(Projects funded under the Call 2014 onwards must use this format)

LIFE Project Number

LIFE18 NAT/ES/000121

Final Report

Covering the project activities from 15/07/2019[1] to 29/09/2024

Reporting Date[2]

29/12/2024

LIFE PROJECT NAME or Acronym

DIVAQUA; Improving Aquatic Diversity in Picos de Europa

Data Project

Project location:	Northern Spain (Deva-Cares and Sella River basins)
Project start date:	15/07/2019
Project end date:	29/09/2024
Total budget:	2,361,506 €
EU contribution:	1,416,903 €
(%) of eligible costs:	60.00%

Data Beneficiary

Name Beneficiary:	Universidad de Cantabria
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Project Website:	https://lifedivaqua.com/

[1] Project start date

[2] Include the reporting date as foreseen in part C2 of Annex II of the Grant Agreement

This table comprises an essential part of the report and should be filled in before submission

Please note that the evaluation of your report may only commence if the package complies with all the elements in this receivability check. The evaluation will be stopped if any obligatory elements are missing.

Package completeness and correctness check	
Obligatory elements	**✓ or N/A**
Technical report	
The correct latest template for the type of project (e.g. traditional) has been followed and all sections have been filled in, in English *In electronic version only*	✓
Index of deliverables with short description annexed, in English *In electronic version only*	✓
Final report: Deliverables not already submitted with the MTR annexed including the Layman's report and after-LIFE plan Deliverables in language(s) other than English include a summary in English *In electronic version only*	✓
Financial report	
The reporting period in the financial report (consolidated financial statement **and** financial statement of each Individual Beneficiary) is the same as in the technical report with the exception of any terminated beneficiary for which the end period should be the date of the termination.	✓
Consolidated Financial Statement with all 5 forms duly filled in and signed and dated *Electronically Q-signed or if paper submission signed and dated originals* and in electronic version (pdfs of signed sheets + full Excel file)*	✓
Financial Statement(s) of the Coordinating Beneficiary, of each Associated Beneficiary and of each affiliate (if involved), with all forms duly filled in (signed and dated). The Financial Statement(s) of Beneficiaries with affiliate(s) include the total cost of each affiliate in 1 line per cost category. *In electronic version (pdfs of signed sheets + full Excel files) + in the case of the Final report the overall summary forms of each beneficiary electronically Q-signed or if paper submission, signed and dated originals**	✓
Amounts, names and other data (e.g. bank account) are correct and consistent with the Grant Agreement / across the different forms (e.g. figures from the individual statements are the same as those reported in the consolidated statement)	✓
Mid-term report (for all projects except IPs): the threshold for the second pre-financing payment has been reached	NA
Beneficiary's certificate for Durable Goods included (if required, i.e. beneficiaries claiming 100% cost for durable goods) *Electronically Q-signed or if paper submission signed and dated originals* and in electronic version (pdfs of signed sheets)*	NA
Certificate on financial statements (if required, i.e. for beneficiaries with EU contribution ≥750,000 € in the budget) *Electronically Q-signed or if paper submission signed original and in electronic version (pdf)*	NA
Other checks	
Additional information / clarifications and supporting documents requested in previous letters from the Agency (unless already submitted or not yet due) *In electronic version only*	✓
This table, page 2 of the Mid-term / Final report, is completed - each tick box is filled in *In electronic version only*	✓

**signature by a legal or statutory representative of the beneficiary / affiliate concerned*

1. Table of contents

2. List of key-words and abbreviations

ALTANO: Altano Energy S.L. – DIVAQUA Beneficiary

CAMBERA: Asociación Red Cambera – DIVAQUA Beneficiary.

CI: Community Interest, regarding habitats and species under the Habitat Directive, those included in Annex I and II of the HD.

CSIC: Agencia Estatal Consejo Superior de Investigaciones Científicas – DIVAQUA Beneficiary.

eDNA: Environmental DNA.

ES: Ecosystem services.

FIHAC: Fundación Instituto de Hidráulica Ambiental de Cantabria – DIVAQUA Beneficiary.

HD: Habitat Directive (92/43/EEC).

ITAGRA: Centro Tecnológico Agrario y Agroalimentario – DIVAQUA Beneficiary.

JCyL: Junta de Castilla y León. Consejería de Fomento y Medio Ambiente. Dirección General de Patrimonio Natural y Política Forestal – DIVAQUA Beneficiary.

PRINCAST: Principado de Asturias – DIVAQUA Beneficiary.

PENP: Parque Nacional de Picos de Europa.

REPSOL: Repsol Generación Eléctrica, S.L.U. – DIVAQUA Beneficiary.

SAC: Special Area of Conservation, under the Habitat Directive.

UC-IHC: Universidad de Cantabria – DIVAQUA Coordinator.

WFD: Water Framework Directive (2000/60/CE).

3. Executive Summary

DIVAQUA has restored the aquatic ecosystems of the Natura 2000 network in the Deva-Cares and Sella River basins (N Spain), where 7 SAC are located. The mean goal of DIVAQUA was to improve the conservation status of aquatic habitats and species of CI and those listed in Annex IV of the HD. The project's achievements have expanded the distribution range of these habitats and species, fostering genetic exchange between populations and enhancing riparian habitats. DIVAQUA has successfully met the key objectives for which it was designed and proposed. Among the different actions taken, the most notable developments, according to the project's specific actions, were:

A1. Characterization of aquatic habitats as initial situation for the subsequent monitoring program. This action was successfully finished and all the deliverables are available in BUTLER. Regarding the **Issue 9 of the letter reached after the final project visit (11 & 12/09/2024), the maps with the location of hydraulic infrastructures (*e.g.* dams) and lentic water bodies (*e.g.* wetlands) are included in the deliverables** *A1. Inventory of hydraulic infrastructures and natural obstacles in Sella and Deva-Cares basins* and *A1. Updated inventory of lentic water bodies in the DIVAQUA area*, respectively.

A2. Development of action protocols regarding diseases and exotic species. This action was successfully completed, and the 3 deliverables are uploaded in BUTLER. However, it was delayed compared to the original schedule due to a shortage of DNA lab processing materials, which were out of stock as a result of the COVID-19 pandemic. Additionally, we reanalysed most of the eDNA samples, incorporating new techniques and approaches to improve the

results, as this is a cutting-edge method in constant evolution. In response to **Issue 7 of the letter, the protocol for activities in, or near, water bodies where pathogens or invasive species are present has been included as an Annex of the *Deliverable A2. Distribution maps of species of interest in the DIVAQUA area.***

A3: Development of guidelines and a methodological guide for the conservation of aquatic diversity in mountain areas. This preparatory action was also completed and its 5 deliverables are available in BUTLER. Regarding **Issue 8 of the letter, the Methodological Guide developed in this action was uploaded to the project website, in Spanish and English, on 14/10/22 (see https://lifedivaqua.com/materiales/). The Issue 9 is answered above (A1).**

C1. Actions to improve riverbanks and reduce the effects of channelling and diversion channels. This action consists of 6 sub-actions (C1.1–C1.6). Although C1 does not have any specific deliverable, the implementation of these sub-actions can be reviewed in *Deliverable D1: Evaluation of the results of restoration actions carried out in C1 and C2*.

Two subactions were not completed within C1: C1.1 could not finally proceed because the Duje River headwaters are unsuitable for the development of habitat 91E0*, while C1.4 was removed, as indicated in the third project amendment, because the restoration of the channelized Corbera River was deemed unfeasible since this river section is located within the urban area of La Hermida. Additionally, *C1.3. Protective measures in Lagos de Covadong*a (**referenced in Issue 10 of the letter**), was only partially done. The stabilization of surrounding slopes to Covadonga Lakes was achieved through the creation of vegetation patches, instead of developing habitat 91E0*. Moreover, the improvement of the drainage system for the access road to the lakes was halted, as PRINCAST secured better funding from another national program to carry out a more comprehensive project.

C2. Restoration of aquatic habitats associated to springs and wetlands. The subactions carried out under C2 are detailed in *Deliverable D1: Evaluation of the results of restoration actions carried out in C1 and C2*. In this case, all sub-actions were completed except for *C2.2, Integral recovery of the Fuente Dé spring*. Despite completing the technical project and obtaining all the necessary administrative permits, finally it was not possible to reach an agreement with the landowner, Paradores del Estado, to carry out this subaction.

C3. Longitudinal connectivity improvement in Deva River. All the subactions included in C3 were successfully finished (see *Deliverable D2. Evaluation of the results of restoration actions carried out in C3 and C4*). Under this action 4 dams were removed (Puentellés, La Ferrería de Ojedo, La Depuradora Potes and Tama) and the permeability of Urdón dam was improved.

C4. Longitudinal connectivity improvement in Sella and Cares rivers. Within this action, C4.1 and C4.3 were done as expected (see *Deliverable D2. Evaluation of the results of restoration actions carried out in C3 and C4*), while C4.5 and C4.6 were replaced by a new subaction called *C4.5 Improvement of connectivity of the Restaño Dam, Dobra River* (see the third project amendment). On the other hand, *C4.4. Improvement of Caín dam fish passage* was ultimately not executed because JCyL secured other funds from the Spanish Government to implement a more comprehensive project than what was initially proposed by DIVAQUA. However, the engineering project for this subaction, along with all the preliminary studies and permits, was completed under DIVAQUA.

D1& D2. Monitoring the results of actions C1 & C2 and C3 & C4, respectively. Both monitoring actions were done as expected (see deliverables in BUTLER), except for those conservation actions delayed or cancelled.

D3. Monitoring and assessment of the socioeconomic impact and ES. This action was successfully finished and deliverables are available in BUTLER. Under this action we assessed

and mapped different ES in DIVAQUA area considering both, current and future scenarios. Additionally, we evaluated the socioeconomic impact of DIVAQUA by conducting interviews and surveys at both, the beginning and the end of the project.

E1. Communication and dissemination of the DIVAQUA project. All the proposed subactions were successfully finished (see deliverables in BUTLER). We can highlight the website, the Layman report, the social media activity, the production of several high-quality videos (https://www.youtube.com/channel/UCjW7kyJkRdfkUqNuMrXdznA), and the production of a great amount of high quality dissemination material (https://lifedivaqua.com/materiales/).

E2. Awareness and training program. Action finished and deliverables uploaded in BUTLER. Three different events were carried out within the awareness program between nov-2020 and dec-2021, while the training program included 2 workshops about amphibian conservation (22 participants) and river connectivity (16 participants).

E3. Citizen participation program. This action was successfully finished and deliverables are available in BUTLER. However, some subactions were changed in relation to those initially proposed (**see issue 13 of the letter regarding DIVAQUA-PARTICIPA**). **These changes are described in detail below, in the section 6 of this document.**

E4. Development of a network for biodiversity conservation in mountain areas. This action was also successfully finished and deliverables are available in BUTLER. However, some subactions were modified from the original plan (**see issue 14, DIVAQUA-network and 15, DIVAQUA-EXPORT of the letter**). **Due to space limitations in this section, these changes are described in detail in section 6.** Noteworthy achievements under this action include the publication of 11 scientific papers in JCR journals (one of which was published in Nature; DOI: 10.1007/s10531-022-02466-x), as well as the creation of the Picos de Europa LTSER node (Long Term Socio-Ecological Research) and its integration into the European LTER network.

We would also like to highlight the post-life plan (Action F3) for the next five years, which has been approved by all DIVAQUA beneficiaries (see this deliverable in BUTLER).

4. Introduction

DIVAQUA area (Sella and Deva-Cares river basins) includes 7 SAC (1- Picos de Europa: ES0000003, 2- Ponga-Amieva: ES1200009, 3-Río Sella: ES1200032, 4- Río Cares-Deva: ES1200035, 5- Liébana: ES1300001, 6- Río Deva: ES1300008 and 7- Picos de Europa Asturias: ES1200001). In these SAC there are inventoried more than 25 animal and plant aquatic species of CI (*e.g.* 1092, 1095, 1096*, 1102, 1106, 1127, 1301, 1355, 1194 1172, 1426, etc.) and more than 10 aquatic habitats of CI (*e.g.* 3140, 7140, 7220*, 7230, 91E0*, 92A0, etc.). The global objective of DIVAQUA was to improve the conservation status of these habitats and species. This objective can be divided into the following specific objectives:

1. Restore a favourable conservation status of aquatic species and habitats of CI within these SAC.
2. Reduce the anthropic pressure on biodiversity, thereby improving the conservation status of CI aquatic habitats and species sensitive to such pressures, while enhancing the provision of ES.
3. Promote the sustainability of productive, educational-cultural and touristic activities within the DIVAQUA area (*e.g.* hydroelectric power or livestock farming), by minimizing their impact on aquatic ecosystems and fostering biodiversity conservation.
4. Develop new tools and approaches to improve the characterization, monitoring, assessment and management of aquatic SAC, along with their habitats and species.

One of the greatest strengths of DIVAQUA was the collaboration among different institutions, bringing together the knowledge and expertise necessary to implement the project on the territory. The DIVAQUA consortium includes: 1- Natural resource management administrations (Regional Governments), 2- Research and technical institutions (UC-IHC, CSIC, FIHAC and ITAGRA.CT), 3- Private hydroelectric companies (REPSOL and ALTANO) and 4- Conservation NGOs (CAMBERA). Along the DIVAQUA lifetime different actions were developed, allowing to achieve the next goals:

- Enhance the knowledge about the distribution and structure of aquatic habitats and species of CI by applying remote sensing and eDNA techniques, respectively.
- Enhance river connectivity in the Sella and Deva-Cares basins by implementing the following measures: 1) Remove four weirs: Potes, Puentelles, Tama and Ojedo, 2) Improve fish passage effectiveness at the Urdón and Poncebos dams, 3) Establish a new fish passage at the Restaño weir and 4) Define and implement an environmental flow regime for both basins to support ecological sustainability.
- Reduce anthropic impacts on aquatic ecosystems and improve water quality in the Duje River by mitigating runoff processes from Las Mánforas mine, located at the river source.
- Enhance the structure and functionality of: 1) habitat 91E0* by restoring the riparian forest along a 2 km river section with native 91E0* tree species and 2) several aquatic habitats of CI (3140, 7140, 7230, 3150, 7110*, 7120) by protecting 3 lakes, 1 spring, and 7 wetlands (fens and bogs) by fencing.
- Expand the distribution area of *Woodwardia radicans* by establishing 6 new colonies of this CI fern in the DIVAQUA area.
- Facilitate the coexistence of traditional practices with the conservation of amphibian populations by implementing a specific design for 26 cattle water troughs that allows for amphibian reproduction and development, while accommodating livestock use.
- Development of new tools and approaches to enhance the monitoring, assessment and management of the SACs and the habitats and species of CI in the DIVAQUA area.
- Increase engagement among the local population, stakeholders and other socioeconomic sectors in the conservation of aquatic habitats, species and ES from aquatic ecosystems through a specific participation program.
- Establish a network of managers, technicians and scientists to improve the management of mountain aquatic ecosystems, optimize future biodiversity and ecosystem conservation actions and connect with other national and international networks.

DIVAQUA promoted different actions to enhance the conservation status of *Salmo salar*, *Petromyzon marinus*, *Astropotamobius pallipes*, *Galemys pyrenaicus* and *W. radicans*, which are threatened by river discontinuity and habitat degradation (unfavourable conservation status in the Atlantic Spanish region). Moreover, it is expected that the conservation status of other CI species, such as *Lutra lutra*, *Lampetra planeri* or *Chioglossa lusitanica*, which currently have a favourable status, will also benefit from these conservation actions. The conservation of other amphibians listed in Annex IV of the HD has not been assessed in the management plans of these SAC. However, some of these species are particularly endangered in these mountain aquatic ecosystems due to an introduced *Ranavirus*, first reported in Spain in the PENP. This virus, which predominantly affects frogs and newts, has been causing a significant mortality among amphibians in the area.

Following the results of D1 and D2 monitoring actions we can highlight:

1. In August 2024 *S. salar* was detected upstream of Potes following the removal of the La Depuradora weir (subaction C3.3). This barrier had previously marked the upstream limit of the species' distribution until its removal by DIVAQUA.
2. After 2 years, the structure and composition of plant communities in wetlands protected by fencing have significantly improved, as noted during monitoring visits by botanical experts and technicians of the own PENP.
3. After 3 years, the development of the new *W. radicans* colonies is progressing as expected. The ferns have increased in size and are successfully reproducing, generating new plants by themselves.
4. An experiment conducted to assess the permeability of the Poncebos dam has demonstrated that its fish passage is more effective after the execution of subaction C4.1.

Expected longer-term results

Aquatic ecosystems: 1- Improvement River connectivity (12 km Sella and 174 km Deva-Cares rivers). 2- Improvement water quality in Duje river. 3- Ecological restoration of mountain wetlands affected by overgrazing and trampling, 4- Reduction the siltation and eutrophication in Covadonga lakes, 5- Inclusion of DIVAQUA area in the European LTER network.

Habitats of CI: 1- Update the inventory and mapping of CI habitats. 2- Improvement the riparian habitat 91E0* in a 2 km river stretch and 3- Improvement the conservation status of habitats 3140, 7140, 7230, 3150, 7110*, 7120 in 3 lakes and 7 wetlands.

Species of CI: 1- Update the distribution of CI aquatic species in Sella and Deva-Cares basins. 2- Enhance habitats and reduction of risks for CI species by eliminating human pressures, 3- Improve amphibian habitat by working on wetlands and water troughs, 4- Decreasing the mortality risk of amphibians and fish species through enhancements in the Camarmeña hydroelectric channel and 5- Creation of 6 new colonies of *W. radicans*, increasing the distribution area of this fern.

5. Administrative part

5.1. Project management process

IC-IHC, as the coordinating beneficiary (CB), oversees and manages the project from technical, administrative and financial perspectives, acting as the intermediary for communications between the associated beneficiaries and the Agency throughout the project lifetime. All project beneficiaries collaborate to achieve a common goal, sharing experiences and procedures and producing significant results with complementary skills.

To fulfil its coordination tasks, DIVAQUA is supported by the Project Coordination Committee (CC), the consortium's ultimate decision-making body. Its mission includes monitoring the design and implementation of actions, the project task board and schedule. It makes decisions regarding proposals for changes to the technical and financial implementation of the project, to be agreed upon by the Funding Authority, as well as any changes to the Consortium Plan. The CC also promotes participation and communication among beneficiaries, considering their interests and concerns. It comprises a representative from each beneficiary, meeting at least once a semester at the invitation of the Board President (UC-IHC) or whenever deemed necessary by the majority of Associated Beneficiaries. The CC is responsible for: 1) Designating a Project Technical Committee (TC), composed of members

from UC-IHC, PRINCAST, and JCYL, which ensures the application of the best possible solutions for improving the state of conservation of habitats and species and 2) Creating the Project Dissemination Committee, represented by UC-IHC, CAMBERA, and CSIC, aimed at enhancing the dissemination of project results.

Nine project coordination meetings have been held throughout the duration of the project on the following dates:

1. Kick-off meeting (21/05/20). Project Initiation Roadmap, Technical and Administrative Monitoring Plan, General Aspects of Administrative and Financial Management, Checklist of Documentation Required by NEEMO, Preparation of DIVAQUA Presentation Video.
2. II project meeting (PM; 04/12/20): Description on the implementation of activities by project partners, Implementation status of milestones and deliverables, Taskboard update and follow up until May 2021, First amendment request proposal (first extension of the project, withdrawal of CPNPE and addition of FIHAC, JCYL and PRINCAST as new beneficiaries, changes of Annex III.
3. III PM (21/05/21). Update on partner activities, Status of deliverables and milestones, Status of administrative and financial information and Progress on the development of the Mid-term Report.
4. IV PM (03/12/21). Update on partner activities, Status of deliverables and milestones, Status of administrative and financial information.
5. V PM (18/05/22). Update on partner activities, Status of deliverables and milestones, Status of administrative and financial information.
6. VI PM (15/12/22). Update on partner activities, Status of deliverables and milestones, Status of administrative and financial information.
7. VII PM (04/07/22). Update on partner activities, Status of deliverables and milestones, Status of administrative and financial information, Preparation of amendment 2 to the Grant Agreement: exit of Navarro Generación as cofinancer, addition of Altano Hidro SAU as new beneficiary. Modification of Annex III.
8. VIII PM (13/12/2023). Update on partner activities, Status of deliverables and milestones, Status of administrative and financial information, Request for an extension of the project amendment until 29/09/2024.
9. IX PM (10/07/2024). Update on partner activities, Status of deliverables and milestones, Status of administrative and financial information, Project closure and administrative steps to follow.

