks to the works that were not part of LIFE project, improve significantly.

The action B4 (filter ecosystems on the Villa Romano) brought a visible improving of quality and quantity of the habitat in the area interested by the works. As underlined above 3 new habitat have been constructed that were not present in the neighborhood: a wetland, a marsh and a wet forest, in addition to the naturalization of the boundary woods in which the undergrowth have been planted. The new wetland is now populated by fishes, presence witnessed by the frequentation of some individuals of gray heron. As for the water quality it is necessary to wait for the results from the postoperam monitoring.

The interventions on B5 and B6 areas (wetlands along the river Lambro) had certain positive effects on the ecosystem and in particular showed an improvement in the quality of habitat and an increase in biodiversity. The pools created in B5 area need a more accurate

investigation about their involvement during the reproductive season of amphibians and insects. The lake created in B6 area instead is yet populated by fishes not present before in the river that feeds it, and by some species of dragonflies and insects. For further results it is necessary to wait for the results from the postoperam monitoring.

Cavolto river (action B7) received a strong improvement from the works although it was necessary to strongly stabilize the upper part of the main stream. The entrance and the final part of the river is fully vegetated and also in the central part, where the turbulence is very low, a hydrophilic vegetation is growing spontaneously. The possibility of ascent the river for the fishes to go from Lambro to Baggero lakes is in course of verification and will be , totally or partially confirmed at the end of the postoperam monitoring.

5.4.2. Long-term benefits and sustainability

Regarding the benefits these are well exposed in the paragraph 5.1.10. These are ALL long term benefits.

Regarding the sustainability, as highlighted in the post-life report, the interventions carried out were designed to have very low maintenance costs, and where these are more conspicuous, the sources of funding have been precisely identified. Low-cost maintenance interventions will be maintained thanks to the Park's action (actions B3, B4, B5, B6, B7) while those with higher management and maintenance costs (B2M and B2N actions) will be borne by the Water Service managers Integrated and remunerated through the tariff.

5.4.3. Replicability, demonstration, transferability, cooperation

In the images below is represented the natural system implemented downstream Cermenate WWP in Como Province subsequent to the works at Merone WWP. The technology is a little simpler but very similar and the designer are the same of Merone plant. It is a further demonstration that Lambrovivo project was an example and a pilot for other similar system in Lombardy region.

Figure 46: ortho images of the natural system of Cermenate WWP, from 10/3/2017 to 23/3/2018

It is interesting necessary to mention here also some moments of networking with other LIFE projects and participation in appointments at national level.

The first networking activity was undertaken at the beginning of the project with a visit to the 2 phytodepuration systems created as part of the Trebbia Integrated project - LIFE00 NAT / IT / 007166 on 5 July 2012; this has already been accounted for in the initiation report.

Subsequently, it was decided to include a section dedicated to LIFE-related projects in the newsletter envisaged among the activities of this project, called "LIFE CONNECTION". The summary of a similar project was reported in each issue of the newsletter. The following related projects have been identified:

• ARTWET - Mitigation of agricultural nonpoint-source pesticide pollution and phytoremediation in artificial wetland ecosystems - LIFE06 ENV / F / 000133

• TREASURE - Treatment and re-use of urban stormwater runoff by innovative technologies for removal of pollutants - LIFE06 ENV / DK / 000229

• RII - Integrated hydraulic and environmental requalification of the rii belonging to the foothills of Emilia Romagna - LIFE11 ENV / IT / 243

• REWETLAND - Widespread introduction of constructed wetlands for a wastewater treatment of Agro Pontino - LIFE08 ENV / IT / 406

• LOTWATER - Innovative demonstration project for local treatment of combined sewer overflows enabling the implementation of the Water Framework Directive - LIFE03 ENV / DK / 000053

• TRELAGHI - Eutrophic reduction through natural technics of three little italian lakes waters - LIFE02 ENV / IT / 000079

• RINASCE - Naturalistic requalification for the integrated hydraulic-environmental sustainability of the Emilian channels - LIFE13 ENV / IT / 000169

In July 2014, the LIFE + RII and RINASCE projects organized a conference in which LAMBROVIVO participated as an auditor on the subject of the flooding allowance.