5.2. Working method

The CB supplies the technical team with a working schedule every 6 months, with task boards being updated every two months. The project coordination team conducts internal meetings overseeing the tasks assigned to each partner when necessary. All partners have participated in the Project Board Team and attended each of the biannual Project Board Meetings. A series of methodological guides and working documents were developed for the project to facilitate its administrative and financial management so as to ensure that all procedures for information

and documentation necessary for tracking DIVAQUA actions and related costs were known and implemented by the consortium. The coordinator has also biannually compiled and reviewed all the economic/administrative documentation of the partners (timesheets, invoices and proofs of payment, etc.). The CB set up a project progress monitoring shared folder specifically available for each Associated Beneficiary through an FTP server.

The Communication Strategy and the Social Participation Strategy guidance documents were also developed in parallel, as one of DIVAQUA's main interests has been to enhance the creation of participatory debate groups with stakeholders (technical staff, administration, farmers, local tourism entrepreneurs, etc.). In addition, the Project Partnership Agreement was signed by the CB and the Associated Beneficiaries, defining their functions and responsibilities to implement the tasks as foreseen in the Grant Agreement, while setting up procedures to solve conflicts and foster effective collaboration and successful project outcomes.

5.3. The Partnership and its added value

DIVAQUA is bringing together essential expertise needed for the project's development over a large area, including natural resource management administrations, research and technical institutions, private hydroelectric companies and nature conservation NGOs: 1) UC-IHC, which is in the international elite in the area of scientific-technological knowledge related to the water cycle and management of aquatic ecosystems, 2) ALTANO, a renewable energy company investing in energy projects that benefit local communities worldwide, 3) CAMBERA, NGO with a great experience on nature preservation by integrating land owners and users of the territory into the management cycle, 4) CSIC participated through its National Museum of Natural Sciences, the largest biodiversity research center in Spain, 5) FIHAC is a non-profit research organization which undertakes basic and applied research for the integrated management of aquatic ecosystems, 6) ITAGRA is a R&D&I center on the environmental, forestry and the agri-food sector, 7) JCYL is the regional administration responsible for the conservation and management of the environment within the territorial scope of the Castilla y León region, 8) PRINCAST is the regional administration responsible for the conservation and management of the environment within the territorial scope of the Principado de Asturias region and 9) REPSOL is an electric power production company which operates several hydroelectric plants in Picos de Europa and stands for compatibility of the energy supply with environmental demands.

5.4. Problems encountered and deviations from the project plan

The COVID-19 pandemic caused delays in several fieldwork campaigns. Actions planned for apr-2020, such as some of the field work trips planned were postponed until spring 2021. Additionally, meetings and events requiring physical attendance under Action E, originally scheduled for spring 2020, had to be rescheduled in line with Spanish COVID-19 regulations in effect from march to June 2020. The pandemic also affected the availability of some consumables needed for DNA surveys. Despite these challenges, the project managed to reschedule wisely, ensuring that its development was not significantly impacted by the pandemic.

Concerning required modifications from the project plan, it is to note that the consortium launched an Amendment Request on April 2023, dealing with the substitution of Action C4.5 (as modifying the Los Llanos Dam was found to be technically impossible), Action C4.6. and sub-action C1.4, involving the restoration of the channelized Corbera River (which proved infeasible) by undertaking a conservation action at the Restaño Dam on the Dobra River. Consequently, sub-action C4.5 was renamed 'Improvement of connectivity of the Restaño Dam, Dobra River,' and sub-actions C4.6 and C1.4 were cancelled

On the other hand, in dec-2023, a delay was detected in the Restaño fishway construction due to an unforeseen issue with a deteriorated retaining wall. The delay impacted the timely completion of action C4 (Subaction C4.5 'Improvement of connectivity of the Restaño Dam, Dobra River'). With the retaining wall issue resolved, continued winter work was impractical due to the site's mountainous location, making the current project end date of feb-2024 unfeasible. Thus, a 6-month extension was proposed thorough a new Amendment request. Additionally, PRINCAST informed by the same time that it was unable to complete all conservation works under action C2 (Subaction C2.3 'Recovery of springs and wetlands in Asturias'), so the 6-month extension from February to September 2024 allowed to complete the aforementioned action.

5.5. Communication with the Agency and the Monitoring team

Communication with the funding Agency and the Monitoring Team has flowed effectively and positively through the entire duration of the project. The project monitor was always available to clarify any procedural and timeline questions, ensuring a clear understanding of the reporting requirements. Four external monitoring meetings were held during the implementation of the project, which served to improve quality control of reports: 19th June 2020, 2nd June 202, 23th June 2022 and 11th September 2024.

Communication with the Agency has been also smooth and efficient concerning the submission of the Mid-term report and the amendment requests that were proposed by the project consortium,

5.6. Changes due to amendments to the Grant Agreement

Three major requests for amendment of the Grant Agreement have been signed during the course of the project:

1. Amendment 1, signed on behalf EASME on 11/03/2021, which contained the following changes: 1) Modification of the project duration from its end date on July 15, 2019, to February 29, 2024, 2) The associated beneficiary, the Inter-autonomous Consortium of the Picos de Europa National Park (CPNPE), withdraws from the Grant Agreement, as of January 15, 2020, 3) The following associated beneficiary entities are incorporated into the Grant Agreement, effective January 15, 2020: FIHAC, JCyL, PRINCAST, 4) Review and modification of Annex III of the Grant Agreement with budget reallocation among the beneficiaries UC, FIHAC, CAMBERA, and ITAGRA.
2. Amendment 2, signed on behalf CINEA on 31/07/2023, which contained the following modifications of the Grant Agreement: The external co-financier NAVARRO GENERACIÓN S.A. (Navarro) requests to withdraw its participation in the project, effective as of March 24, 2023 and the associated beneficiary ALTANO joins the project, with an effective incorporation date of April 1, 2023. The concerned budget reallocation involved redistributing financial resources, primarily from the external cofinancing compromised by NAVARRO GNERACIÓN of the canceled sub-actions to the new associated beneficiary ALTANO (CAMBERA, whose budget is modified in relation to actions A2, C1, C2, E1, E2, E3; and ALTANO, which joins the GA as an Associated Beneficiary). The budget originally provided by Navarro (€35,163) now forms part of ALTANO´s own contribution (€48,000).
3. Amendment 3, signed by CINEA on 15/01/2024, which implied the extension of the project duration until sep-2024.

6. Technical part

All technical issues raised in the final visit letter will be addressed in the following section (6.1. Technical Progress by Action), with the exception of Issues 5 and 6, which are addressed here:

- **Issue 5**: All deliverables have been uploaded to BUTLER, and each one includes a summary in English outlining the purpose of the deliverable and its key outcomes.
- **Issue 6**: The content of all deliverables uploaded to BUTLER is easily accessible by using the bookmark tool in the Adobe Acrobat software (see Fig. 1).

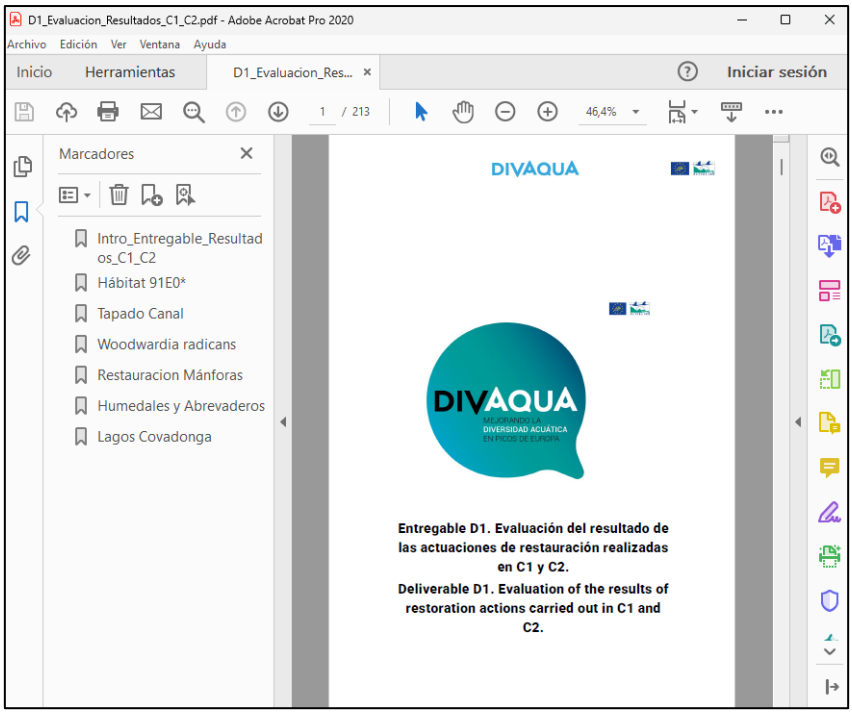

Figure 1. Capture of image of the deliverable D1 opened with Adobe, with the bookmark tool expanded, at the left of the picture, showing the different parts of the document.

6.1. Technical progress, per Action

Action A1. Characterization of aquatic habitats.

All the subactions proposed within A1 were successfully finished and deliverables are available in BUTLER.

A1.1. Inventory of lentic water bodies (UC-IHC & FIHAC). We have developed a georeferenced cartography with the location of 1.005 lentic water bodies in the DIVAQUA area: 339 cattle water troughs, 285 wetlands, 69 lakes and lagoons and 312 springs (Fig. 2). The wet perimeter of all wetlands, lakes, lagoons and springs was delimited using satellite image (Fig. 2). All this information is available in *Deliverable A1. Updated inventory of lentic water bodies in the DIVAQUA area*, where each one of these water bodies is geographically located.

A1.2. Inventory of hydraulic infrastructures and natural obstacles that generate river discontinuity in the Sella and Deva-Cares river basin (UC-IHC & FIHAC). A georeferenced database with the location of 208 transversal river obstacles (171 anthropic and 37 naturals) was done within this subaction (Fig. 2). Obstacles were characterised with information from Regional Governments, Water Agency (Confederación Hidrográfica del Cantábrico) and fieldwork campaigns (*e.g.* conservation status, material, use, width, height, fish pass possibility, etc.). All this information is available in *Deliverable A1. Inventory of hydraulic infrastructures and natural obstacles in Sella and Deva-Cares basins*, where each one of these obstacles is geographically located and characterized in a descriptive sheet.

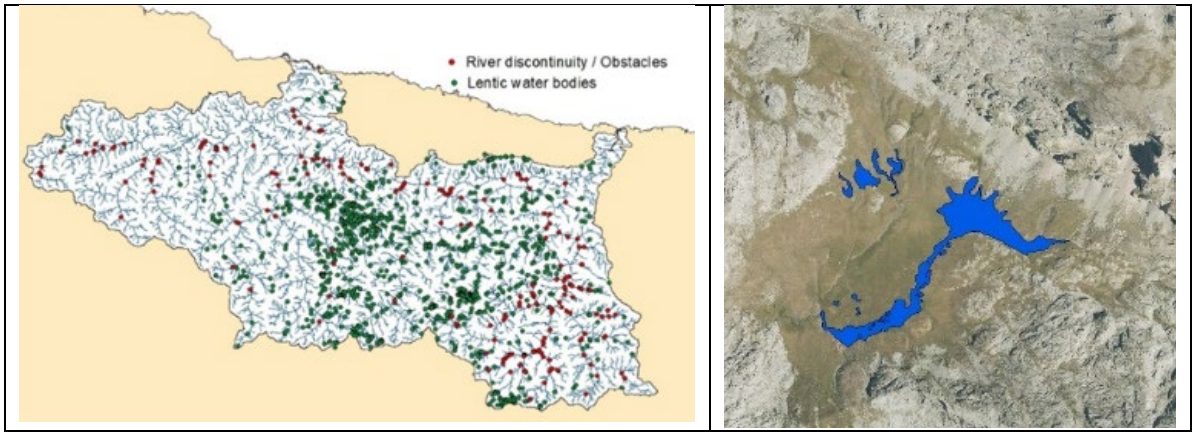

Figure 2. Location of river obstacles (red spots) and lentic water bodies (green spots) in Deva-Cares and Sella River basin (left) and wet perimeter of Vega de Liordes wetland (right).

A1.3. Physical and chemical characterization of aquatic ecosystems in DIVAQUA area (UC-IHC, FIHAC, CAMBERA & CSIC). We have characterised the physical and chemical conditions of lentic and lotic ecosystems. Water quality was analysed in two field campaigns in 113 sites (summer-2020 and spring-2021). This information, along with the physical description of lentic water bodies identified in A1.1 (perimeter, surface, etc.) is included in *Deliverable A1. Physico-chemical characterization of selected aquatic ecosystems in the DIVAQUA area*. This subaction went beyond to the initially proposed to include other quality elements according to the WFD, such as a biological characterization of bioindicator communities and river metabolism in 13 sites and a continuous characterization (every 30 minutes) of river temperature and water level in 8 river gauging stations. The objective is to keep this biological and physical characterization in the future to get a large long-term database to evaluate these ecosystems in relation to global change. The characterisation of aquatic ecosystems was done by field campaigns, the installation of field instruments and the use of satellite information and eDNA.

A1.4. Riparian characterization in Deva-Cares and Sella basin (UC-IHC & FIHAC). We have mapped the riparian forests at physiognomic and phytosociological levels of vegetation by applying distribution models based on remote sensing data over riparian zones obtained from virtual watersheds analyses. We have also modelled interactions between main drivers of the spatial patterns of riparian forest across the entire catchments. Results showed an overall accuracy over 70% with a clear differentiation between Eurosiberian (91E0* and 9160) and Mediterranean (92E0) riparian forests. Topography and land use were the main drivers in defining their distribution at the physiognomic unit, whereas altitude, climate and percentage of pasture determined their composition, highlighting the anthropic control on riparian vegetation dynamics at a regional scale.

Final visit letter question - Issue 9. As indicated above, maps with the location of hydraulic infrastructures (*e.g.* dams) and lentic water bodies (*e.g.* wetlands) are included in the deliverables of this action: *Inventory of hydraulic infrastructures and natural obstacles in Sella and Deva-Cares basins* and *Updated inventory of lentic water bodies in the DIVAQUA area*, respectively, which are updated in BUTLER.

Compare with planned output and time schedule. We had a delay respect to the initial proposal schedule because the field sampling campaign foreseen for spring-2020 had to be delayed to spring-2021, due to the state of alarm produced by the COVID-19 pandemic and the associated restrictions.

Indicate if action was modified and any correspondence with CINEA approving the changes. This action was carried out without significant changes, not overspending in relation to the approved budget.

Indicate major problems/drawbacks, delays, including consequences for other actions. The main problem to develop this action was produced by the state of alarm in Spain because of the COVID-19 pandemic. This problem produced a delay in the sampling campaigns to characterise the water quality of aquatic ecosystems in the DIVAQUA area, which finished one year later to the initial proposed schedule.

Action A2. Development of action protocols regarding diseases and exotic species.

All the subactions proposed within A2 were successfully finished and deliverables are available in BUTLER.

A2.1. Pathogens distribution in DIVAQUA water bodies (UC-IHC, FIHAC, CAMBERA & CSIC).

We have created maps with the update distribution of pathogens present in the DIVAQUA area: Bacteria: *Aeromonas salmonicida, Flavobacterium psychrophilum* and *Yersinia ruckeri*; Fungus: *Aphanomyces astaci* and *Batrachochytrium spp*; Virus: *Ranavirus.* The detection of the species has been done using the technique Environmental DNA (eDNA) in environmental samples of different matrices: water, sediment and biofilm in 117 sampling points. We have generated new specific primers for the detection of the fungus *Batrachochytrium* (See table 2 Deliverable A2: Distribution maps of pathogen aquatic species in the DIVAQUA area). We have found fish pathogens (*A. salmonicida*, *F.psychrophilum* and *Y. ruckeri* in several localities (between 20 and 34), being in general more frequent in the Deva-Cares basin. Precise data of the distribution of these pathogens in the literature was not available, although some studies report the presence of *A. salmonicida* in some scattered locations of rivers Sella and Piloña. The distribution maps presented in DIVAQUA mean an important update of the distribution of these pathogens in the area.

A2.2. Invasive species distribution in DIVAQUA water bodies (UC-IHC, FIHAC, CAMBERA & CSIC).

We have created maps with the updated distribution of invasive species present in the DIVAQUA area: American vison (*Neovison vison*); Signal crab (*Pacifastacus leniusculus*); American crab (*Procambarus clarkii*); Mud snail (*Potamopyrgus antipodarum*) and the diatom *Didymosphenia geminata.* The detection of the species has been done using the technique Environmental DNA (eDNA) in environmental samples of different matrices: water, sediment and biofilm in 117 sampling points. We have generated new specific primers for the detection of all these invasive species except for *D. geminata*. (See table 2 Deliverable A2: Distribution maps of invasive aquatic species in the DIVAQUA area). In general, we have found few localities with the presence of invasive species. *N. vison* has been found in 3 localities of the Deva-Cares basin. According to old records (see Deliverable A2: Distribution maps of invasive aquatic species in the DIVAQUA area) the species is present in some localities of Cantabria and Castilla y León.

Regarding the invasive crayfish species, both of them has been found in one location of the Sella basin. Although there are informal data of their distribution in the DIVAQUA area, we have not found records of the presence of these species in the area. The mud snail has been found in 4 localities in the Deva-Cares basin. Previous records also found this species in few locations of this basin. The invasive algae *D. geminata* has been found in 9 locations, in nearby locations of the monitoring sampling sites from IHCantabria from 2017-2021. The distribution maps presented in DIVAQUA mean an important update of the distribution of these invasive species in the area.

A2.3. Key species distribution in DIVAQUA water bodies (UC-IHC, FIHAC, CAMBERA & CSIC).

We have created maps with the updated distribution of key species for the conservation present in the DIVAQUA area: Mammals: *Galemys pyrenaicus, Lutra lutra*; Fishes: *Salmo salar*, *Salmo trutta*; Amphibians: *Alytes obstetricans*, *Salamandra salamandra*, *Discoglossus galganoi*, *Hyla arbórea, Rana ibérica, Rana temporaria*, *Bufo spinosus, Triturus marmoratus,*

Lissotriton helveticus, Ichtiosaura alpestris; Arthropods: *Austropotamobius pallipes* and Plants: *Woodwardia radicans.*
The detection of the species has been done using the technique Environmental DNA (eDNA) in environmental samples of different matrices: water, sediment and biofilm in 117 sampling points. We have generated new specific primers for the detection of all of these species within the DIVAQUA project (See table 2 Deliverable A2: Distribution maps of species of interest in the DIVAQUA area). With the eDNA technique have not detected the following species that were also of interest in the area: *Mustela. lutreola*, *Alosa alosa*, *Petromyzom marinus*, *Lampetra planeri*, *Achondrostoma arcasii*; *Chioglossa lusitanica and Woodwardia radicans.* We believe that some of these species might be absent of with very scarce in the area, in the case of fishes and *M.lutreola*. In the case of *C. lusitanica*, we believe we have not detected it due its terrestrial habitats in the most part of its life cycle, besides of being scarce in the area. Also, we have not detected *W. radicans* because is a terrestrial species, seems that it is not easy to find DNA traces of this fern in the rivers.
Regarding the results of mammals, it is important to highlight a relatively high detection *of G. pyrenaicus* in the DIVAQUA area (66% of localities). This species is of community interest and is emblematic in the National Park. *G. pyrenaicus* has nocturnal habits and its detection by traditional methods (fieldtraps, feces examination) is not cost-effective and not very accurate, current records are quite incomplete (See deliverable A2: Distribution maps of species of interest in the DIVAQUA area). In addition, we have detected the species in lentic water bodies, information that was not available before. The updated maps presented in DIVAQUA opens a new line of research and monitoring in the national park to further investigate the distribution of this species. The director of the national park already told us his interest have required a specific report with the updated distribution of *G. pyrenaicus* in the DIVAQUA area.
Regarding fishes. we have detected *S. trutta* and *S. salar.* More locations than expected were positive for *S. salar*. We need to continue the verification and assessment of the accuracy of the primers as it seems that in some cases, both species may hybridize. The results motivate the preparation of a new scientific proposal to validate and study the possible hybridization of these salmonids. Regarding amphibians we have detected most of them. We have performed a comparison of detectability by the observations of herpetologists and eDNA and found a much higher detection with eDNA than with traditional methods (These results were presented in ARC Life platform meeting). We also found that amphibian species whose life cycle is mainly aquatic (*A. obstetricans; B. spinosus, L helveticus or I. alpestris*) yield greater number of positives. It is important to highlight that regarding the different amphibians' habitats, cattle drinking troughs were one of the most important for them, having the highest number of positives together with rivers. The last species was the European crayfish (*A. pallipes*). We have found them in only one locality, in the river Gueña, in the Sella basin.
We can conclude that we satisfactory have updated the distribution of several key species for conservation in the DIVAQUA area and got interested information regarding rates of detectability and limitations with eDNA techniques. Some of the updated maps will need further exploration of data and visits to the field localities to confirm some of the positives of *G. pyrenaicus* or *S. salar*.

A2.4 –Prioritization of actions in water bodies and development of safety protocols (UC-IHC, FIHAC)
A cross-analysis of the distribution of pathogens, invasive species, and key species for conservation, alongside the measured physico-chemical variables, was conducted to prioritize water bodies in the DIVAQUA area for future conservation actions. We have created a weighting matrix including the number of key species for conservation, the presence of invasive and pathogen species and taking in account the water quality of the water bodies sampled. This analysis and detailed methodology can be found as an annex in the deliverable

A2: Distribution maps of species of interest in the DIVAQUA area. This work also answers ***Issue 7 of the evaluation letter after the visit of CINEA.***
For the application of the weighting matrix, we have divided the water bodies by type (lotic water bodies, lakes, wetlands and cattle drinking troughs. Finally, we have divided the results of the evaluation of each water body in three prioritizing categories: high, medium and low priority.

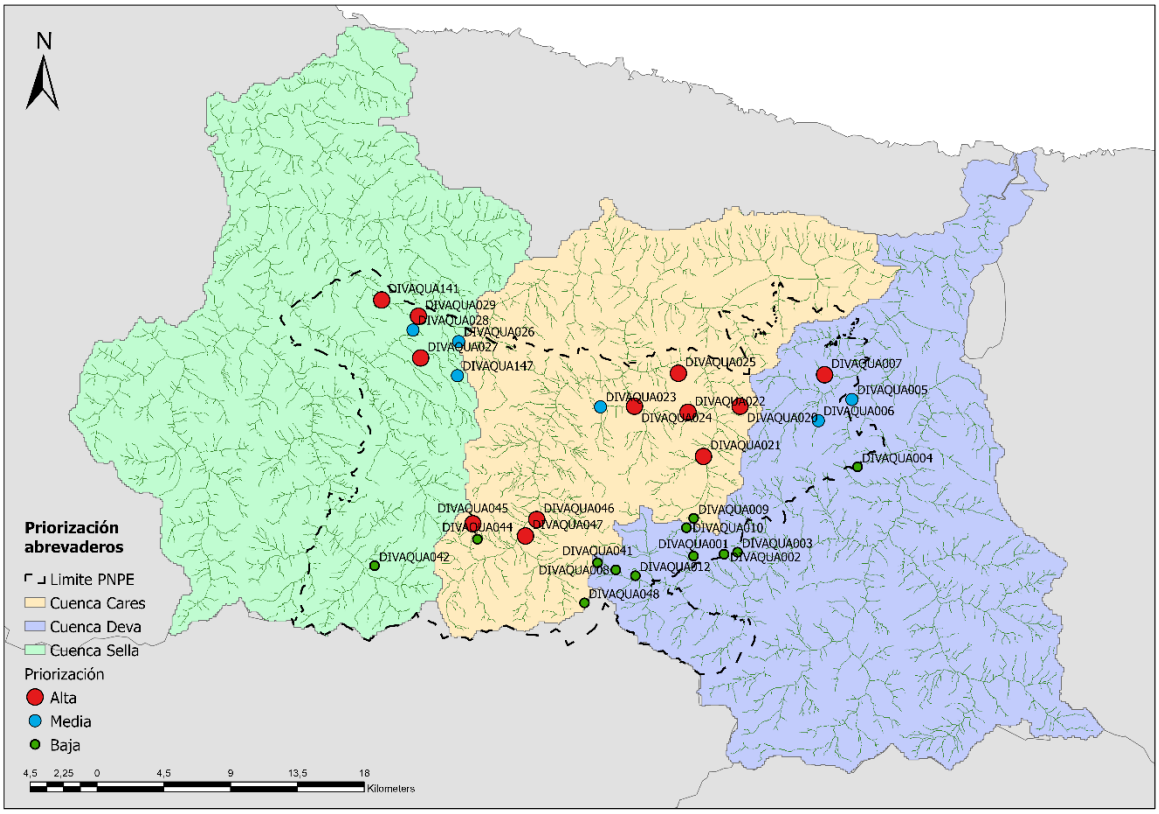

Figure 3. Example of prioritization of conservation actions in cattle drinking troughs in the DIVAQUA area in the three described categories (high, medium, low priority) following Annex 1 of deliverable A2: Distribution maps of species of interest in the DIVAQUA area.

Additionally, due to the presence of these invasive and pathogenic species in the DIVAQUA area, a safety protocol was developed for activities occurring in or near the affected water bodies. The protocol is also in annex 1 of deliverable A2: Distribution maps of species of interest in the DIVAQUA area. This work also answers ***Issue 7 of the evaluation letter after the visit of CINEA.***

Compare with planned output and time schedule. The planned output came with a delay due to several reasons explaining below. The most important issue is that this action was meant to be preparatory, but due to fieldwork delays and technical problems we have it concluded in the middle -end of the project. So, although the planned output is the same, was not finished within the planned timeframe.

Indicate if action was modified and any correspondence with CINEA approving the changes. This action was carried out without significant changes, not overspending in relation to the approved budget.

Indicate major problems/drawbacks, delays, including consequences for other actions. The first problem to develop this action was produced by the state of alarm in Spain because of the COVID-19 pandemic. This problem produced a delay in the sampling campaigns to

characterise the water quality of aquatic ecosystems in the DIVAQUA area, which finished one year later to the initial proposed schedule. Later one, during the lab analysis of the eDNA samples we encounter a problem since the extraction method used (a commercial kit for soil samples) extracted very little amount of DNA and very fragmented. Once we have found this, we decided to perform the extraction in all samples (more than 300) to obtained high quality DNA with the method of phenol-chloroform. A comparison of DNA quantity got by both methods can be found in Figure 4. The highly fragmented DNA found with kit and longer fragments obtained with phenol-chloroform can be found in Figure 5.

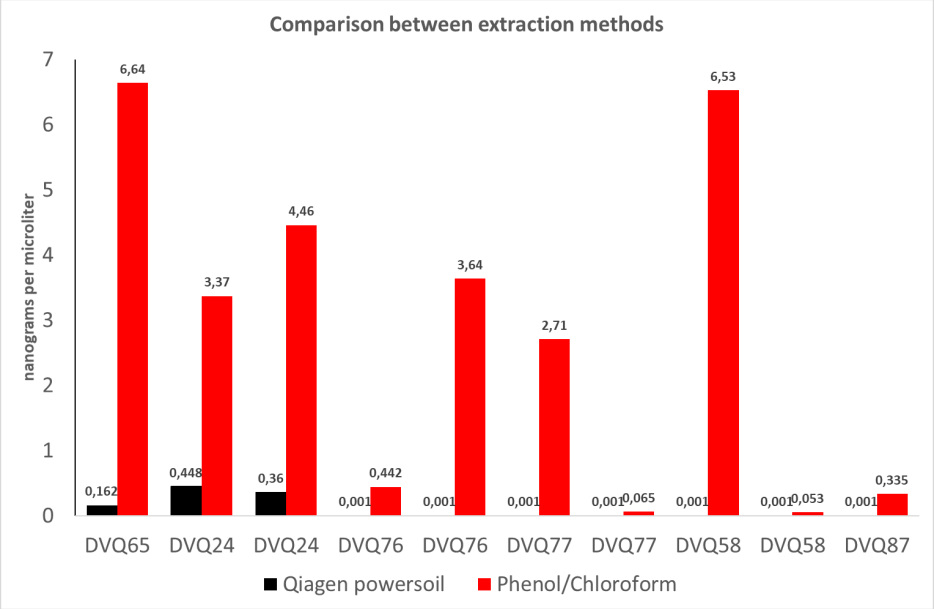

Figure 4. DNA quantity in ng/L of some DIVAQUA samples obtained from commercial kit (QIAGEN powersoil) and phenol-chloroform.

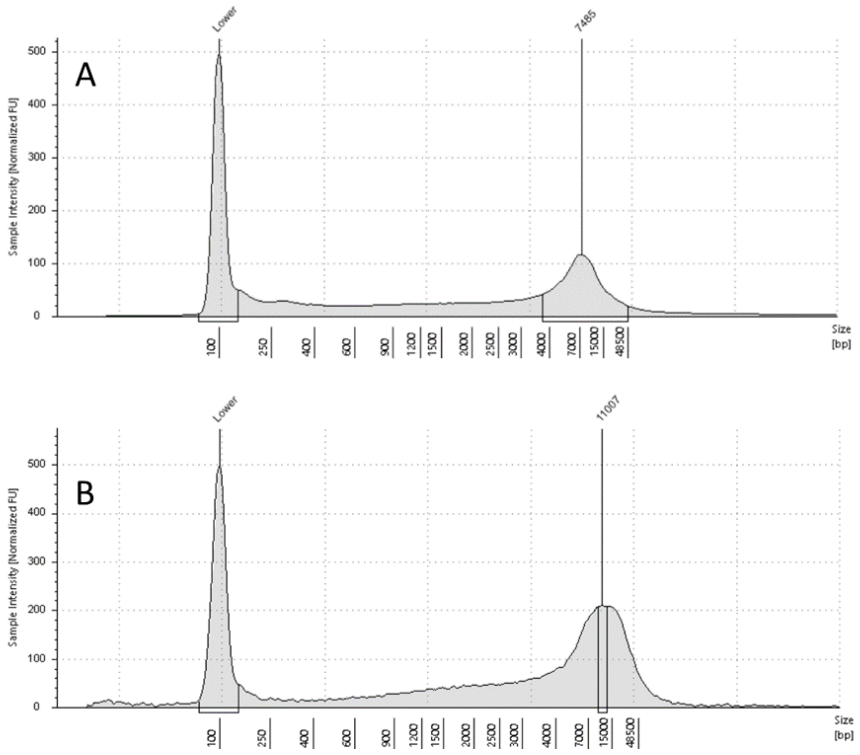

Figure 5. DNA fragment size in samples extracted with commercial kit (A) and samples extracted with phenol-chloroform (B).

In addition, bioinformatic pipelines for eDNA metabarcoding data obtained from ONT was not developed before and this was extremely time consuming, taking us 4 times more of the time we have planned.

The consequence of this delay is that we could not finish this preparatory action on time and we were not able to develop a prioritization of water bodies on time.

Action A3. Development of guidelines and methodological guide for the conservation of aquatic diversity in mountain areas.

All the subactions proposed within A3 were successfully finished and all the deliverables are available in BUTLER.

A3.1. Vegetation mapping of terrestrial habitats using remote sensing (UC-IHC & FIHAC). Within this framework we have developed a predictive vegetation mapping method based on environmental variables and remote sensing including satellite imagery and LIDAR data, to estimate the Areas Of Occupancy (AOO) of habitat types. The crosslinks between vegetation units and habitat type were adapted for the study area using the European nature information system (EUNIS 2017). Models showed consistently high AOO values, with an average of 94.2 ± 4.4% for the potential AOO and 98.6 ± 1.2% for the local AOO. Validation of the generated AOO using testing data showed an overall accuracy of 67.59%, with some habitat types reaching more than 80% of user's and producer's accuracy. Results were then integrated into comprehensive landscape units corresponding to small hydrological basins covering the whole study area in order to provide a framework for a further assessment of ecological functions and ES across the study area (Fig. 6).

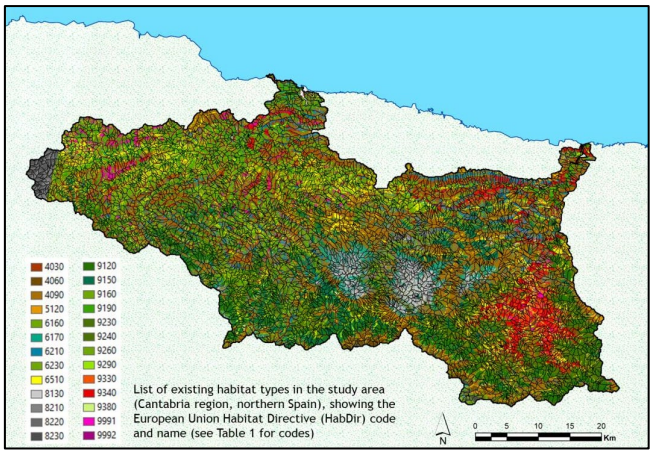

Figure 6. Vegetation map combined with landscape units (basins) for further analyses of ecosystem functioning and services.

A3.2. Modelling natural hydrological regime and climate change effects (UC-IHC & FIHAC). Under this subaction was defined:

1. The natural hydrological regime for Sella and Deva-Cares basins in the current situation and in a future scenario. The distributed SPHY model used for the hydrological model has shown satisfactory. Despite the underestimation of peak flows in some individual events, the model's fit during both calibration and validation has been good. Results highlight that, in a future scenario, there will be a generalized increase in temperatures and a decrease in precipitation, which, along with changes in land cover, will result in a generalized reduction of river flow in Deva-Cares (21,2%) and Sella (18.7%) basins (see a complete description in D*eliverable A3. Definition of the natural hydrological regime for Sella and Deva-Cares river network*).

2. A new proposal of environmental flows for the different river sections of these river basins. This study was done with data from 17 study sites located in Sella and Deva-Cares basins (2,966 km^2), This represents a significant effort when compared to the official ecological flow assessments conducted by the competent water authority (Confederación Hidrográfica del Cantábrico), which used 20 study sites to evaluate a much larger territory of 20,831 km² across northern Spain. Our environmental flows results (Fig. 7) and its comparation with the official ones can be seen in *Deliverable A3. Definition of environmental flows for Sella and Deva-Cares river network.*

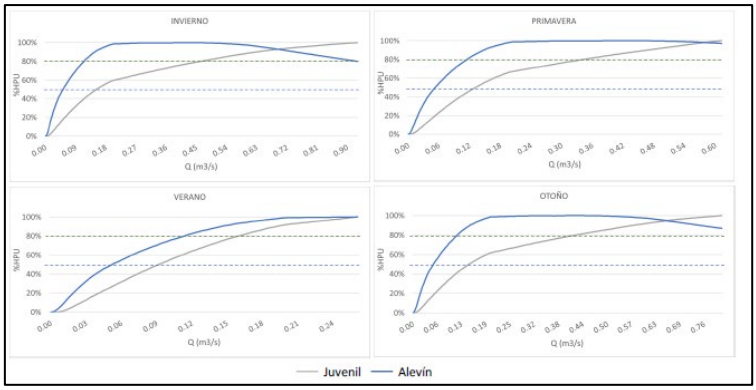

Figure 7. Variation (%) of the HPU respect to the HPU max. for the different stages of *S. trutta* in the hydrological periods corresponding to winter, spring, summer and autumn at the Fuente Dé study site.

A3.3. Validation of future scenarios through a participation process (UC-IHC & FIHAC). We have estimated trout (*S. trutta*) population density in the Deva basin, with and without management actions. A meta-population model has been used to detect how changes in the river network connectivity due to the removal (4) and improvement (1) of barriers influence trout population density patterns. After these actions, and according to the results of the model, a low decrease in the network-averaged density is produced in this scenario. However, these changes are not homogeneous across the whole basin, but occur differently at the reach level, where the increase or decrease in population density compared to the scenario without management actions depends on the age class and the location of the river reach in the fluvial network. Barriers could be functioning as possible biomass traps, obstructing and/or preventing the movement of adult individuals downstream, which in turn would be increasing the densities of all life stages in fluvial reaches blocked by the longitudinal barriers. Therefore, the lack of longitudinal connectivity could lead to a local alteration of the spatial distribution of each age class of the population.

A3.4. Methodological guide for the conservation of aquatic biodiversity (UC-IHC & FIHAC). The final version of this guide turned out to be much more comprehensive than a simple methodological manual. It encompasses all the approaches and developments undertaken in PENP over the past decade for the characterization, monitoring and assessment of freshwater ecosystems and other catchment processes and elements, including climate patterns, land uses, ES, freshwater biological communities, physical elements of freshwater ecosystems, biodiversity, etc. (see *Deliverable A3. Methodological guide for the conservation of aquatic diversity in mountain areas*, for the English version see https://lifedivaqua.com/materiales/).

Final visit letter - Issue 8. the Methodological Guide developed in this action was uploaded to the project website, in Spanish and English, on 14/10/22 (see https://lifedivaqua.com/materiales/). **Issue 9**. As indicated above, all the maps with the location of hydraulic infrastructures and lentic water bodies are included in the A1 deliverables: *Inventory of hydraulic infrastructures and natural obstacles in Sella and Deva-Cares basins* and *Updated inventory of lentic water bodies in the DIVAQUA area*, respectively.

Compare with planned output and time schedule. Some parts of this action finished with a delay due to technical problems, but it did not affect in the development of other conservation actions planned in DIVAQUA.

Indicate if action was modified and any correspondence with CINEA approving the changes. This action was carried out without significant changes, not overspending in relation to the approved budget.

Indicate major problems/drawbacks, delays, including consequences for other actions. We did not find any special problem for the development of this action.

Action C1. Actions to improve riverbanks and reduce the effects of channelling and diversion channels.

Except C1.4, all the subactions were successfully finished, with some modifications in C1.3. See *Deliverable D1. Evaluation of the results of restoration actions carried out in C1 and C2*.

C1.1. Habitat 91E0 improvement* (REPSOL, UC-IHC, FIHAC, PRINCAST & CAMBERA). Finished in feb-2024. Five hundred trees of species characteristic of habitat 91E0* (*Fraxinus excelsior*, *Alnus glutinosa*, *Salix atrocinerea*, *Coryllus avellana* and *Betula celtiberica*) were planted in 5 plots along a river section of the Cares River, downstream of Poncebos (Fig. 8). These plots cover a total area of 3,500 m^2. This subaction was delayed due to the need for careful selection of appropriate plots, ensuring no harm to other habitats of CI inventoried in this river section. To date, the plantations are progressing as expected and have withstood several floods since being stablished.

Figure 8. Working in the tree plantation and some plants used in this subaction.

C1.3. Establishing protection measurements for the protection of the Covadonga Lakes (PRINCAST). This subaction was modified from the original proposal. Main changes were:

1. Stabilization of the slopes surrounding Covadonga Lakes: Instead of developing habitat 91E0*, as initially proposed in DIVAQUA, these slopes were stabilized by creating vegetation patches through selective clearings. This adjustment was made to avoid conflicts with local farmers, who do not support the establishment of continuous forests in this area. This task was completed in 2023 with funds from outside the LIFE program.
2. Improvement of the drainage system for the access road to the lakes: This task was postponed, as PRINCAST secured more favourable funding from a Spanish Government program to implement a more comprehensive project. The work is expected to take place throughout 2025.