On 21/05/2015 in Collecchio (PR) starting from the initiative of LIFE CONFLUPO and BARBIE an operational networking meeting was organized which involved, in addition to the

promoters, LIFE CSMON, LAMBROVIVO, MAKING GOOD NATURA, MERMAINDS, RII, RINASCE and TROTA. The meeting has laid some foundations for broader cooperation between all parties involved. LAMBROVIVO on that occasion brought a second time for networking to take to the National Conference on River Restoration, which took place in Reggio Calabria between 27 and 30 October 2015 (see the website dedicated to the event). The event was attended by representatives of the LIFE + projects RII, TROTA, RINASCE, Progress report LIFE+ 55 BARBIE, AQUALIFE, RINASCE, SOS TUSCAN WETLANDS, as well as representatives of LAMBROVIVO project.

Figure 47: Collecchio (PR) networking with other LIFE projects

LAMBROVIVO in that venue proposed a second networking moment to be brought to the National Conference of River Redevelopment to be held in Reggio Calabria between 27 and 30 October 2015. Only few of the projects mentioned before participated with oral speeches. Lambrovivo was present with a presentation within the session dedicated to "Nature conservation in the management of river systems", but many LIFE projects were present.

sessione L

CONSERVAZIONE DELLA NATURA NELLA GESTIONE DEI SISTEMI FLUVIALI					
DATA	28 ottobre	**ORARIO INIZIO**	11.30	**ORARIO FINE**	13.00
AULA	da def.	**CHAIRMAN**	Giuseppe Dodaro (CIRF)		

PRESENTAZIONI ORALI

La caratterizzazione e il miglioramento della reticolarità ecologica: il contributo dei territori fluviali
Autori: *M.R. Minciardi* (ENEA – Ente Nazionale per l'Energia e l'Ambiente) et al.

Valorizzazione e rigenerazione del patrimonio pubblico nel Parco Naturale Regionale del fiume Ofanto: tra gestione naturalistica e rilancio del partenariato pubblico-privato
Autori: *M. Iacoviello* (Parco Naturale Regionale del fiume Ofanto) et al.

LambroVivo: interventi per il miglioramento della qualità delle acque e degli habitat nella valle del Lambro
Autori: *S. Minà* (Parco del Lambro) et al.

Conservazione della natura e sicurezza idraulica nel Parco fluviale del Taro
Autori: *M. Zanelli* (Ente di gestione dei parchi e biodiversità Emilia Occidentale) et al.

Riqualificazione e gestione fluviale: contributo e priorità per la conservazione della lontra (*Lutra lutra*) al margine dell'areale italiano
Autori: *R. Fusillo* (Lutria snc) et al.

POSTER

Modello di idoneità ambientale del massiccio della Sila per la Lontra (Lutra lutra)
Autori: *P. Gariano* (Università di Pavia) et al.

Il progetto LIFE+ Nature "SOS Tuscan Wetlands": i primi risultati
Autori: *C. Turchi* (Consorzio di bonifica 4 Basso Valdarno) et. al.

Ecologia & Funzionalità del Fiume Crati
Autori: *A. Brusco* (Ente gestore delle Riserve Tarsia-Crati - Amici della Terra Italia) et. al.

Figure 48: Reggio Calabria (RC): networking with other projects during the Italian Meeting on River Restoration in 2015

A subsequent meeting was organized by the Life CONFLUPO in collaboration with the Life BARBIE in Boretto Po on 29/02/2016. Here AdbPo and 4 regions involved in the management of the river Po (Piedmont, Lombardy, Emilia Romagna, Veneto) signed a memorandum of understanding "for a sustainable and unified management of fisheries and the protection of fish stocks in the river Po". At this LAMBROVIVO the project did not take part.