Within this action, and using LIFE program funds, permanent wooden fencings were installed around La Ercina and La Mina Lakes (Fig. 9). Due to the positive results observed in the monitoring visits, the fencing will be extended to the nearby Enol Lake in 2025, funded by the Spanish Government.

Figure 9. Wood protection fences in La Ercina and La Mina lakes.

C1.4. The restoration of the channelized Corbera River. As outlined in the project's third amendment, executing this subaction has been deemed infeasible, primarily because the channelized section of the river is located within the urban area of La Hermida. After several discussions with the water authority (Confederación Hidrográfica del Cantábrico), it became clear that obtaining the necessary permits to carry out the technical project was not viable due to the potential flood risk to the urban areas surrounding the Corbera River (La Hermida village). Thus, this subaction was finally discarded.

C1.5. Camarmeña channel covering (REPSOL). This subaction was finished in nov-2021. The project involved covering the section of the Camarmeña hydroelectric channel located between PK 7+768 and PK 7+858 with a mixed structure composed of 1.00 mm thick galvanized steel corrugated sheet (60 mm rib) and reinforced concrete HA-25/P/20/IIa. As a result, 310 m² of the channel (approx. 100 lineal m), where wild animals frequently fell accidentally, were covered, eliminating a hazard for wildlife conservation within the PENP limits.

C1.6. Improvement of W. radicans populations (UC-IHC, FIHAC & CAMBERA). Six new colonies of this CI fern were established in the Sella and Deva-Cares river basins. In sep-2020 we collected 140 bulbs from 4 wild populations of this species. Bulbs were germinated in a plant nursery, resulting in 98 plants used to create the new colonies. To select suitable sites for the new colonies, a potential distribution area for this species was estimated. This analysis identified suitable habitats as areas dominated by native atlantic forests, with altitudes < 565 m. and not oriented to the south (Fig. 7). Field visits were conducted to verify the suitability of several locations for hosting populations of this species. In sep-2021, ferns were planted at 6 sites (Ponga, Casaño, Tanarrio, Basieda, Cimiano and Navedo), establishing the 6 new colonies of *W. radicans* (Fig. 10).

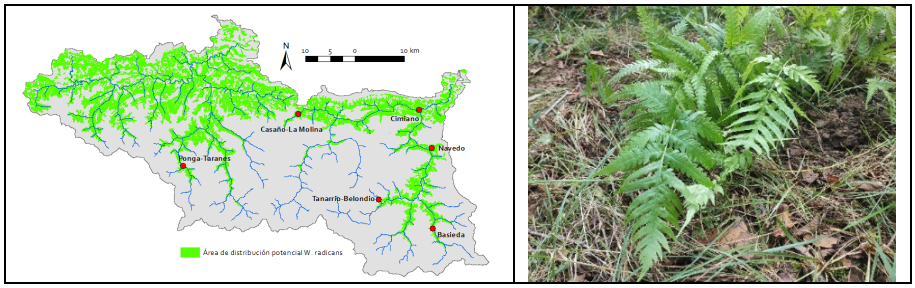

Figure 10. Potential distribution area for *W. radicans* and location of the new colonies with one of the ferns in Navedo.

Final visit letter - Issue 10. This question is answered above, in the description of the subaction C1.3.

Compare with planned output and time schedule. C1.1 was initially expected to be completed in dec-2022 but was postponed until feb-2024. This delay was primarily due to the time required to obtain the environmental permits, ensuring that the necessary works to do this subaction would not cause damage to other habitats of CI identified in this river section.

Indicate if action was modified and any correspondence with CINEA approving the changes. The most significant modifications to this conservation action were mentioned earlier in the description of subaction C1.3 and C1.4. Regarding the budget, there were cost overruns in the execution of C1.3, primarily due to the increase in wood prices for fencing, driven by the high inflation in recent years. In C1.5, the costs doubled from our initial estimate, reaching €82,000 instead of the projected €40,000. This overrun was caused by the challenge of working in a high mountain area, where the use of helicopters was finally required.

Indicate major problems/drawbacks, delays, including consequences for other actions. The main issues, delays and cost overruns were outlined above. No other conservation actions were affected by these problems within action C1.

Action C2. Restoration of aquatic habitats associated to springs and wetlands.

The development and results of subactions included within C2 can be seen in *Deliverable D1. Evaluation of the results of restoration actions carried out in C1 and C2,*

Subaction C2.1. Solutions to sediment runoff from settling mining ponds in the Duje River (UC-IHC, FIHAC & ITAGRA). This subaction included 3 different tasks (Fig. 11): 1) Construction of a containment dike to stop the carry of sediment from the mine to the Duje river mouth by runoff processes. This dike was finished in jun-2022. One year later, we have estimated that this dike has contained 250 m^3 of sediment, 2) Installation of wood sheet piles to stop the erosion in the gullies of the mine´s sediment pond. This task was finished in june-2022. However, a big rain and snowmelt event occurred in spring-2023 broke all the wood piles, so they had to be removed in summer-2023. Therefore, the result of this task was not successful. 3) Livestock exclusion perimeter fencing (>500 m perimeter) to promote vegetation development in the sediment pond to reduce the runoff processes. This task was successfully finished in summer-2023. However, part of the fence was vandalized and the electric shepherd was stolen. In 2024 all the fence perimeter was repaired and the electric shepherd was replaced with a new one with a reinforced design.

Figure 11. From left to right, containment dike, broken wood sheet piles and livestock exclusion fencing.

Along with these works, 6.2 tons of metal waste scattered across the mining pond, as a result of mining activities, were collected and transported to a waste treatment facility (cables, drums and other metal debris; Fig. 12).

Figure 12. Metal waste removal and transport from the Las Mánforas mining pond.

C2.2. Fuente Dé spring integral restoration (ITAGRA, FIHAC & UC-IHC). It is worth noting that this subaction could not be finally done. Although a technical project was developed and the necessary permits were obtained from the different administrations (Government of Cantabria and the Confederación Hidrográfica del Cantábrico)), as well as the approval of the Espinama Local Council, an agreement with the Parador of Fuente Dé (Paradores del Estado), owner of the plot where part of the work had to be carried out, could not be reached. It is important to highlight that there was a lengthy communication process with the Director, initially, and then the Directress of the Parador. Although both initially showed willingness to carry out this action, the legal services of Paradores del Estado did not finally approve the

intervention on the referred plot. It is also important to indicate that the technical project to execute this subaction was redacted by DIVAQUA. We also dedicated a great effort in the process to get the permits and present the project to public administrations and local population.

C2.3. Restoration of 5 springs and 5 wetlands (PRINCAST, JCyL, FIHAC & CAMBERA). Under this subaction *7* wetlands and 1 spring with habitats of CI (*e.g.* 7140, 7230, 7110* or 7120) were protected with fences (Fig. 13). To avoid problems with local farmers we also carried out compensatory measures by doing an integral reparation of livestock fences and vegetation selective clearings. This subaction included the 3 regions of DIVAQUA:

1) Cantabria: 2 wetlands were protected with fences in Las Salgardas. Close to this place 3 livestock fences were repaired.
2) Asturias: 2 wetlands and 1 spring were protected with wood fences in Vegacomeya, where 1 livestock fence was completely repaired. Due to the positive results observed in the monitoring visits, PRINCAST will protect the Toyeyu wetland, close to Covadonga lakes, along 2025 with own funds.
3) Castilla y León: 3 wetlands were protected (2 in Vegabaño and 1 in Pedavejo) and 1 livestock fence was repaired in Pedavejo.

Figure 13. Wetlands protected by fences in Cantabria (Las Salgardas), Asturias (Vegacomeya) and León (Vegabaño).

C2.4. C.2.4. Installation of amphibian ramps at 15 cattle water troughs (PRINCAST, JCyL, FIHAC & CAMBERA). It is worth mentioning that this sub-action has gone far beyond the original scope of the DIVAQUA proposal, mainly for two reasons:

1) The work carried out has been far more ambitious than initially planned. These efforts went beyond the simple installation of amphibian ramps. Thus, a design proposed by DIVAQUA was applied to the most of these cattle troughs, creating a basin protected by a metal grid to prevent the complete drying out of at least part of these troughs (Fig. 11). Additionally, when necessary, other types of work were carried out to ensure both livestock and the ecological functionality of these small mountain hydraulic infrastructures (*e.g.*, waterproofing).
2) Ramps for amphibians were also installed in 11 firefighting water tanks belonging to the Government of Cantabria. This activity, not initially planned, was carried out following a request from the Cantabria Government's ranger service.

Finally, 6 water troughs and ramps for amphibians in 11 firefighting water tanks were done in Cantabria, 13 water troughs, some of them newly built, were done in Asturias (PRINCAST did these works with funds out of the LIFE program, although using the DIVAQUA) and 7 water troughs were restored in León.

Figure 14. Example of restored water troughs in Cantabria, Asturias and León.

Compare with planned output and time schedule. C2.1. was finished later than expected due to a delay in permits and also because it was necessary to do the different works in different periods, from 2021 to 2024.

Indicate if action was modified and any correspondence with CINEA approving the changes. The execution of C2.1 incurred cost overruns, primarily due to increased raw material expenses and the repairs necessitated by vandalism of the fence and the electric shepherd system. The initial budget for the technical project and subsequent works in C2.1 was €47,000, but the final costs amounted to €65,000. Other important costs not included in the original budget were those related to the compensatory measures (reparation of livestock fences and selective clearings), along with other smaller expenses for installing ramps in water tanks and maintaining fences.

Indicate major problems/drawbacks, delays, including consequences for other actions. As explained above, main problems were related to the execution of C2.2, which was finally discarded. Other important problems were related with C2.1, because this place is located in a high mountain area, very difficult for working, and also by the vandalism acts.

Action C3. Improving the longitudinal connectivity of Deva River.

The development and results of all the subactions included within C3 can be seen in *Deliverable D2. Evaluation of the results of restoration actions carried out in C3 and C4.*

C3.1. Puentellés dam removal (ITAGRA, CAMBERA & UC-IHC). Successfully finished in sep-2022 (Fig. 15). This subaction was proposed to reverse the migratory flow of salmons and increase the number of individuals heading towards the Deva River, expanding the potential distribution area of *S. salar* by 155 km² (21 km. of the main river channel).

Figure 15. Works on Puentellés dam (sep-2022). River section before and after the dam removal.

C3.2. Ferrería de Ojedo dam removal (ITAGRA, CAMBERA & UC-IHC). Successfully finished in sep-2021 (Fig. 16). With this action it is expected that the distribution area of *S. salar* increases by 156 km^2 (the Bullón river basin area), that is, 20 linear km of river channel, because this dam supposed one of the distribution limits for salmons in Deva-Cares basin.

Figure 16. Works on Ferrería de Ojedo dam (sep-2021) and the river section after the dam removal.

C3.3. La Depuradora dam removal (ITAGRA, CAMBERA & UC-IHC). This removal was done in two different steps, in sep-2021 and oct-2022 (Fig. 17). This action can increase the distribution area of *S. salar* increases by 150 km^2 (20 km of channel in Deva river), because this dam supposed one of the distribution limits for salmons in Deva-Cares basin. In this regard, following the completion of the first step in 2021, a salmon was captured upstream of this location for the first time in 2022, followed by two more in 2024 (see action D2 below).

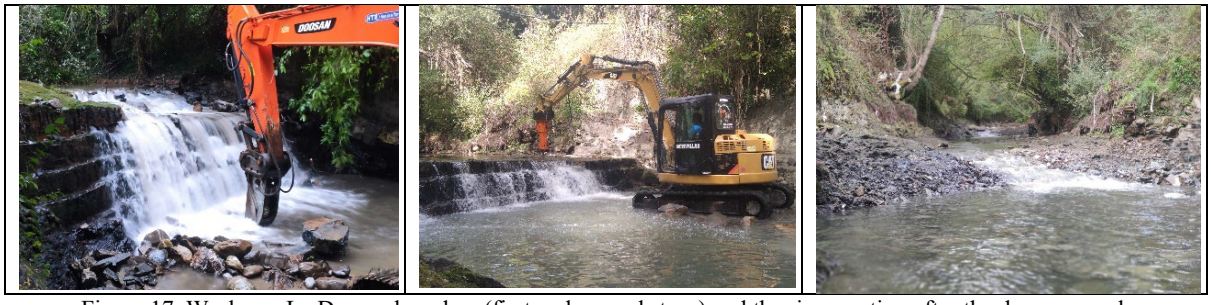

Figure 17. Works on La Depuradora dam (first and second steps) and the river section after the dam removal.

C3.4. Sotama dam removal (ITAGRA, CAMBERA & UC-IHC): Successfully finished in oct-2023 (Fig. 18). This dam had no fish passage. While it was relatively passable during high flow periods, it posed significant challenges for various fish species during low flow conditions.

Figure 18. Works on Sotama dam (oct/2023). River section before and after the dam removal.

C3.5. Improvement of Urdón fish passage (REPSOL & ITAGRA)*:* This subaction was modified from the original proposal. Since it was not possible to work directly on the fish passage to improve its functionality, an alternative solution was selected to achieve similar results. Ultimately, the work was carried out on the release channel (aug-2022), where a 0.4 x 0.8 m bottom opening was created to increase water flow through the fish passage, enhancing the fish attraction and raising the river level at the passage´s entrance, with the ultimate goal of reducing the access jump for fishes (Fig. 19).

Figure 19. Works on Urdón dam (aug-2022).

Compare with planned output and time schedule. C3.4 and C3.5. were slightly delayed respect to the original schedule, although it did not suppose any special problem in the development of other actions, neither in the objectives of the project.

Indicate if action was modified and any correspondence with CINEA approving the changes. The most significant cost overrun occurred in C3.3, because this subaction had to be completed in two different phases, in 2021 and 2022, increasing the cost from the expected €24,500 to a final expenditure of €35,000. Another overrun occurred in C3.5, where the final cost was €5,000 higher than initially estimated. Additionally, other costs were not included in the initial proposal, such as fish rescue operations before dam removal works (€1,500*5=€7500).

It is worth noting that during DIVAQUA, we identified another important barrier to fish movement in the Cares basin: the Niserias weir, currently used for hydropower production. Although it was ultimately not possible to intervene directly on this infrastructure, DIVAQUA (ITAGRA) undertook an assessment of the obstacle and prepared a technical project aimed at improving the permeability of the Niserias weir. The cost of this work, which was not included in the initial project budget, amounted to €12,500.

Indicate major problems/drawbacks, delays, including consequences for other actions. As explained above, the main problems were related to the project planned for C3.5, which could not be carried out. Therefore, an alternative technical solution was selected to achieve results similar to those initially expected.

Action C4. Improving the connectivity in Sella and Cares rivers.

The development and results of all the subactions carried out within C3 are described in *Deliverable D2. Evaluation of the results of restoration actions carried out in C3 and C4*.

C4.1. Improvement of Poncebos fish passage attraction and entrance (REPSOL & ITAGRA). This subaction successfully finished in oct-2022 (Fig. 20). All the works were carried out in accordance with the initial project, but including the following adaptations: 1) Regarding works on the last pond of the fish passage, only 1 spillway has been constructed instead of the 2 originally planned. Since the elevation could not be lowered, the effective depth of the last pond was considered too small if two spillways (*i.e.* 3 ponds) were executed, 2) A buffer basin was constructed at the exit of the fish passage and 3) The water intake chamber for the pipeline in the fish passage has not been built due to space constraints. This issue was resolved by installing the pipeline intake directly, in the pond.

Figure 20. Works on Poncebos fish passage (oct/2022).

C4.3. Fish barrier in Camarmeña diversion channel (REPSOL)*:* This subaction finished in apr-2022. The electric barrier finally installed supplies an electric current flow that is unpleasant for fishes (Fig. 21), forcing them to move upstream and avoiding their entrance in the hydroelectric diversion channel. The voltage of this equipment is adjustable depending on the water conductivity, with the Cares River having acceptable values within the operating range of the equipment. The estimated electrical consumption of this barrier is below 1 kW, which is easily supported by the electrical connection to the technical room of the Caín weir.

Figure 21. Caín hydroelectric dam and the electric barrier installed to avoid the entrance of fishes in the diversion channel.

C4.4. Improvement of Caín dam fish passage (REPSOL & ITAGRA): as indicated above, this subaction was finally not done because JCyL secured other funds from the Spanish Government to implement a more comprehensive project than the one proposed in DIVAQUA. However, the engineering project for this subaction, along with all the preliminary studies and

permits, was completed under DIVAQUA. It is expected that the execution of this improvements with the new funds will be done along 2025.

C4.5 Connectivity improvement of Restaño Dam, Dobra River (ALTANO). This subaction replaces other discarded subactions in DIVAQUA (see the third amendment signed in may-2023) and was finished in apr-2024. Following the technical project proposed by ALTANO, the DIVAQUA beneficiary owner of this facility, and responsible of this subaction, the construction of a reinforced concrete fish passage at the Restaño dam was executed (Fig. 22). The purpose of this subaction is to establish a fish passage system that enables the longitudinal migration of fishes in the Dobra River, at the Restaño weir.

Regarding the **Isue 11 of the final visit letter** the engineering company that redact the final technical project of this subaction (INCENERSA) indicates:

1. The completed fish passage maintains the same typology and fundamental characteristics as the one proposed by the project DIVAQUA team, with the exception of enhancements introduced in the latest design, which improve its efficiency.
2. The project drafted by INCENERSA ensures the upstream migration of the fish species present in the section of the Dobra River where the fish passage is located (salmonids).
3. The project drafted by INCENERSA does not reduce the drainage capacity of the Dobra River, even during 500-year flood events.
4. According to the Environmental Document included in Annex 3 of the project's report, (see Deliverable D2) the potential environmental impact of the fish passage construction works is considered to be moderate.

Figure 22. Construction works of Restaño dam fish passage and finished passage (apr-2024).

Compare with planned output and time schedule. C4.5 was completed in the final months of the project, because this subaction was not initially planned. Moreover, the beneficiary responsible for this action, ALTANO, joined DIVAQUA later in the process, replacing NAVARRO, so they needed time to adapt to the LIFE program's conditions and administrative requirements.

Indicate if action was modified and any correspondence with CINEA approving the changes. **Regarding the Issue 12 of the final visit letter**, all of these subactions experienced cost overruns, primarily due to the challenge of working in a high mountain area. Additionally, the original budgets underestimated certain costs, services and solutions that were ultimately implemented. For example, works done to improve the fish passage of Poncebos were budgeted in €22,000, while the final cost was €64,000, although in this case the executed works improved the initial proposed project. The costs to install the electric barrier (C4.3) were also higher than initially expected, increasing from €22,000 to €36,000.

Following with the Issue 12 and also to respond the Issue 11, it is important to note that the initial budget for the Restaño project (subaction C4.5; May 2021) was ultimately lower than the final execution costs (2023–2024). This discrepancy was primarily driven by the inflationary environment in Spain and Europe, which led to rising prices for energy and materials. Consequently, the final budget exceeded the initial estimates due to cost increases across various items. The most significant increases were: 1) "Excavations and Fills": an increase of €35,000, 2) "Main Body (Troughs)": an increase of €19,000 and 3) "Complementary Elements": an increase of €21,000.

Additional increases in project costs resulted from modifications implemented during the construction phase. These changes, as outlined in the final construction report prepared by the third-party engineering firm Qanat (see Deliverable D2), were essential to overcome challenges and ensure the project's success. The key modifications made during construction included:

1. Redesign of the Inner Wall: Initially, the natural slope on the right bank of the Dobra River was planned to serve as part of the fishway's inner wall. However, excavation revealed risks of detachment and collapse, necessitating the construction of the entire inner wall using conventional methods.
2. Restoration of a Wooden Fence: Following a requirement from the PNPE Director, a wooden fence was reinstated to prevent animal access to the fishway. This measure was critical for safeguarding both the infrastructure's functionality and local wildlife.
3. Construction of a Concrete Wedge and Road Repairs: The same directive highlighted the need for a concrete wedge to facilitate road access to the bridge. Additionally, repairs were required for a damaged section of the road, which had deteriorated due to heavy truck traffic during construction.
4. Installation of a Slide Gate Valve: Although a slide gate valve was included in the project to regulate water flow, it was not installed by the contractor due to delays in procurement. The responsibility for acquiring and installing the valve laid with Altano Hydro, which completed this action.

These modifications, though essential for addressing environmental conditions and operational needs, resulted in significant cost increases due to additional construction requirements, unforeseen works, and rising material prices.

Indicate major problems/drawbacks, delays, including consequences for other actions. Apart from the problems indicated above, the main drawback was, in fact, an opportunity. Although all the previous technical and administrative tasks were done to execute subaction C4.4, this subaction was finally cancelled in DIVAQUA, because JCyL secured more funds from other Spanish Government program to implement a more comprehensive project, which is expected to be executed in 2025.

Action D1. Monitoring the results of C1 and C2.

The monitoring results of C1 and C2 are described in *Deliverable D1. Monitoring and assessment of Conservation Actions C1 and C2*.

Subaction C1.1 (CAMBERA & FIHAC). Due to delays in implementing this subaction, completed in feb-2024, the proposed monitoring plan, using satellite imagery and spectral signal analysis, could not be executed. The limited time since planting has not allowed the vegetation to mature enough for evaluation with these methods. Instead, a field visit in may-2024 confirmed proper maintenance across all plots, with no signs of failure in the planted trees. It is therefore expected that the riparian alder-ash habitat (91E0*) will establish successfully in the five restored plots and potentially expand over 2.1 km section of the Cares River in subsequent years.

Subaction C1.3 (FIHAC & PRINCAST). Since the actions ultimately excluded road drainage works and vegetation management on slopes near the Lakes, sediment traps were not installed along the shores to assess runoff. Instead, field monitoring reports from jun-2023 and sep-2024 detail the conservation status of the Ercina lake peatlands and La Mina pond, after the installation of the protection perimeter fencing. These reports compare the current condition of CI habitats in these lakes with a botanical survey done prior to the action, in may-2021. Monitoring results highlight a significant improvement in plant communities and CI habitats (3140, 7140 and 7230) within the areas protected by fences.

Subaction C1.5 (FIHAC). In the most recent visit, it was observed that the infrastructure is in good condition, showing no deterioration signals (jun-2024). However, its degree of naturalization is not as good as expected, likely due to the materials used in these works (concrete). Nonetheless, it is hoped that, over time, vegetation will be able to develop along this section of the channel without compromising its functionality.

Subaction C1.6 (FIHAC, UC-IHC & CAMBERA). The monitoring of the new 6 colonies of *W. radicans* was done in 6 different field visits (jan-2022, jun, sep and nov-2023, and apr-2024). We can conclude that all the colonies have been successfully developed in this period, showing new reproductive structures, such as bulbs (Fig. 23), in the last visits, although Cimiano and Basieda´s colonies showed some deterioration signals. For a more detailed description see *Deliverable D1. Monitoring and assessment of Conservation Actions C1 and C2*.

Figure 23. Vegetative and reproductive structures in the ferns of the six new colonies, indicative of their good development (bulbs, sori and new fern growing up from a bulb). Pictures were taken in the different monitoring visits.

Subaction C2.1 (FIHAC & UC-IHC). This subaction had 3 different tasks: 1) Containment dike: we have estimated that this dike has contained 250 m^3 of sediment just in one year, although this facility it is currently filled (Fig. 21). 2) Wood sheet piles: A big rain and snowmelt event in spring 2023 broke all the wood piles, so they had to be removed in summer 2023. Therefore, the result of this task was not successful. 3) Livestock exclusion perimeter

fencing. This task was successfully finished in summer 2023. However, part of the fence was vandalized and the electric shepherd was stolen. In 2024 all the fence was repaired and the electric shepherd was replaced with a new one installed in a reinforced steel case (Fig 24).

Figure 24. Sediment retained by the containment dike and the new electric shepherd installed in a reinforced steel case.

Subaction C2.3 (FIHAC). To monitoring the results of this action a field botanic characterization of protected wetlands (and other taken as control) was done before the action was carried out (initial status; may-2021) and after it finished (sep-2024). The botanical final report indicates a "spectacular improvement" of the plant communities and the CI habitats (*e.g.* 7140, 7230, 7110* or 7120) in wetlands protected by this subaction in these wetlands (see deliverable for a more detailed description of these results).

Subaction C2.4 (FIHAC, UC-IHC, CAMBERA & CSIC). The conservation status of the 7 cattle water troughs improved in Cantabria was assessed during field visits conducted in sep-2023 and jun-2024. Overall, the modifications made to most of the water troughs were found to be in good condition. However, in two of them, the metallic grids were stolen. In these cases, the stolen grids were replaced with new ones. The monitoring of the 7 water troughs in León was conducted in jun-2024. All 7 troughs were found to be in good condition and functioning effectively. Meanwhile, of the 12 water troughs improved in Asturias through funding outside of DIVAQUA (6 newly constructed and 6 upgraded with the DIVAQUA design), two were inspected in jul-2024 to evaluate their conservation status and functionality. Both inspected troughs were determined to be in satisfactory condition and functioning well.

All this monitoring work was completed through the analysis of water and sediment samples using the environmental DNA technique (eDNA) to identify aquatic species of interest for the management of the DIVAQUA area, before and after the implementation of subactions C1.3, C2.3 and C2.4. These analyses were used to identify the presence of 24 species, including important species for conservation, invasive species and pathogens (bacteria and fungi). However, due to improvements made to this technique for analysing samples from the 2023 campaign, the results obtained after the execution of these subactions are not comparable to the results corresponding to 2020 and 2021 (see results in *Deliverable D1. Monitoring and assessment of Conservation Actions C1 and C2*).

Compare with planned output and time schedule. Due to a delay in the execution of some of the conservation actions of C2.3 and C2.4 that finished in 2023 and even 2024 (some water troughs in Asturias) it was not possible to perform monitoring with eDNA the results of some conservation actions, and monitoring activities occurred with some delay as a consequence.

Indicate if action was modified and any correspondence with CINEA approving the changes.

We modified the monitoring of action C1.1. because it was not possible to monitor this action using satellite imagery and spectral signal analysis, due to the delay in its implementation. Also, for some conservation actions of C2.3 and C2.4 we lack eDNA data from some wetlands and cattle drinking troughs because some of them were executed during 2023 and even 2024, so it was no time to perform fieldwork and laboratory analysis.

Indicate major problems/drawbacks, delays, including consequences for other actions.

The eDNA monitoring action results were delayed because we encounter some problems in the laboratory analysis. Some of the samples were inhibited, and quantity and quality of DNA were very poor. We had to reanalyse these samples using anti-inhibitors kits. We also have encountered some issues during sequencing. We have applied a novel technique, sequencing of long fragments using Oxford Nanopore Sequencing Technique (ONT) and it took us time to adjust and make trials of optimum number of sequences per run. For the samples of 2022 and 2023 we counted on with a more powerful sequencing device, and we performed the sequencing with it (PromethION). We later on found out that due to this change in the sequencing device the results obtained after the execution of these subactions were not comparable to the results corresponding to 2020 and 2021 preparatory campaigns.

Action D2. Monitoring the results of C3 and C4.

The monitoring results of C3 and C4 are described in *Deliverable D2. Monitoring and assessment of Conservation Actions C3 and C4.*

Monitoring of subactions C3.1-3.4 (FIHAC & UC-IHC). Carried out through the analysis of 1) hydromorphological indicators, 2) fish fauna and 3) the functioning of river ecosystem (*i.e.* metabolism). Field data were collected in all 4 cases before and after weir removal. Results show how sediments accumulated upstream of each weir were mobilized and transported to downstream sections after demolitions (Fig. 25). Regarding fish community, the presence of salmon (*Salmo salar*) upstream of La Depuradora Weir (Potes) after its removal (C3.3) is noteworthy, as this weir represented one of the distribution limits of this species in the basin. These salmons were reported in 2022 and 2024. In terms of river functioning, the estimation of metabolism indicates a reduction in heterotrophy post-demolition, leading to lower CO_2 emissions from the water column to the atmosphere. Additionally, an increase in chlorophyll-a and epilithic carbon was observed in sections with larger basin sizes due to the increment of light reaching the benthos after weir removal. Contrary, the opposite pattern was observed in small rivers, where a higher percentage of shade over the channel limits the light incidence.

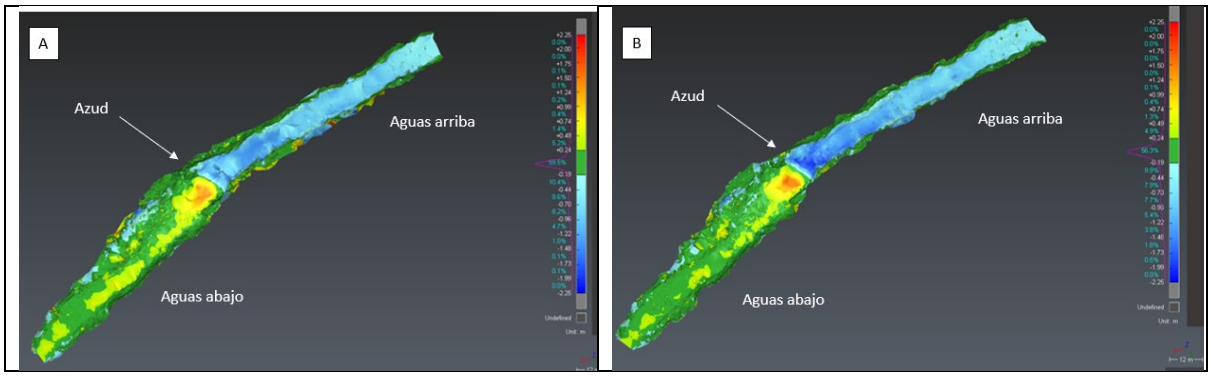

Figure 25. Post-demolition mesh (A: Phase 1 and B: Phase 2) of the La Depuradora weir (Potes) based on the loss or gain of elevation, compared to the pre-demolition situation.

Monitoring of subaction C3.5 (ITAGRA). The effectiveness of this subaction was evaluated with an in-situ assessment of the infrastructure by ITAGRA´s technicians in jun-2024. The main conclusions were that the measures implemented to improve the attraction of the fish passage are considered positive and appropriate, as they increase the flow at the base of the fishway while simultaneously reducing attraction in the discharge area of the channel. Moreover, this increased flow at the base of the fishway also reduces the drop between the river and the fishway entrance. However, it is necessary to emphasize the need for a deeper understanding of the fishway and for improvements that could enhance its efficiency: 1) A detailed analysis of actual fish passage through the fishway is recommended, as this aspect has not been evaluated, and it is necessary to verify its suitability for the target species, 2) Guidelines for managing the fishway should be established, tailored to the flow rates in the affected river section, to ensure the continuous and proper functioning of the system, and 3) The implementation of complementary measures should be considered, focusing on reducing the drop at the fishway entrance, which remains challenging

Monitoring of subaction C4.1. (ITAGRA & FIHAC). This monitoring work, conducted before and after the subaction, evaluated fish success in overcoming the obstacle by analysing the percentage of fish able to pass it and the time required to do it. Fishes were marked with PIT tags (Fig. 26), and the passage was equipped with cameras and antennas to track successful crossings and timing. Results indicate that this subaction has improved fish attraction and access by reducing the water drop at the obstacle. The lower section of the fish passage,

previously the most problematic one, now exhibits enhanced conditions for fish ascent. This enhancement is due to reduced water level differences between pools and an increased volume for energy dissipation, which facilitates fish propulsion (see experiment results in *Deliverable D2. Monitoring and assessment of Conservation Actions C3 and C4*).

Figure 26. PIT-tags, field monitoring station and placement of the PIT in the intraperitoneal cavity of a trout.

All this work was completed through the analysis of water and sediment samples using the environmental DNA technique (eDNA) to identify aquatic species of interest for the management of the DIVAQUA area, before and after the implementation of subactions C3.1, C3.2, C3.3, C3.4, C3.5, and C4.1. These analyses were used to identify the presence of 24 species, including important species for conservation, invasive species and pathogens (bacteria and fungi). However, due to improvements made to this technique for analysing samples from the 2023 campaign, the results obtained after the execution of these subactions are not comparable to the results corresponding to 2020 and 2021 (see results in *Deliverable D2. Monitoring and assessment of Conservation Actions C3 and C4*).

Monitoring of subaction C4.3. (REPSOL). The effectiveness of this subaction was monitored using rescue fishing data from the Camarmeña and Arenas channels (control case), with data available since 2017 (Fig. 27). However, the electric barrier was only activated in apr-2022, and there is insufficient data to draw definitive conclusions on its success. Moreover, data after the electrical barrier installation were not representative due to two main factors: 1) A landslide damaged the Camarmeña channel in feb-2022 and 2) although the barrier was operational in apr-2022, it initially lacked remote monitoring, meaning interruptions in its operation could not be ruled out. In sep-2023 the system was upgraded to enable remote monitoring, but testing is still ongoing. Given these factors, the monitoring data are not yet robust enough to evaluate the barrier's effectiveness in preventing or reducing fish entry into the Camarmeña channel.

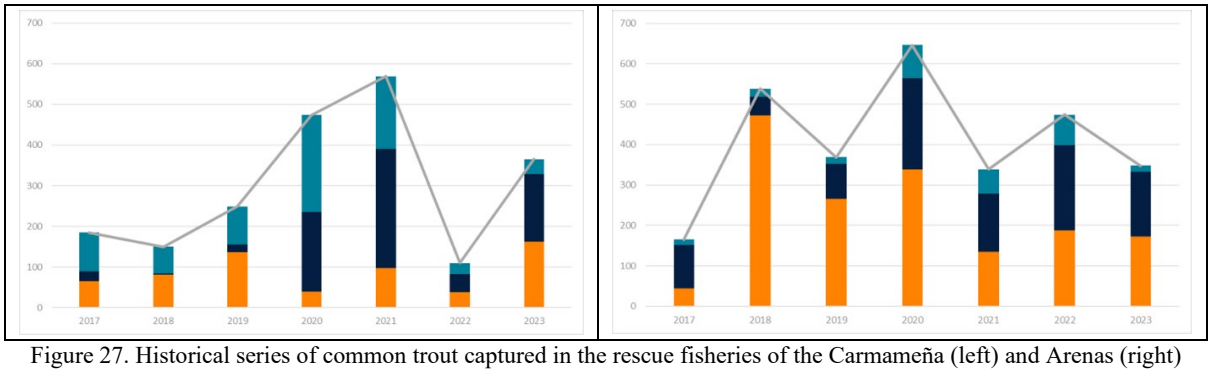

Figure 27. Historical series of common trout captured in the rescue fisheries of the Carmameña (left) and Arenas (right) channels in the 2017-2024 time series (Bar graph; orange= fry, dark blue= subadults and blue= adults).

Monitoring of subaction C4.5. (ITAGRA) The effectiveness of this subaction was not monitored by electrofishing because the works done under this subaction finished in apr-2024, almost at the end of the DIVAQUA project, leaving no time enough to assess the success of

this subaction. Instead, an in-situ assessment of the infrastructure was done by ITAGRA´s technicians in jun-2024. The main recommendations of this evaluation were:

1. Improve the access to the fish passage from downstream to reduce the elevation difference and enhance the resting and propulsion conditions at the fish entrance. Ideally, the fish entrance should be located at the base of the scouring caused by the bridge, as this area tends to concentrate fish during their upstream movement.
2. Reducing the water drop in the downstream-most pool and increasing its depth.
3. Ensuring submerged water flows rather than free falls between all pools, including the fishway entrance and exit.
4. Increasing the flow through the passage device, as the current flow is insufficient.

Compare with planned output and time schedule. The output of the monitoring of the results of actions C3 and C4 was in compliance with the expectations. The delay mainly occurred in the evaluation of the fish passages improved due to the delay in subaction C4.5. We have published a scientific paper with the evaluation of Poncebos fish passage (subaction C4.1) https://www.mdpi.com/2073-4441/14/17/2750. The monitoring with eDNA results also came with some delay, se explanation below.

Indicate if action was modified and any correspondence with CINEA approving the changes. The monitoring of actions C3 and C4 was not modified.

Indicate major problems/drawbacks, delays, including consequences for other actions.

The major delay resulted in getting the final results of the eDNA monitoring of the conservation actions. As it was explained in action D1, some of the samples were inhibited, and quantity and quality of DNA were very poor. We had to reanalyse these samples using anti-inhibitors kits. We also have encountered some issues during sequencing. We have applied a novel technique, sequencing of long fragments using Oxford Nanopore Sequencing Technique (ONT) and it took us time to adjust and make trials of optimum number of sequences per run. For the samples of 2022 and 2023 we counted on with a more powerful sequencing device, and we performed the sequencing with it (PromethION). We later on found out that due to this change in the sequencing device the results obtained after the execution of these subactions were not comparable to the results corresponding to 2020 and 2021 preparatory campaigns.

Action D3. Monitoring and assessment of socioeconomical and ES impact.

All the subactions proposed within D3 were successfully finished and all the deliverables are available in BUTLER.

D3.1. Evaluation of the socio-economic impact of DIVAQUA (FIHAC & UC-IHC). To evaluate changes in the perception of aquatic ecosystems over a four-year period, telephone interviews and an open online questionnaire were conducted in 2020 and 2024. To enable a meaningful comparison on the project's key issues, most questions in the 2024 questionnaire were derived from the 2020 version. The analysis of these recurring questions provided the most significant insights. Based on the results of this consultative work, we can primarily conclude that:

- During the DIVAQUA project, the perceived importance of all aquatic ecosystems has increased, with the exception of lakes and lagoons, where the decline has been minimal.
- Perceived knowledge of the four types of aquatic ecosystems has grown significantly, particularly for springs, watering troughs, ponds, and wetlands, which saw an increase of over 10%.
- Survey respondents now recognize a greater impact of climate change on aquatic ecosystems than they did four years ago, and there is a stronger sense of urgency to take action (Fig. 28).
- The perceived potential of aquatic ecosystems as an economic resource has risen significantly in recent years, according to respondents.
- DIVAQUA has made a notable contribution to outreach and awareness-raising efforts regarding the ecosystems and aquatic biodiversity of the target area.

<table>
<tr><td></td><td colspan="3">Año 2020</td><td colspan="3">Año 2024</td></tr>
<tr><td></td><td>Telefónicas</td><td>Online</td><td>Media</td><td>Telefónicas</td><td>Online</td><td>Media</td></tr>
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<tr><td>Lagos y lagunas</td><td>8,2</td><td>8,5</td></tr>
<tr><td>Charcas y humedales</td><td>8,1</td><td>8,6</td></tr>
<tr><td>Manantiales y abrevaderos</td><td>8,1</td><td>8,5</td></tr>
<tr><td>Media</td><td></td><td></td><td></td><td>8,17</td><td>8,47</td><td></td></tr>
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Figure 28. Capture of image of the *Deliverable D3 Quantification of the socioeconomic impact of DIVAQUA* showing the results of the question about the effects of climate change on aquatic ecosystems (from 0= no effects to 10=very important effects).

D3.2. Assessment of ecosystem services in the DIVAQUA space (FIHAC & UC-IHC). Under this subaction different analyses were carried out to asses several ES in the DIVAQUA area. Each one of these ES was modelled, assessed and represented with a map, for two different time periods, representing 1- the current situation and 2- a future scenario according to RCP8.5. The ES modelled in DIVAQUA were 1) Hydrological regulation: hillside runoff, 2) Hydrological regulation: water storage capacity in the floodplains, 3) Freshwater supply, 4) Regulation of erosion, transport and sedimentation in aquatic systems, 5) Regulation of river water temperature and 6) Cattle grass provision (see a detailed description of the results for the different ES considered in *Deliverable D3. Mapping the current ES under the structural and connectivity patterns of aquatic ecosystems in DIVAQUA area*).