However, from the results of this meeting ensued one else at the headquarters of the Lombardy Region in Milan on 19/09/2016. Partners of the following projects have attended or

participated remotely: ACQUALIFE, BARBIE, CONFLUPO, CSMON LIFE, GESTIRE, IP GESTIRE 2020, LAMBROVIVO, MAKING GOOD NATURA, RII, RINASCE, TROTA.

Negotiations has been taken to start ad additional networking with SILIFFE project (LIFE14 NAT/IT/00809) and other similar projects to start before the end of 2018 but they didn't concretize.

5.4.4. Best Practice lessons

There are some ongoing projects, external to LIFE financing, which interact and implement the activities provided for. In particular:

• ACTION B2: as above mentioned Merone WWTP ended an upgrade that allows to treat a greater part of the wastewater, especially the first flush during the storms, and to produce an higher quality effluent. At Nibionno WWTP the upgrade started in 2019 and this will allow to send to the ecosystem filters a better wastewater, both in terms of flow and concentration. Valbe servizi (now Larioreti Holding) promoted a new project to move some wastewater from their WWTP to Merone one, with the aim to relieve a pipeline that often go in pressure pouring its content in the neighbourhood. This operation will allow to eliminate the colour from the effluent in Nibionno WWTP, colour that finish without treatment directly into the 2 basins affecting their efficiency.

This coupled effects will bring to an objective increase in the quality water of Lambro river.

• ACTION B4: the elimination of the discharge is expected on the Orrido of Inverigo river in conjunction with some interventions of the sewerage network arrangement. This intervention, eliminating the major source of pollution of the river, will improve water quality. Actually the works on the sewerage system (a 3rd lot of a multipurpose action) were completed, while the 1st and the 2nd, directly conducted by Parco Valle Lambro, are waiting to start at the beginning of 2022.

• ACTION B5-B6: the relieving of the pipeline indicated above will allow to eliminate the salutary provision of wastewater on these areas.

5.4.5. Innovation and demonstration value

A certain impact on the technology will be adopted in the future of water treatment is noticeable: Nibionno WWP manager decided that, after the empowering of the plant that started in 2019, the part of the rain water coming from 2nd flow will be treated into a new natural basin very similar to the ones realized in this project.

As to the plant realized for the Merone WWP it is noticeable that the coupling of engineering and natural technologies has allowed the maximization of the efficiency of the plant over a relatively small area of intervention: this represents an innovation in the Italian panorama in the field of purification.

5.4.6. Long term indicators of the project success

The long term indicators are well exposed in the paragraph 5.1.10 and in the deliverables annexes. Below is reported a synthesis of the results obtained from the monitoring phase for each areas. For details see technical part. For fishes*: the results on Lambro river do not depend upon the interventions but describes a generalized situation of increasing allochthonous presence. For bats**: not investigated in certain areas.

AREA INDICATOR	B2M	B2N	B4	B5	B6	B7
Water quality				-	-	-
Fishes*			-	-	-	
Birds						
Bats**	-	-	-			
Amphibians						-
Odonates						-

Legend (see explanation of * and ** above)

	Worsening/negative impact
	Stability/neutral impact
	Improvement/positive impact

6. Comments on the financial report

6.1. Summary of Costs Incurred

Below is shown general overview of the costs incurred for the realization of the project until the end of the project on 31/12/2019:

Cost categories	Budget according to the grant agreement*	Costs incurred within the project duration	%**
1. Personnel	86.912	75.618	87,01%
2. Travel and subsistence	0	0	
3. External assistance	500.159	616.678	123,30%
4. Durable goods			
Infrastructure	3.081.206	3.075.421	99,81%
Equipment	22.500	19.180	85,25%
Prototype	0	0	
5. Land purchase / long-term lease	0	0	
6. Consumables	8.750	7.800	89,14%
7. Other Costs	0	3.651	
8. Overheads	93.000	93.000	100,00%
TOTAL	**3.792.527**	**3.891.348**	**102,61%**

The costs of VAT is exposed because for Parco Regionale della Valle del Lambro is a cost that cannot be recovered.