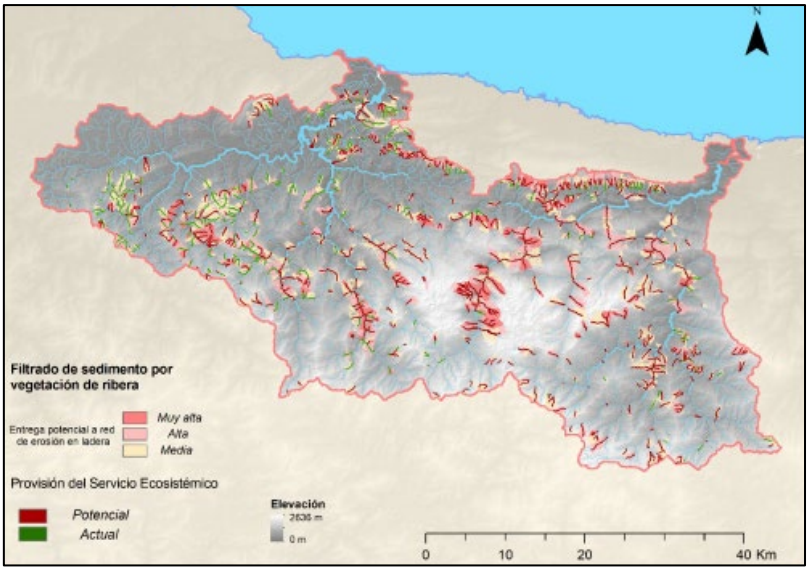


Figure 29. Map for the SE of sediment filtration by the riparian vegetation in the current scenario represented as erosion rate and sediment transport.

D3.3. Synthesis of socioeconomic impacts and impact on service provision ecosystems (FIHAC & UC-IHC). To conduct this assessment, a conceptual model has been applied, focusing on the interactions between abiotic and biotic flows within river basin ecosystems. This model identifies 3 key ecosystem components: 1) the intensity of abiotic flows, 2) patterns of biodiversity and 3) ecosystem functioning indices. The methodology involves both, qualitative assessments and quantitative modelling of specific ES dependent on vegetation cover and climate conditions, such as water provision and erosion regulation.

Results indicate a generally positive impact of DIVAQUA interventions on ES, particularly in restoring longitudinal connectivity within the river network, benefiting both, salmonid populations and sediment transport. However, the production of pasture may suffer due to competition with newly established woody species. The evaluation also highlights significant future transformations in ES provision, particularly a decrease in freshwater availability and pasture production, alongside improved runoff and erosion regulation due to projected forest expansion.

Overall, the findings underscore the complexity of interactions between human interventions and river ecosystems, emphasizing the need for holistic planning and management strategies for future restoration and conservation efforts (see a detailed description in *Deliverable D3: Generation of future scenarios for provision and demand of ecosystem services*).

This action was carried out without significant changes, not overspending in relation to the approved budget and we did not find any special problem for the development of this action.

Action D4. Evaluation of performance indicators

The DIVAQUA Key Performance Indicators (KPIs) outlines the achievements and outcomes of the DIVAQUA project. The KPIs are divided in three categories:

- Project setting, area/length and population
- Environmental and climate action outputs and outcomes
- Societal outputs and outcomes
- Economic outputs and outcomes

Project setting area/length and population: DIVAQUA project have performed conservation actions in lotic and lentic ecosystems within the 2000 Natura network. Regarding lentic water bodies, DIVAQUA has performed conservation actions in 50.91 ha, aiming at improving water quality and restoring priority habitats. In lotic water bodies, DIVAQUA performed conservation actions in 120 km of rivers within the Deva-Cares and Sella basins.

The humans that have been influenced within the project has been divided in three categories:

- Persons who changed their behaviour due to the project actions: During the project, 6 stewardship agreements have been achieved and 12 people have participated directly in these agreements (see deliverable D4- Technical document with the results of Key Performance Indicators (KPIs)).
- Persons whose lives were directly, positively impacted by MAIN envir. actions of project: In action D3, we have performed surveys (telephonic interviews and online questionnaires) to identify the perception of DIVAQUA project and the level of knowledge and awareness of environmental problems in the DIVAQUA area at the beginning and at the end of the project. During the final interviews (41 interviews) we found that around 50% of people interviewed knew about the conservation actions carried out in DIVAQUA and evaluated positively the impact of all conservation actions with a mean value of 7.6 from a maximum of 10.
- Persons who may have been influenced via dissemination: During DIVAQUA project, we have carried out several workshops, seminars and dissemination activities to rise ecological awareness within the DIVAQUA area. A summary of the persons reached via dissemination is in the deliverable D4- Technical document with the results of Key Performance Indicators (KPIs). Taking in account all the participants of communication actions we have a total number of 15,878 persons who may have been influenced.

Environmental and climate action outputs and outcomes: There are several KPIs involved in this section.

- The aquatic extent affected by the pressure or risk addressed: Regarding lentic ecosystems we have reduced the pressure addressed from 170.50 ha to 119.59 ha. In the case of lotic ecosystems, we have reduced the pressure addressed from 193.00 km to 73.00 km.
- Dam, barriers and locks: We have removed 4 dams from 99 originally present in the Deva-Cares and Sella basins, and we have restored 3 from 26 fish passages present in the area.
- Diffuse source pollution: We have addressed ammonium concentration in Lake Ercina before and after the restoration action took place. We have found a reduction from 10.35 ug/L to 0 ug/L. However, we believe is still very early for reporting and seeing real differences before and after restoration, because the measurement can vary with the season, temperature, light conditions and livestock present. We will need several measurements after the restoration to be sure this water quality parameter improved. For data details see deliverable D4 - Results of KPIs.
- Natural and semi-natural habitats: We have created 3.3 new ha of priority habitat 91E0* (Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*), and together with the

fact that agricultural practices are being abandoned, we expect an improving habitat trend for 91E0*. In addition, we have restored 5.1 ha of priority habitat 7140 (Transition mires and quaking bogs).

- Wildlife species: We have increased the distribution area of *S. salar*, at least in 20 km, as we have found *S. salar* upstream of the removed weir Depuradora de Potes. From all the records of electrofishing surveys of IHCantabria (surveys carried out since 2012), in 2022 it was the first time we have encountered *S. salar* upstream of this dam. For more details see Deliverable D4- Technical document with the results of Key Performance Indicators (KPIs) and deliverable D4 – Evaluation of Key Performance Indicators (KPIs)). In addition, we have created 6 new colonies of the protected fern *W. radicans*, previously we only knew the existence of 5 colonies.
- Other threats: In subaction C1.5 and C4.3 we executed two conservations actions to protect wild species. In subaction C1.5 we have covered 320m^2 of Camarmeña hydroelectric channel to prevent wild animals from falling. A study conducted by VIESGO, the company responsible for the canal built in 1921, highlighted the negative attraction effect it has on various wildlife species, leading to the fall and death of a considerable number of amphibians and other species of community interest (BSH Consultores, 2008). With the achievement of this action, we have reduced to cero the mortality risk of mammals and amphibians in this channel. In subaction C4.3 we have installed an electric barrier to prevent the entrance of fishes in Camarmeña diversion channel, with the result of also reducing mortality risk for *S. trutta* and *S. salar*. For detailed information of the results of these actions see deliverables ¨D1-. Evaluación del resultado de las actuaciones de restauración realizadas en C1 y C2¨ and D2- Evaluación del resultado de las actuaciones de restauración realizadas en C3 y C4¨. The evaluation of the effectiveness of the electric barrier is still ongoing but the details of the monitoring can be found in this Final Report (action D2) and in the deliverable ¨D4- Evaluación de los indicadores de rendimiento¨.
- Carbon sequestration: In the removed weirs a reduction in post-demolition heterotrophy has been observed (Net Ecosystem Productivity - NEP closer to zero), the river became autotrophic (positive NEP, greater sequestration than carbon emission) which led to lower CO^2 emissions into the atmosphere. The relationship between dammed waters and the emission of greenhouse gases into the atmosphere has been previously described (see references and data in D4- Technical document with the results of Key Performance Indicators (KPIs)) and carries important implications for the management of anthropogenic river barriers in a context of global climate change. Following the data and results of the deliverable ¨D2- Seguimiento de acciones C3 y C4¨ we have obtained that the barrier removal sequester carbon at a rate of 11,826 kg C/ha/year.

Societal outputs and outcomes:

- Involvement of non-governmental organisations (NGOs) and other stakeholders: During the project 5 ONGs, 5 civil society organizations, 7 public bodies, 3 private companies have actively intervened offering support for the execution of the conservation actions, public bodies have visited the weirs after and before removal and gave advices on how to implement the actions, other groups help organizing workshops and seminars, as well as has helped gathering volunteers. (Detailed outcomes can be found in D4- Technical document with the results of Key Performance Indicators (KPIs). In addition, 80 volunteers have been participated in DIVAQUA conservation actions.
- Website: DIVAQUA website was designed from the beginning of the project and open to the public at the beginning of the second quarter of 2020, it can be visited at www.lifedivaqua.com. Contains basic DIVAQUA information and advances through

news. It has an English version. During the project, this website has received 39.479 visitors, 11.191 users and 18.465 open sessions with a trend that has been constantly increasing. Given this trend we expect to increase the number of users in 3.000 more beyond 5 years. All date has been obtained from Google Analytics.

- Surveys carried out regarding awareness: During the project we have conducted two surveys, at the beginning (91 persons) and at the end (41 persons) of the project, realizing telephone interviews and online questionaries. The objective was to assess the evolution of the perception of aquatic ecosystems, their conservation issues and the effect of climate change over four years 2020-2024. In total, 132 people have participated in these surveys. See deliverable ¨D3 - Quantification of the socioeconomic impact of DIVAQUA¨.
- Networking: We highlighted 3 main networking activities. The first one was the meeting we have with Daniel Guinart, he is working in LIFE TRITO MONTSENY. He was interested in having a collaboration to apply the hydrological models and tools used in DIVAQUA. The second one is in relation to several emails and a meeting we had with Marta Valle (Steps for LIFE project) She asked us for a support letter for a new LIFE project she is preparing and also to meet to discuss possibilities of restoration action in the area of Fuente Dé. The third one is that we are in contact with Anna Kirk Larsen from Greater Copenhagen EU Office. They are currently developing a nature restoration project that will apply for LIFE funding in September 2025 together with three Danish municipalities and one Swedish county. The project seeks to create ecological corridors both within and outside Natura 2000 sites, targeting a relatively wide range of species and habitats, including aquatic ecosystems. She wants to learn from our restoration approach, particularly regarding the innovative use of monitoring tools and eDNA.

Economic outputs and outcomes:

- Jobs: The DIVAQUA project has helped to generate five different work contracts in the UC (three of them in force), two in ITAGRA (both in force), three in CAMBERA (one of them in force) and 2 contracts in CSIC. Moreover, the project also helps to consolidate several employments in FIHAC, ITAGRA and CAMBERA. We expect that some of these jobs will no longer be available after the project finishes. The specific calculation is based on the Financial Statements of each partner. UC has 6808,85 contract hours, Cambera 9304 h, CSIC 4385 h and ITAGRA 2168h. The total hours/ 5,25 is 4317,4 h. This total divided by 1760 is 2,45 FTEs. The table with this information can be found in Deliverable D4- Technical document with the results of Key Performance Indicators (KPIs)).
- Running cost/operating costs during the project and expected: The whole project budget has been spent during DIVAQUA project 2,361,506 €. Beyond 5 years, we expect the demolition of an extra barrier (Niserias). The project for this demolition has been done during DIVAQUA lifetime and the estimated cost is 21,602 € (Annex 10 -Page 58 Deliverable D4-Results of KPIs), it is expected that the public administration PRINCAST together with CHC (Confederación Hidrográfica del Cantábrico) execute this action within the next 5 years. PRINCAST also informed us during our 7th coordination meeting, that is planning to execute new conservation actions in the next 5 years to extend the protection fences in Enol Lake, Ercina Lake and Tolleyu wetland. The estimated costs of these conservation actions are 251,897.04 € (See annex 2 Deliverable D4-Results of KPIs). The government of Castilla y Leon informed us of the intention of executing the action of Cain after DIVAQUA with an estimated budget of 200.000 € (Personal communication). In addition, we had conversations with the

local administrations and government of Asturias, Cantabria and Castilla y Leon to continue financing aquatic ecosystems monitoring in the DIVAQUA area after DIVAQUA ends. A prove of these fruitful conversations, is the financing we get in 2024 to carry out the monitoring of aquatic organisms (macroinvertebrates, fishes, algae and macrophytes) though traditional techniques and eDNA together with the monitoring of river functional and physico-chemical parameters to continue the work carried out in DIVAQUA. The budget we got in 2024 is 33,850 € (Contract under Docket number 016/24 Consorcio Interautonómico Parque Nacional Picos de Europa). We expect to get this amount every year, so beyond 5 years we will get a total amount of 169,250 €. Thus, with the expected interventions of the government of Asturias and Castilla y León, together with the subsidies we get from the three autonomous communities in the area, we expect to get a total amount of 3,004,255.04€.

- Capital expenditure in case of continuation/replication etc.: The capital expenditure expected in case of continuation is 642,749.04 €. This amount is the expected future conservation actions (Niserias weir removal, conservation actions in lakes and wetlands from PRINCAST, and Cain fish passage improvement) and annual financing from the governments of Asturias, Cantabria and Castilla y León for the monitoring of aquatic ecosystems in the DIVAQUA area. See previous paragraph for the details and deliverable D4-Results of KPIs.
- Future funding: See indicator¨ Running cost/operating costs during the project and expected¨.
- Continuation: We expect to continue with DIVAQUA main conservation actions: weir removal to increase river connectivity and wetlands and lakes protection. In the case of weir removal, during DIVAQUA project it has been identified a weir that interferes with *S.salar* life cycle as it prevent the fishes from passing the weir and as a result they cannot reach spawning areas upstream. This weir is Niserias, located in the Cares River in Cabrales, Asturias. The project has been prepared during DIVAQUA but it was not possible during the project to execute it due to lack of budget to perform extra conservation actions. CHC, Confederación Hidrográfica del Cantábrico and Asturias government informed us of the interest in demolishing this weir. Castilla y León, also informed us of the interest of improving Cain fish passage, but with a higher budget than the one available in DIVAQUA for this action (see final report Action C4.4., page 24). We expect this work to be executed beyond 5 years. Besides, as mentioned in the previous sections, Asturias government, PRINCAST a beneficiary of DIVAQUA project is intended to execute several conservation actions in the next 5 years:
  - Closing dyke restoration in Ercina Lake
  - Installing a new fence in the area of maximum visitor influx of Ercina Lake
  - Installing a new fence in the area of maximum visitor influx of Enol Lake
  - Restoration by installing a new fence in Tolleyu wetland, a wetland with priority habitat 7140.In addition, we already have been granted in 2024 from the government of Asturias, Cantabria and Castilla y León to continue with the aquatic ecosystems monitoring carried out in DIVAQUA:

  1- Monitoring of fluvial indicator communities (macroinvertebrates, fishes, diatoms and macrophytes)

  2- Monitoring water chemistry and functional parameters

  3- Monitoring of key specie for conservation using eDNA

Action E1. Communication and dissemination of DIVAQUA project.

All subactions were successfully completed and all the proposed deliverables are available in BUTLER. The main responsible of this action was CAMBERA, although all the DIVAQUA´s beneficiaries contributed in the development of the different subactions.

E1.1 Presentation and closing session (Fig. 30). The COVID 19 pandemic caused a delay in the organization of the project presentation day and a change in its format, due to social restrictions. Instead of an open house meeting, we held 3 different meetings in the 3 DIVAQUA regions (Cantabria, Asturias and León), attended by 14 municipal mayors and neighbourhood meetings (july-2020). The objective was to present DIVAQUA and its different actions and provide an active communication channel. The closing session was held in Santander on 17 sep-2024 to share the main results of the project. More than 80 people attended this session, both in person and online.

Figure 30. One of the presentation days in Tama (Cantabria) and DIVAQUA beneficiaries' family picture in the closing session in Santander.

E1.2. Development of the visual identity of the project. This identity was finally defined in jan-2020. Since then, it has been shown in all internal and external communications. It consists of the design of a main and secondary logo, as a support element, covers and templates for documents and presentations, icons and banners for social media and a corporate typography. This identity and its style manual have given coherence and strength to the project's messages.

E1.3. DIVAQUA website development and dissemination on the media and social networks. Designed from the beginning of the project and open to the public at spring-2020 (see www.lifedivaqua.com). Until oct-2024 the website had 39.479 visitors (11.191 users and 18.465 open sessions). During the project lifetime, a total of 98 posts were written and published in the news section. This subaction was complemented by the creation of media and social networks: Facebook (with 414 followers, 443 post, 95.462 audience and 27.856 interactions) and YouTube, that currently hosts 7 videos with more than 2.000 views. The relationship with the media can be summarized in 92 publications, of which 8 printed editions, 74 digital editions, 7 interventions on radio and 3 appearances on TV.

E1.4. Development of informational material for the general public. This subaction has been in constant progress. All materials have used a powerful visual design and accessible language, including a key message tailored to the different audiences they were aimed at. The first ones were a dossier (500 printed copies) and a roll-up with essential project information. Five project signs were created and temporarily installed in the restoration work areas to raise public awareness. The guide *"Who lives here?"* (2.500 printed copies) to inform about the aquatic species and habitats of Picos de Europa. 26 infographics were designed with scientific illustrations of CI species /habitats under the "*Illustraciencia Academy*" in 2023 and 2024. Finally, 15 thematic newsletters were sent quarterly by email to 1.000 people interested in the project advances. Each newsletter focused on a specific topic and highlights progress and actions. All these materials are available at www.lifedivaqua.com/materiales/.

E1.5. Installation of informational panels and augmented reality. This subaction was postposed, since the initial idea was to install them in parallel to the implementation of conservation actions. Additionally, for budgetary and applicability reasons, we replaced the use of augmented reality by QR codes. In 2022, 8 information panels with QR codes were installed in strategic places of the PENP to inform about the species that inhabit the area. In 2023, 3 informational panels were installed in Asturias and León to highlight the benefits of wetland fencing for mountain aquatic species. All of them were manufactured in composite, a extra durable and aesthetic material (Fig. 31).

Figure 31. Some examples of information and QR panels.

E1.6. Installation of action notice boards. Since the beginning of the project 22 notice boards were designed and installed (Fig. 32). Moreover, different conservation activities, awareness-raising events and citizen participation workshops were held (one notice board for event). Both digital notice boards and physical ones were used and installed, depending on the case and its relevance, in strategic locations such as town halls, cultural centres, public establishments, etc.

Figure 32. Three examples of notice boards.

E1.7. Production of audio-visual material. From aug-2020 to sep-2024 we have generated an important audio-visual archive with 7 videos with subtitles in Spanish and English, showed at conferences and meetings, in the national park visitor centres and on YouTube (>2.000 views). Topics of these videos are: 1- Project presentation, 2- Climate change day, 3- The importance, uses, problems and solutions of water in Picos de Europa, 4- Final summary video with actions and results and 5- Closing session.

E1.8. Layman's report. Published in Spanish and English in sep-2024 (document) where we show in a clear, concise and visual way the actions developed to improve the biodiversity in the aquatic ecosystems of Picos de Europa and the project´s main results.

Compare with planned output and time schedule. There were no significant changes in the development of this action, just a light delay in the beginning of E1.1 and E.1.5.

Indicate if action was modified and any correspondence with CINEA approving the changes. This action was carried out without exceeding the approved budget. The only thing worth highlighting is the unforeseen expense of €9,000 for a communication support person, but compensated by the budget reduction of other expenses, without affecting the financial budget of the action.

Indicate major problems/drawbacks, delays, including consequences for other actions. We did not find any special problems for the development of this action than those described above.

Action E2. Awareness and training program.

All subactions were successfully completed and all the proposed deliverables are available in BUTLER. The main responsible of this action was CAMBERA, although all the DIVAQUA´s beneficiaries contributed in the development of the different subactions.

E2.1. Awareness program against global change. Carried out between nov-2020 and dec-2021. It comprised 3 meetings (Fig. 33): one online session *"Nature vs. Climate Change"* and two face-to-face meetings *"DIVAQUA-CAMBIA"* and *"DIVAQUA-CAMBIO",* in Cantabria and Asturias, with 45 participants and 96 online (more than 350 views on YouTube). It was a successful program in terms of participation and interest and helped raise awareness about the effects of climate change on environmental risks, socioeconomic and impacts on biodiversity. We also talk about citizen science, social perception and the value of local knowledge to be applied at conservation planning.

Figure 33. Online session and meetings in Potes (Cantabria) and Arenas de Cabrales (Asturias).

E2.2. DIVAQUA-FORMA training program. Carried out between march and apr-2022 (Fig. 34). This program consisted in 2 workshops with experts, based on a robust methodology: 1- Workshop "Nature-based solutions: Blue-Green Infrastructure Networks", titled: *"Reconnecting the rivers of Picos de Europa: elimination and adaptation of river obstacles to improve the conservation status of mountain rivers"* and 2- Workshop "An adaptation with principles", titled: *"With Amphibians: knowing and conserving in Picos de Europa".* We had 41 participants. The objective was to expand knowledge and raise awareness about the sustainable management of aquatic ecosystems, involving citizens in participatory processes.

Figure 34. DIVAQUA-FORMA workshops in Cabezón de Liébana and Camaleño (Cantabria).

Compare with planned output and time schedule. The first meeting within E2.1 was held late and online due to the COVID-19 pandemic, but it did not affect the schedule or final planning of the program.

Indicate if action was modified and any correspondence with CINEA approving the changes. This action was carried out without significant changes regarding the proposed budget.

Indicate major problems/drawbacks, delays, including consequences for other actions. We did not find any special problem for the development of this action.

Action E3. Citizen participation program.

All subactions were successfully completed and all deliverables are uploaded in BUTLER.

E3.1. Volunteer camp. (CAMBERA) The COVID-19 pandemic caused delays and adjustments in the implementation of this subaction. Additional modifications arose due to logistical challenges in transporting volunteers to remote high mountain areas with difficult access. Despite these obstacles, the sub-action was successfully carried out with the involvement of volunteers who: 1) spent 3 days in restoring 5 wetlands (installation, maintenance and dismantling of temporary fences; Fig. 35) and 2) participated in a clean-up activity along one-km stretch of the Casaño River, where 2,5 Tn of trash were removed. During this activity, volunteers also conducted a semi-quantitative monitoring, with a total of 80 participants.

Figure 35. Volunteer days in Poo de Cabrales (Asturias), Las Salgardas (Cantabria) and Vegabaño (León).

E3.2. DIVAQUA collaboration and agreement program. (CAMBERA) From may-2022 to sep-2023, 4 thematic workshops with field visits were developed (Fig. 36). A total 73 attendees participate in these workshops: 17 local socioeconomic agents and neighbours in the riparian forest workshop, 20 in the wetlands workshop, 10 rangers in the workshop on the importance of River Natural Reserves and 26 national and international students in the two scientific illustration workshops (Ilustraciencia).

Figure 36. Some field visits from the workshops: riparian forest (Asturias), wetlands in Áliva (Cantabria).and the importance of the River Natural Reserve; Bullón river (Cantabria).

E3.3. Generation of social participation in the agreement of aquatic ecosystems uses. (CAMBERA) From jan-2021 to may-2022, 6 meetings were held across Asturias (1), Cantabria (2) and León (3). These meetings aimed to inform stakeholders, foster social participation and create an atmosphere of acceptance. A total of 17 participants attended these sessions.

E3.4. DIVAQUA-PARTICIPA sessions. (CAMBERA) **Regarding Issue 13 of the final visit letter**, this subaction was carried out between sep and dec-2022. As stated in the proposal, it consisted of 5 DIVAQUA-COOPERA meetings with the total participation of 43 people, divided into (Fig. 37):

1. A technical day in Puentelles (Asturias) with the objective of reporting on the actions to be carried out during the demolition of the dam (C3.1) assessing the perception of the different stakeholders. 7 people participated, including local officials, natural environment agents, river rangers, fishermen, etc.

2. Three specific DIVAQUA-COLABORA sector tables for the tourism and hospitality sector of Picos de Europa, and surroundings, with 29 attendees in total, to learn about the Picos de Europa aquatic habitats and species, its current situation, ecology and threats, in addition to collecting their perception of the conservation status and the project's actions. We have collaborated with the Association of Hospitality and Tourism Entrepreneurs of the Camaleño Valley (Cantabria), the Association of Entrepreneurs of the Picos de Europa (Asturias) and the "La Fonseya" Visitor Center (León), who have distributed the guide "Who lives there?" among their members.
3. A mixed DIVAQUA-PARTICIPA day in Potes (Cantabria) with 7 attendees representing the regional and local administration, ranchers and businessmen, to promote open dialogue with a participatory dynamic to encourage debate and establish lines of future work.

Figure 37. Technical day in Puentelles, sectoral table in Cangas de Onís and mixed day in Potes.

E3.5. Generation of land stewardship agreements for aquatic ecosystems. DIVAQUA established 6 land stewardship agreements, allowing us to carry out conservation actions essential to ensure the success of the conservation actions results in the medium, and long term. These agreements, signed between jan-2021 and jun-2023 were in ZECS of Asturias (2), Cantabria (2), and León (2). The agreements were carried out between CAMBERA and different landowners, including local councils and community livestock associations from each of the 3 Picos de Europa regions.

Compare with planned output and time schedule. There were no big changes in development of this action. Only a delay in starting E3.1 and the replanned activity that did not affect the objectives.

Indicate if action was modified and any correspondence with CINEA approving the changes. The only significant changes are the delay and replanning of one of the environmental volunteer activities, explained above, in subaction E3.1. It has not meant increase in the budget.

Indicate major problems/drawbacks, delays, including consequences for other actions. Except for the situation explained above and the difficulties in obtaining trust and custody agreements in writing, there have been no significant problems in achieving the objectives.

Action E4. Creation of a network on conservation of aquatic diversity in areas mountain.

All subactions were successfully completed and the proposed deliverables are available in BUTLER.

E4.1. Development of a network for the management of the mountain aquatic ecosystems: DIVAQUA-Network. (FIHAC and UC-IHC). The development of this subaction was adapted from the original proposal, preserving all its intended goals. To achieve the different objectives, we stablish 4 different networks (The description of these networks addresses the **Issue 14 of final visit letter**):

- We collaborate in the creation of The Iberian River Observatory (IberRios) network, a multidisciplinary initiative comprising over 80 scientists and practitioners. This is the first large-scale observatory focused on monitoring the impacts of multiple stressors on river biodiversity and ecosystem functioning across Spain and Portugal. Five of the 113 DIVAQUA study sites contribute to one of the seven regions included in this observatory (Fig. 35). Launched in 2022 (kick off meeting in Sevilla; Fig. 38), IberRios has successfully integrated the experience and results from the DIVAQUA project. The network remains active, and its initial findings are currently being incorporated into the first scientific publications of this network.

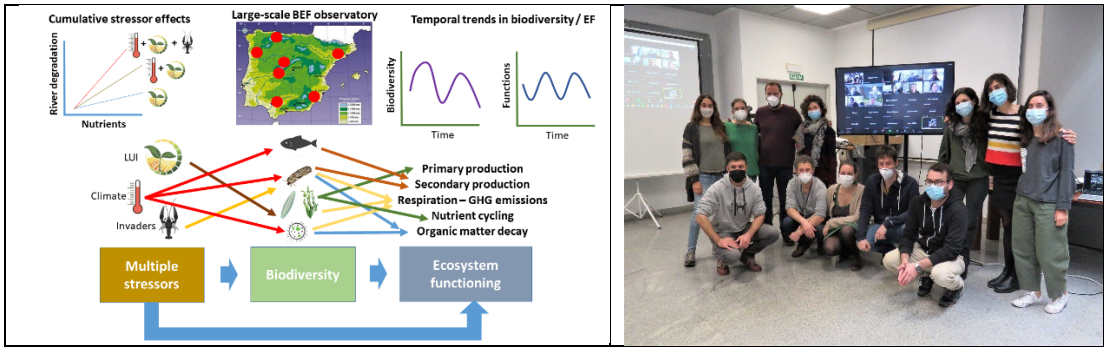


Figure 38. Conceptual design of the IberRios network and picture of the kick-off meeting in The Estación Biológica Doñana, Sevilla, march-2022.

- We are actively collaborating with the Autonomous Organism of National Parks (OAPN) of the Spanish Ministry for the Ecological Transition, to define a unified methodology for long-term monitoring of aquatic ecosystems in all mountain national parks across Spain. Our most recent progress was showcased at the *XII Seminar on Long-Term Monitoring in the National Parks Network: Assessment of the Status of Monitoring Initiatives at the Network Level and Specific to Each National Park*, held in Valsaín, Segovia, in October 2023. Information from DIVAQUA has been essential in the definition of this proposal. See our presentation here:

  https://www.miteco.gob.es/content/dam/miteco/es/ceneam/grupos-de-trabajo-y-seminarios/red-parques-nacionales/seguimiento/xii-seminario-2023/07FranciscoJ.Pe%C3%B1as_Seguimiento-de-aguas-en-PPNN.pdf)

- We have also collaborated with a European network of scientists from different institutions to create a long-term biodiversity database aimed at assessing European aquatic ecosystems. Data on invertebrate communities from 13 of the 113 DIVAQUA study sites has been incorporated into this database. This information has contributed to several scientific publications, including a notable paper published in **Nature in 2023 (see https://doi.org/10.1038/s41586-023-06400-1). This paper has received the prestigious Frontiers Planet Prize in its second edition, awarded by the Senckenberg Society for Nature Research.**

- Finally, perhaps the most significant achievement within this subaction was the **inclusion of the DIVAQUA study area in the Long-Term Ecological Research (LTER) Spanish Network as a new node: LTSER Picos de Europa** (see https://lter-spain.csic.es/parque-nacional-de-picos-de-europa/). The establishment of this node was driven by the DIVAQUA project with the collaboration of several project beneficiaries, including PRINCAST, JCyL, FIHAC and UC-IHC. Moreover, other institutions involved in monitoring the PENP in recent years are also part of this node/platform. This accomplishment is crucial for the future of the national park monitoring, as it integrates the park into both the Spanish and European LTER networks. The acceptation of LTSER Picos de Europa in the LTER network was finally achieved in apr-2023. In this period José Barquín (UC-IHC) has travelled to different meetings of LTER Spain (Madrid; sep-2023) and LTER Europe (Vienna, apr-2023) as coordinator of the LTSER Picos de Europa node.

E4.2. DIVAQUA EXPORT Technical Workshops. (JCyL, PRINCAST, FIHAC and UC-IHC). This technical workshop was conducted in Posada de Valdeón (León; 17 and 18 oct-2023; Fig. 39) within the *I Research Conference of the Picos de Europa National Park* (The description of these event addresses the **Issue 15 of final visit letter**). A total of 23 presentations were exposed in this event, 4 of them by FIHAC and UC-IHC personnel, who presented the most important results of DIVAQUA:

1. Study of the Spatiotemporal Dynamics of River Metabolism in the Rivers of the Picos de Europa National Park.
2. Hydrological and Thermal Scenarios for the Rivers of the Picos de Europa National Park.
3. Temporal Variation in River Invertebrate Communities of Picos de Europa Over a Decade.
4. Temporal Variation Patterns of Trout Populations in the Rivers of the Picos de Europa National Park.

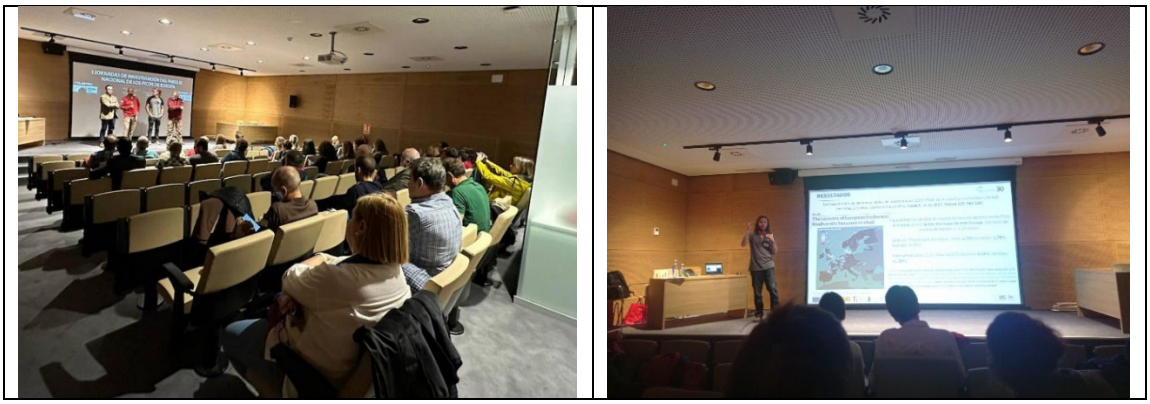


Figure 39. Reception of the *I Research Conference of the Picos de Europa National Park* and José Barquín (UC-IHC) presentation.

Compare with planned output and time schedule. There were no important changes.

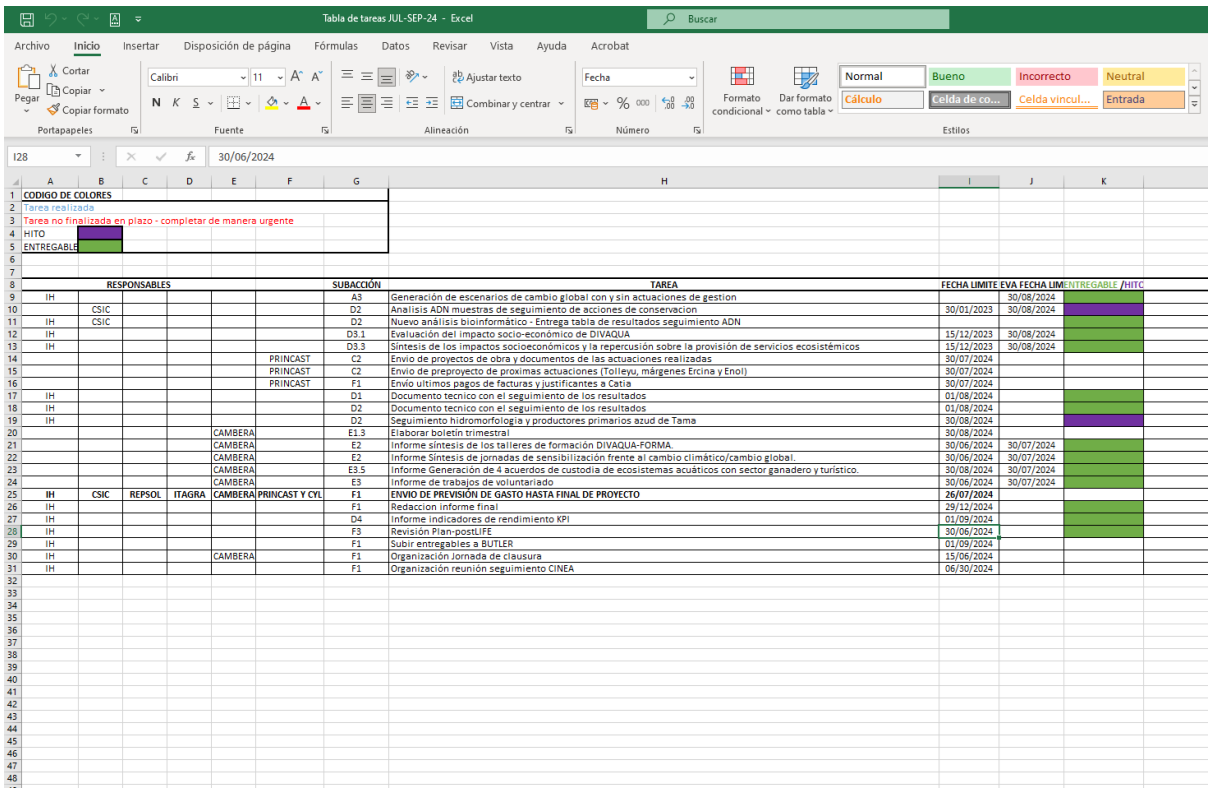
Indicate if action was modified and any correspondence with CINEA approving the changes. This action was modified from the original proposal, although all the goals were achieved, as described above, including the publication of 11 scientific papers in JCR journals (see Deliverable).

Indicate major problems/drawbacks, delays, including consequences for other actions. There have been no significant problems/delays/overcost in the development of this action.

Action F1. General project management.

Following the document ¨Plan de seguimiento técnico y administrativo¨ created at the beginning of the project, the management of DIVAQUA have been carried out by the coordinating beneficiary following these tasks:

- We held coordination meetings with all associated beneficiaries every 6 months. We have minutes of all the coordination meetings.
- We prepared task timetables every 3 months (Fig. 40) and shared them with all the associated beneficiaries to keep track of the status of actions and degree of execution, delays or any problems encountered regarding project actions



CODIGO DE COLORES
Tarea realizada
Tarea no finalizada en plazo - completar de manera urgente
HITO
ENTREGABLE

RESPONSABLES						SUBACCIÓN	TAREA	FECHA LIMITE EVA	FECHA LIM	ENTREGABLE /HITO
IH						A3	Generación de escenarios de cambio global con y sin actuaciones de gestion		30/08/2024	
	CSIC					D2	Analisis ADN muestras de seguimiento de acciones de conservacion	30/01/2023	30/08/2024	
IH	CSIC					D2	Nuevo análisis bioinformático - Entrega tabla de resultados seguimiento ADN			
IH						D3.1	Evaluación del impacto socio-económico de DIVAQUA	15/12/2023	30/08/2024	
IH						D3.3	Síntesis de los impactos socioeconómicos y la repercusión sobre la provisión de servicios ecosistémicos	15/12/2023	30/08/2024	
					PRINCAST	C2	Envio de proyectos de obra y documentos de las actuaciones realizadas	30/07/2024		
					PRINCAST	C2	Envio de preproyecto de proximas actuaciones (Tolleyu, márgenes Ercina y Enol)	30/07/2024		
					PRINCAST	F1	Envio ultimos pagos de facturas y justificantes a Catia	30/07/2024		
IH						D1	Documento tecnico con el seguimiento de los resultados	01/08/2024		
IH						D2	Documento tecnico con el seguimiento de los resultados	01/08/2024		
IH						D2	Seguimiento hidromorfologia y productores primarios azud de Tama	30/08/2024		
				CAMBERA		E1.3	Elaborar boletin trimestral	30/08/2024		
				CAMBERA		E2	Informe síntesis de los talleres de formación DIVAQUA-FORMA.	30/06/2024	30/07/2024	
				CAMBERA		E2	Informe Síntesis de jornadas de sensibilización frente al cambio climático/cambio global.	30/06/2024	30/07/2024	
				CAMBERA		E3.5	Informe Generación de 4 acuerdos de custodia de ecosistemas acuáticos con sector ganadero y turístico.	30/08/2024	30/07/2024	
				CAMBERA		E3	Informe de trabajos de voluntariado	30/06/2024	30/07/2024	
IH	**CSIC**	**REPSOL**	**ITAGRA**	**CAMBERA**	**PRINCAST Y CYL**	**F1**	**ENVIO DE PREVISIÓN DE GASTO HASTA FINAL DE PROYECTO**	**26/07/2024**		
IH						F1	Redaccion informe final	29/12/2024		
IH						D4	Informe indicadores de rendimiento KPI	01/09/2024		
IH						F3	Revisión Plan-postLIFE	30/06/2024		
IH						F1	Subir entregables a BUTLER	01/09/2024		
IH				CAMBERA		F1	Organización Jornada de clausura	15/06/2024		
IH						F1	Organización reunión seguimiento CINEA	06/30/2024		

Figure 40. Task timetable of July-September 2024.