6.1.1. Personnel

As regards the reporting of personnel expenses, the following should be noted:

- The number and arrangement of the monthly working hours of the respective employees are noted on excel sheets prepared by everyone, then printed and signed by the employee and the project coordinator in the first available days of the following month;
- The hourly cost of employees has been calculated by dividing the employee's annual gross cost by the Entity by processing the payroll of the respective years by the number of hours worked during the year.

It is necessary to underline the very low increase in personnel costs in the period between the delivery of the Progress report on 09/30/2018 and the final cost.
This is due to the fact that the amounts of eligible costs have been revised, as ineligible costs were also incorrectly indicated such as mileage refund or one-off economic incentive.
As requested in your letter of 23 February 2016 and 1 August 2019, the roles, covered by the staff in the project, have been aligned with those identified in the budget.
The cost of Dr. Sabina Rossi has been revised according to the directions and, as a risult, is more in closely aligned to that provided. The same goes for the other employees.
With regard to Dr. Farchi, his daily cost it is still quite high (partly because it was initially underestimated), but it must be said that, under the supervision of Mr Farchi the project traveled with good speed, thanks especially to his delegation and problem solving skills.

6.1.2. External Assistance

It must be expected that the thresholds provided by the national order for direct entrustments should be identified as follows:

- € 40.000,00 (art. 125 D.Lgs 163/2006 and, since18/04/2016, art. 36 D.Lgs. 50/2016)

In the choice of economic operators, when we need specific professionalism and experience, and the amounts of the service were potentially above the threshold and the burden of the procedure were sustainable, in terms of time and availability of staff, the most efficient and safe theoretical criteria have been adopted i.e. open tender with the most economically advantageous tender method).
With this criterion have been chosen, for example, the designers of the final and executive phase of the Merone finishing and those the definitive phase of environmental works (B4-B5-B6).

With regard to all other assignments above threshold of minor importance, we have opted for methods based on the offer of the lowest price; in the choice of the designers of the finishing system of the Nibionno purifier the request was made to the same operators who had already participated in the previous tender for the design of the Merone system and which therefore had already qualified specifically in the sector requested.

Finally, as regards the positions below the threshold, in order not to burden further on staff with other selection tender and having a supplier register "de facto "specialized in certain sectors and reliable from a technical point of view, the choice of operators was based on the principles of economy, competence, availability and continuity.

- The cost-effectiveness is due to the fact that the compensation offered to different professionals is regularly below the relevant rates standard; this negotiation was made possible by the relationship of mutual trust that binds some professionals with the Park Authority;
- The competence is given by the fact that the professionals in charge are chosen both for them specific technical professionalism both for the in-depth knowledge of the area and of its problems and peculiarities, often decisive in execution the assignment.

As required in your letters of 23 February 2016 and 1 August 2019, the descriptions of the external assistance have been reviewed and accordingly modified in order to make the reference with the foreseen costs clearer.

6.1.3. Infrastructure

The accounting status of "Opere Ambientali" (related to Actions B5 and B6) and the reporting of the respective costs in the Infrastructure category has been accepted in the letter following Progress Report no.3, even though you cannot register the costs in the inventory of durable goods as requested by the Common Provisions.
As required in your letters of 23 February 2016 and 1 August 2019, it is confirmed that the same depreciation was applied for the goods related to actions B2 and B7, but for different reasons here explained:

1) As to B2 goods, mainly machines and plants, these will probably be transferred in the future to the sewerage management company. In the meantime the inclusion of these works in the Park assets book at least for the time necessary for their partial or complete depreciation is under evaluation;
2) As to B7 goods has been applied the same rules as for the actions B5 and B6.

6.1.4. Equipment

Depreciation of goods, according to the "Accounting Principles and Rules of General Government Economic Accounting System" prepared by the Ministry of Economy and Finance, should be determined by the following coefficients, provided by D.lgs 118/2011:

- Industrial and commercial equipment 15%
- Office machinery 20%
- Office furniture 10%
- Hardware 25%
- Other goods 20%

but is conventionally exposed to 50%.

6.1.5. Other Costs

From the Progress Report of 31/03/2017, some cost items, not foreseen in the budget, have been included in the "Other costs" category. They represent an extremely marginal part of total expenditure and they have been as necessary costs for the implementation of the project. They are relating to tender costs and municipal administrative fees for some planning procedures, necessary for the execution of the works. In detail, there are some mandatory contributions for ANAC - Autorità Nazionale Anticorruzione for call for tenders and a municipal contribution for building permit.

6.2. Accounting system

The spending and accounting system of the Park is based on the fundamental administrative principles adopted in an Italian Public Body, regulated by the Consolidated Law of Local Authorities pursuant to Legislative Decree 267/2000; in particular, the shopping phases are ordered in articles 182-185 and can be summarized as:

- 1. Commitment
- 2. Clearance
- 3. Ordering
- 4. Payment

In the first phase, the sum to be paid is determined, the creditor, the reason and the relative due date are indicated, and the constraint on the budget forecasts is established, within the sphere of verified financial availability.

In the second phase, on the basis of the documents and titles to prove the creditor's acquired right, the certain and liquid sum to be paid is determined within the limits of the amount of the final commitment assumed.

In the last two phases, the payment mandate is signed by the employee of the entity identified by the accounting regulation in compliance with the laws in force, must have a series of elements indicated in article 185; is controlled, as regards the existence of the commitment and the liquidation and compliance with the cash authorization, by the financial service, which also carries out the accounting and transmission operations to the treasurer; the latter makes payments deriving from tax obligations, from sums registered in the role, from payment delegations, and from other legal obligations, even in the absence of the prior issue of the related payment mandate.

As regards the univocal identification of the competence of the expenses, the organization of the budget chapters helps. For simplicity, an expense chapter has been defined for each loan received, so to date the main chapters used are the following:

- 3207 ("design and construction of the rolling operation on the Lambro in the Municipalities of Inverigo, Nibionno and Veduggio"), initial availability 5,200,000.00 euros;
- 3208 ("implementation of the Lamber resource of Brianza project"), initial availability 440,000.00 euro;
- 3216 ("River contract: design / implementation of treatment treatment in Merone"), initial availability 1,450,000.00 euros;
- 3217 ("LIFE 2011 Lambro vivo Project"), initial availability 566,686.00;
- 3212 ("River contract: design and construction of the Bevera Molteno purification area in Merone"), initial availability € 450,000.00.

As regards chapters 3208, 3216 and 3217, only expenses relating to the LIFE project were charged on these. In particular:

- On the 3208 chapter, created at the time of the allocation of the Cariplo funding for the Lamber resource project of Brianza (2012) which then flowed into the LIFE project, all expenses relating to actions B7, C2, C3 and a small part of the shares D and E;
- Chapter 3216, created at the time of the granting of the Lombardy Region funding for the finishing project of the Merone treatment plant, which has always been included in the LIFE project, bears all the expenses relating to action B2 as regards only purifier of Merone;
- On chapter 3217, created at the time of the allocation of the European Commission funding for the LIFE project, all expenses relating to B2 actions are charged for the Nibionno purifier only, and a large part of the D and E actions;

As regards chapter 3212, this represents the granting by the Lombardy Region of a loan that was aimed at creating a purification area in the final stretch of the Bevera di Molteno. Following the technical feasibility analysis of this solution, which ended with a negative result, the Park asked and obtained the use of those funds for the finishing of the Merone treatment plant which in the meantime had seen its costs increase (from 1,450,000, 00 euros from preliminary had gone to 1,900,000.00 euros from definitive, in order to respond to the requests of the Lombardy Region for greater purification yields). To make the situation clearer as soon as possible, a change in the budget will be made which will substantially bring together the availability of chapter 3212 in 3216, giving full financial correspondence, among other things, to what has already been formalized from the contractual point of view between the Park and the Region (is attached in this regard, the integration to the agreement signed by the two Bodies on 12 June 2014 - E1_all12 - where the aforementioned operation is reported) or the chapter will simply be renamed indicating clearly its real destination.

Therefore, as regards the correspondence of the expenditure commitment documents to which the invoices then refer, the situation is very clear as regards all the insistent items on chapters 3208, 3216 and 3217. In these cases the Unique Project Code (CUP) introduced with the law 16 January 2003 n. 3 guarantees beyond all doubt the bi-univocal correspondence between the expenditure committed and paid and the related chapter. The following are the Unique Project Code (CUP) for actions B2 and B7:

- Action B2 - Nibionno: B63E12000190006;
- Action B2 - Merone: B13E12000050001;
- Action B7: B73E11000070007.

Chapter 3207 was created at the time of the granting of the Lombardy Region funding for the design and construction of the works relating to the rolling area of Inverigo. This loan includes a series of interventions that have followed a distinct authorization and procedural process, and are:

1. Hydraulic adjustment works;
2. Environmental works;
3. Arrangement of the landslide and rolling area on the Bevera in Veduggio con Colzano;
4. Guard house of the rolling area of Inverigo;
5. Interventions to make the Lambro river banks safe.

Of these interventions, those included in the LIFE project are only a few contained within the works referred to in point 2, "Environmental works".

Therefore, as regards the correspondence of the expenditure commitment documents to which the invoices then refer, the situation is very clear as regards all the insistent items on chapters 3208, 3216 and 3217. In these cases the Unique Project Code (CUP) introduced with the law 16 January 2003 n. 3 guarantees beyond all doubt the bi-univocal correspondence between the expenditure committed and paid and the related chapter.

Chapter 3212 was recently fully committed to the tender for the assignment of the finishing works of the Merone treatment plant, so the problem of correspondence does not arise because there will be a single commitment for the realization of the works. When it merges into chapter 3216 or is renamed, the same considerations made above will apply.

The reporting on chapter 3207 is certainly more complex. Here, in fact, the 5 projects belonging to the same chapter of expenditure also all have the same CUP, which therefore is not a guarantee of relevance of the expenditure with the LIFE project. The only project of interest for LIFE is in fact the number 2, called "Environmental works". To identify the related expenses, it is therefore possible to always refer to this wording; however, to make accounting even more intelligible, the following measures will be taken:

1. Control of the Race Identification Codes (CIG) connected to services and works related to environmental works;
2. Inclusion in all documents with accounting value (determine, invoices and payment mandates) of the name of the project "LIFE11 ENV / IT / 004 Lambrovivo";
3. Affixing a special stamp "LIFE11 ENV / IT / 004 Lambrovivo" exclusively on the expenses pertaining to the project which are not already sufficiently explicit.

A further clarification must be made on the expenses relating to "Environmental works" and reported on chapter 3207. The actions pertaining to the LIFE project (B4, B5 and B6) represent only a (slightly majority) part of the complex of these works. Their identification and quantification took place in a precise and detailed manner in the final project (delivered as deliverable B4-5-6_Del14). As regards the reporting of the expenses incurred in this regard, it is understandable how difficult it can be for the Commission to accept certain commitments where it is extremely cumbersome to break down the part relating to LIFE actions. It is for this reason that it was decided not to report the first expenses that are at the origins of the project, such as those relating to the feasibility study and the preliminary project, where the other 4 contracts are also present. From the definitive project stage, however, the picture has been simplified. Below are the proposals made for the recognition and reporting of expenses for this part of the project, you accepted with a note of 23/01/2019:

- Expenses relating to the final design and the relative tender procedures: since the relative "weights" of the various components within the "Environmental works" has been defined in the final design, it is proposed to allocate the expenses incurred in this area in proportional measure for the LIFE component and the non-LIFE component. In particular, the LIFE part would commit approximately 58% of the total intervention (7% action B5, 26% action B6, 25% action B7) while the remaining 42% would be in non-LIFE share (the percentages were calculated by proportionally proportioning the cost of specific works in relation to the whole project);

- Expenses related to Works Management: the Works Management may be requested to produce a separate invoicing for LIFE works and for non-LIFE works.

- - Expenses related to the execution of the works: the implementation of LIFE interventions had priority over non-LIFE interventions. SAL (work progress) specific to the work included in LIFE actions and for non-LIFE has been issued.

It should also be noted that the executive design and implementation services for the environmental works have a single Race Identification Codes (CIG), therefore all invoices relating to these are uniquely linked with the aforementioned "Environmental Works".

6.3. Auditor's identification

The external auditor in charge of auditing the project is dr. Michele Giovanni Pozzoli, registered in the register of auditors, Ordine dei Dottori Commercialisti e degli Esperti Contabili di Monza e Brianza, with number 546.

6.4. Summary of costs per action

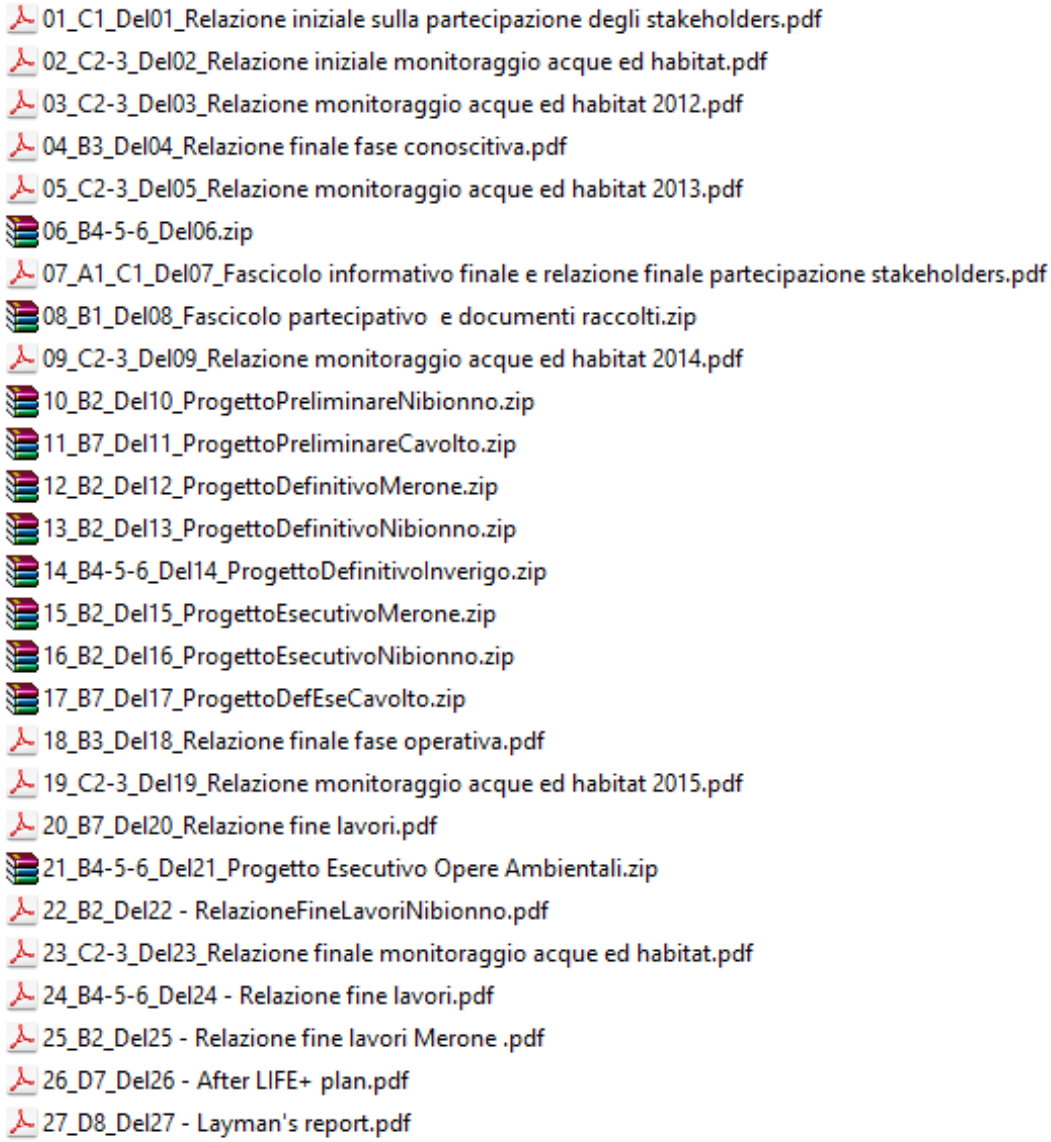
The following page shows a summary of the costs incurred so far broken down by action and type

Action no.	Short name of action	1. Personnel	3. External assistance	4.a Infra-structure	4.b Equip-ment	6. Consumables	7. Other direct costs	TOTAL
A1	Avvio del progetto e coinvolgimento degli stakeholders.	3.073	2.517					5.590
B1	Creazione e sviluppo di un modello decisionale e di progettazione partecipato.	2.905	13.067					15.972
B2	Realizzazione di ecosistemi filtro per il finissaggio delle acque in uscita dai depuratori di Merone e Nibionno con tecniche di fitodepurazione.	7.543	253.063	1.901.628			3.426	2.165.660
B3	Individuazione e riduzione delle fonti inquinanti lungo alcuni affluenti minori del Lambro critici per la qualità delle acque in comune di Inverigo.	3.327	2.499					5.826
B4	Realizzazione di ecosistemi filtro lungo alcuni affluenti minori del Lambro critici per la qualità delle acque in comune di Inverigo.	5.762	28.551	409.758				444.071

B5	Creazione di un'area umida permanente lungo l'asta del Lambro nei comuni di Nibionno ed Inverigo (1/2)	2.785	9.035	113.612				125.432
B6	Creazione di un'area umida permanente lungo l'asta del Lambro nei comuni di Nibionno ed Inverigo (2/2)	2.815	35.553	432.216				470.584
B7	Rinaturazione del tratto finale della Roggia Cavolto	1.651	32.565	218.206			225	252.647
C1	Monitoraggio della partecipazione degli stakeholders.	725						725
C2	Monitoraggio della qualità delle acque.	3.183	48.189		4.928	0		56.301
C3	Monitoraggio della qualità dell'habitat.	3.189	37.190					40.380
D1	Implementazione sito web del progetto.		3.080					3.080
D2	Realizzazione pannelli informativi LIFE+.		8.469					8.469
D3	Realizzazione relazione per i non addetti ai lavori.	1.170	4.870		0	683		6.724
D4	Realizzazione mailing list e newsletter.	3.017	3.080		0			6.097
D5	Realizzazione blog.		900		0			900
D6	Realizzazione convegni e seminari informativi		2.860		982	653		4.495
D7	After LIFE+ Communication		1.269					1.269
D8	Layman's report		3.806					3.806
E1	Gestione del progetto e monitoraggio avanzamento lavori.	34.473	126.115		13.269	6.464		180.321
Over-heads								93.000
	TOTAL	75.618	616.678	3.075.421	19.180	7.800	3.651	3.891.348

7. Annexes

7.1. Deliverables



Note for deliverables: the expected B3-Relazione finale is outdated and replaced by B3_Del18_Relazione finale fase operative.

7.2. Administrative annexes

01 - election of the new president of the Park;

02 - declaration of non-recoverability of VAT;

03 - Timesheet and paycheck Sabina Rossi;

04 - Call for tender for final design of Merone purifier;

05 - Financial reporting (pdf and xls format);

06 - Audit report

7.3. Dissemination annexes

- D1 - Website
- D2 - Billboards
- D3 - Layman's report_2015
- D4 - Newsletter
- D5 - Forum & blog
- D6 - Meetings and Networking
- D7 - After LIFE+ plan
- D8 - Layman's report_2021