- We have prepared technical internal reports every 6 months to keep track of project outputs, progress and achievements. Accomplished till January 2023.

To be able to check and share the technical and administrative documents with all the project partners, we have created an FTP server (Fig. 41).

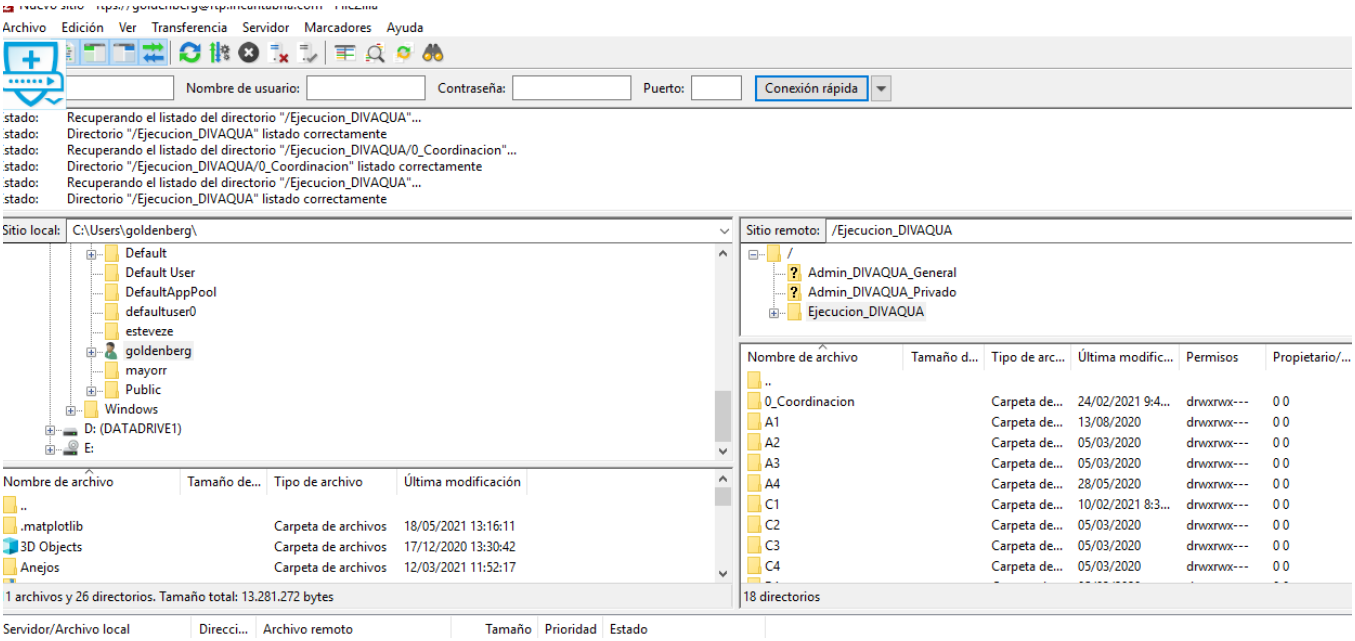


Figure 41. FPT server used in DIVAQUA to share the important documents of the project.

Action F.2: Plan post-LIFE.

The post-DIVAQUA Plan is a strategic framework designed to ensure the conservation and monitoring of the DIVAQUA project results over the next 5 years, after the project's official conclusion. This comprehensive plan outlines the measures, tasks and responsibilities of all beneficiary partners, ensuring long-term sustainability and dissemination of the project's outcomes. The key components of this post-DIVAQUA plan include:

1. Conservation and monitoring of results: the main focus is on maintaining the environmental and ecological achievements of the DIVAQUA project.
2. Tasks and responsibilities of each beneficiary partner. The plan clearly delineates the roles of each partner in the post-DIVAQUA phase, depending on their expertise and competencies.
3. Dissemination and communication strategy. A clear dissemination and communication plan is defined to ensure that the DIVAQUA project's results are shared effectively even after the project ends.

Thus, the post-DIVAQUA plan is designed to ensure that the conservation, monitoring, and dissemination efforts of the project remain impactful in the long term (minimum of 5 years), with a well-defined role for each beneficiary partner, a clear strategy for outreach, and sustainable funding mechanisms, the plan ensures that the project's outcomes will continue to benefit ecosystems and communities long after the project officially concludes. For a more detailed description, please, see *Deliverable F2. post-LIFE DIVAQUA plan*.

No delays, cost overruns, or other significant issues impacted the development of this action, which was finished in sep-2024.

6.2. Main deviations, problems and corrective actions implemented

The most important deviations, problems, cost overruns and delays that we have found along the project lifetime have been explained above, in the technical description of the different actions (see 6.1. Technical progress, per Action).

6.3. Evaluation of Project Implementation

In general terms, the different approaches followed in the project implementation were successfully applied.

1) All the objectives of the preparatory actions have been achieved. However, certain innovative techniques, such as eDNA, presented challenges as we had to continuously adapt to advancements in these methods throughout the project lifetime.
2) While most conservation actions were successfully implemented, some were ultimately postponed. This was partly due to securing funding for future years, which will enable us to execute these actions more comprehensively in the near future. We firmly believe that all efforts dedicated to conservation actions have been instrumental in achieving the primary goals of DIVAQUA, particularly regarding the conservation of aquatic habitats and species of CI.
3) Monitoring actions confirm the success of the conservation ones, though it is still too early to draw definitive conclusions about the project's long-term benefits for these aquatic species, habitats and ecosystems.

4) Finally, dissemination, communication, and other public engagement activities (E actions) have significantly contributed to reach these objectives by raising awareness of the issues among local communities and fostering collaboration among different stakeholders, including administrations, businesses, researchers, land managers and others with a shared interest in mountain aquatic ecosystems.

Compare the results achieved against the objectives and expected results foreseen in the proposal and described in section 4.

	Foreseen in revised proposal	**Achieved**	**Evaluation**
A1	**Objectives.** Environmental characterization of aquatic ecosystems in DIVAQUA area. **Expected results:** 1. Generate useful information to prioritize sites on which we will act (conservation actions). 2. Provide the knowledge of the initial situation for assessing the success of conservation actions. 3. Improve the management of aquatic biodiversity in DIVAQUA area.	This action was completed and all the expected objectives and results have been achieved (**100%**).	We have finished the 3 deliverables proposed in this action. The inventory of natural and anthropic obstacles in Sella and Deva-Cares basin and the inventory of lentic water bodies in DIVAQUA area are completed. We also have a complete characterization of the water quality conditions in both basins. Moreover, the cartography of the riparian vegetation was also defined by using distribution models based on remote sensing data. All this information (field and modelled) will be part of the base for the management of these aquatic ecosystem in the next years.
A2	**Objectives.** Biological **c**haracterization of aquatic ecosystems in DIVAQUA area. **Expected results:** 1. Prioritize sites for aquatic ecosystem restoration actions. 2. Develop protocols for places with presence of pathogens that cause diseases in species of CI, as well as invasive species. 3. Update knowledge on the distribution of aquatic species of CI and others to evaluate biodiversity.	This action was completed and all the expected objectives and results have been achieved (**100%**).	We have finished all deliverables of this action. Due to the COVID that delayed field campaigns and some technical problems with eDNA analysis, we have finished deliverables later than planned.

	Foreseen in revised proposal	Achieved	Evaluation
A3	**Objectives.** Development of a 1) Methodological guideline for the conservation of mountain aquatic biodiversity and a 2) Monitoring guide to be able to export to other mountain areas within Spain and in the world. **Expected results:** 1. Vegetation modelling to predict habitat and land use changes. 2. Hydrological model to assess the effect of climate change over aquatic ecosystems and water resources. 3. A new proposal of the environmental flow regime for PENP. 4. Development of future climate change scenarios to evaluate the impact of climate change on aquatic biodiversity in the DIVAQUA area. 5. Development of a methodological guideline for the conservation of mountain aquatic biodiversity and ecosystems.	In general terms all the expected results were reached, so the two main objectives were also achieved (**100%**).	1) The vegetation mapping using remote sensing techniques was done by developing a framework of predictive vegetation mapping to estimate the AOO (Areas Of Occupancy) of different habitat types, 2) The natural hydrological regime for Sella and Deva-Cares basins in the current situation and in a future scenario (RCP8.5) was satisfactory modelled with a distributed model (SPHY), 3) A new proposal of environmental flows for the DIVAQUA basins was done with a greater effort than the Spanish official one (DIVAQUA: 1 study site/175 km^2; Confederación: 1site/1000 km^2) and 4) A metapopulation model has been used to detect how modifications in river network connectivity due to barrier removal influence trout population density patterns. Finally, all this information (and other important in the monitoring and conservation of mountain aquatic ecosystems) was compiled in a complete guide (English version https://lifedivaqua.com/materiales/).
C1	**Objectives.** Restoration and improvement of the riparian area in several aquatic ecosystems. **Expected results:** 1. Improve the conservation status of habitats and species of CI. 2. Improve the conservation status of Enol and La	Three of the 5 subactions were successfully and completely finished (C1.1, C1.5 & C1.6), while other one was partially executed, although is expected to be finished in 2025 with own funds (C1.3). Finally, C1.4. was not viable due to	C1.1. >400 trees of characteristic species from the 91E0* habitat were planted in five plots along a section of the Cares River. At the moment, trees are developing as expected in this river section. C1.3. This subaction was modified from the original proposal. Instead of developing habitat 91E0*, lakes slopes were stabilized by creating vegetation patches through selective

	Foreseen in revised proposal	Achieved	Evaluation
	Ercina lakes, and associated wetlands.	the potential flood risk for the surrounding urban area (La Hermida). Thus, we estimate that **70-75%** results/obj. of this action were finally achieved.	clearings. Moreover, Ercina and La mina lakes were protected with permanent wood fences. C1.4. Finally discarded. C1.5. 100 m of the Camarmeña diversion channel, where wild animals frequently fell accidentally, were covered, removing a black point for wildlife conservation in the PENP. C1.6. Six new colonies of *W. radicans* were successfully established and are currently developing well.
C2	**Objectives.** Improve the habitat conditions of several lentic water bodies (springs, peat bogs and water troughs) and the Duje river headwaters. **Expected results:** 1. Improve the conservation status of several aquatic habitats and species of CI. 2. Reduce the sediment load over the Duje river headwaters, produced by runoff processes in the antique Las Mánforas mine.	Two of the 4 subactions were successfully and completely finished (C2.3 & C2.4), while other one (C1.3) was also finished, although one task within this subaction did not have the expected success. Finally, C2.2 could not be implemented due to a legal conflict involving the public company that owns the land (Paradores del Estado) and the development of this subaction. Thus **65-75%** results/obj. of this action were finally achieved.	C2.1. With 3 different tasks. 1) The containment dike to stop the sediment from the mine to the Duje river mouth by runoff processes was finished in jun-22, 2) The livestock exclusion perimeter fencing to protect the vegetation development in the sediment pond and reduce the runoff processes was finished in summer-23 and 3) A big rain and snowmelt event in spring-23 broke all the wood piles installed to stop the erosion in the gullies of the mine´s sediment pond. C2.2. Finally discarded. C2.3. Seven wetlands and 1 spring with habitats of CI were protected with temporal (Cantabria and León) and permanent fences (Asturias). C2.4. Six water troughs were restored and ramps for amphibians were installed in 11 firefighting water tanks in Cantabria, 13 water troughs, some of them newly built, were done in Asturias (PRINCAST did these works with funds out of the LIFE program)

	Foreseen in revised proposal	Achieved	Evaluation
			and 7 water troughs were restored in León.
C3	**Objectives.** Enhance the longitudinal connectivity of the Deva River network by removing 4 unused weirs (Potes, Ojedo, Sotama and Puentellés) and improving fish passage efficiency of a weir for hydroelectric power production (Urdón). **Expected results:** 1. Increase the distribution area of several fish species of CI in the Deva basin. 2. Enhance the conservation status of other species of CI linked to the aquatic environment. 3. Help to improve the ecological status of water bodies in the Deva basin, *sensu* WFD.	All the subactions included in C3 were successfully completed without any deviations from the proposal, except for C3.5, where we had to modify the initial plan. However, these modifications did not impact neither in the results nor the objectives of this subaction. Therefore, we can conclude that **100%** of the results and objectives of this action were achieved.	All these subactions were finished between 2021 and 2022. Weir removals (C3.1-C3.4) were carried out as planned, and the affected river sections are now fully integrated into the fluvial landscape, as if the weirs had never been installed in these locations. Regarding C3.5, since it was not possible to work directly on the fish passage to improve its functionality, an alternative solution was selected to achieve similar results by enhancing the fish attraction and raising the river level at the passage´s entrance, with the ultimate goal of reducing the access jump for fish.
C4	**Objectives.** Improve the longitudinal connectivity of Sella and Cares basins, by improving the fish passage of several weirs/dams. **Expected results:** 1. Increase the distribution area of several fish species of CI in Sella and Cares River network. 2. Enhance the conservation status of other species of CI linked to the aquatic environment. 3. Help to improve the ecological status of water bodies in the Deva basin, *sensu* WFD.	Three of the 4 subactions (C4.1, C4.3 & C4.5) were successfully completed, while the remaining one (C4.4) could not be implemented because JCyL secured alternative funding from the Spanish Government to execute a more comprehensive project in the near future than the one originally proposed in DIVAQUA. Thus, **75%** results/obj. of this action were currently achieved, although we expect	C4.1 and C4.3 were done as initially expected, with no significant changes compared to the DIVAQUA proposal. C4.5 was included in the third amendment of the project, instead off two subactions initially proposed by the project. The construction of a reinforced concrete fish passage at the Restaño dam was executed under this subaction, enabling the longitudinal migration of fishes in the Dobra River. C4.4. Finally discarded. It will be carried out throughout 2025 using a budget allocation from the Government of Spain.

	Foreseen in revised proposal	Achieved	Evaluation
		to reach **100% in the next years**.	
D1	**Objectives.** Monitoring C1 & C2 results to determine if these actions have achieved their objectives and, otherwise, take the necessary corrective measures. **Expected results:** 1. Monitoring the results and assessment of the effectiveness of conservation actions C1 and C2.	This action was done as expected, except for those conservation subactions delayed or discarded. Thus, the objective of this action was **100%** achieved.	C1.1: The short time since planting has not allowed the trees to mature sufficiently to carry out the monitoring plan outlined in the project proposal. Instead, a field visit in may-2024 confirmed proper maintenance across all plots, with no signs of important damages in the planted trees. C1.3. Monitoring results highlight a significant improvement in plant communities and CI habitats within the areas protected by fences in La Mina & Ercina lakes. C1.5. The last monitoring visit (jun-2024) indicates that the infrastructure is in good condition, showing no deterioration signals and good functionality. C1.6. The monitoring of the new 6 colonies of *W. radicans* was done in 6 different field visits (from jan-2022 to apr-2024). Fern colonies have been successfully developed in this period, showing new ferns and reproductive structures, such as bulbs and sori. C2.1. with 3 tasks: 1) The dike has contained 250 m^3 of sediment in one year, 2) Wood sheet piles: a big rain and snowmelt event in spring 2023 broke all the wood piles, so the result of this task was not successful. 3) Livestock exclusion perimeter fencing. Part of the fence was vandalized and the electric shepherd was stolen. In 2024 all the fence was repaired and the electric shepherd was replaced. C2.3. A botanic assessment of protected wetlands was done before and after the action was

	Foreseen in revised proposal	Achieved	Evaluation
			carried out. The botanical final report indicates a "spectacular improvement" of the plant communities and the CI habitats. C2.4. In general terms all the restored water troughs (25) remain in good conditions and functionality.
D2	**Objectives.** Monitoring C3 and C4 results to determine if these actions have achieved their objectives and, otherwise, take the necessary corrective measures. **Expected results:** 1. Monitoring the results and assessment of the effectiveness of conservation actions C3 and C4.	This action was done as expected, except for those conservation subactions delayed or discarded. Thus, the objective of this action was **<u>100%</u>** achieved.	C3.1-C3.4. Weir removals were monitored through the analysis of 1) hydromorphological elements, 2) fish fauna and 3) river metabolism. We would like to highlight the presence of salmon upstream of the Potes weir following its removal (2022 & 2024). This obstacle was formerly the distribution limit for this species in the Deva River C3.5. Monitoring report indicates that the result of this subaction is considered *positive and appropriate*, increasing the flow at the base of the fish passage while simultaneously reducing attraction in the discharge area of the channel. C4.1. Monitoring report indicates that this subaction has improved fish attraction and access to the Poncebos fish passage by reducing the water drop at the obstacle. The lower section of the fish passage now shows enhanced conditions for fish ascent, due to reduced water level differences between pools and an increased volume for energy dissipation. C4.3. Monitoring data are not yet robust enough to properly evaluate the barrier's effectiveness in preventing or reducing fish entry into the Camarmeña channel due to a landslide in feb-2022.

	Foreseen in revised proposal	Achieved	Evaluation
			C4.5. An in-situ assessment of the infrastructure was done by ITAGRA´s technicians in jun-2024, concluding: 1) Improve the access to the fish passage from downstream to reduce the elevation difference and enhance the conditions at the fish entrance, 2) Reduce water drop in the most downstream pool and increase its depth, 3) Ensure submerged water flows rather than free falls between all pools, including the fishway entrance and exit and 4) Increase the flow through the passage device, as the current flow seems insufficient.
D3	**Objectives.** Monitoring the socio-economic impact of DIVAQUA and the effect of the conservation actions in the ES of the area. **Expected results:** 1. Cartography of the current aquatic ecosystems ES in the project area. 2. Quantify the socio-economic impact of the project. 3. Forecasting future scenarios for the provision and demand of ES.	With the development of this action we have reached all the expected results and objectives (**100%**).	D3.1. To evaluate changes in the perception of aquatic ecosystems over a four-year period, telephone interviews and an open online questionnaire were conducted at the beginning (2020) and at the end of the project (2024). After compare results from 2020 and 2024 we can conclude that DIVAQUA has made an important contribution to outreach and awareness-raising efforts regarding the ecosystems and aquatic biodiversity of the target area. D3.2. Under this subaction we have quantified and assessed a great set of ES in the study area in the current situation and in a future scenario. These results could be very useful for the management of the territory and to anticipate how global change could affect the most important uses and policies in the modelled future, being an appropriate tool for future adaptation. D3.3. This subaction complete the previous one by including the effects of the DIVAQUA actions

	Foreseen in revised proposal	Achieved	Evaluation
			on ES in the different scenarios presented in D3.2.
D4	**Objectives.** Monitoring and measure the performance indicators of the project. **Expected results:** 1. Evaluate the performance indicators of the project at the end of the project and 3 and 5 years later.	All performance indicators have been presented in the KPI platform webtool.	We have achieved all types of indicators. We have increased in 120km but not in 185 km (as stated in the proposal) the potential area of *S. salar* and other species. We have created new 3.3 ha of habitat 91E0* instead of 7.23 ha as originally planned due to some actions that we could not execute.
E1	**Objectives.** To develop a communication strategy and the necessary tools for its implementation. **Expected results:** The elaboration of a web site, informative material, promotional movies and the Layman report.	The main objective was reached at **100%** through the production of a large amount of material for the dissemination of the project and its most important results.	Under this action we have elaborated: 1. The visual identity of the project, with two different logos, covers and templates for documents and presentations, icons and banners for social media and a corporate typography. 2. Website (lifedivaqua.com; 98 post and 39479 visitors) and social media (Facebook: 27.856 interactions and Youtube: 7 videos/2.000 views). 3. Informative panels (QR). 4. 22 physical and digital notice boards. 5. Two version of the Layman report in English and Spanish are available in the web project (https://lifedivaqua.com/materiales/).
E2	**Objectives.** Improve the knowledge of stakeholders (public and private sector, conservation NGOs and local population) about the problems associated with the conservation of habitats and aquatic species. **Expected results:**	The primary objective was fully achieved (**100%**) through the successful implementation of the proposed programs.	E2.1. *The Awareness Program Against Climate/Global Change* was composed by 3 different meetings. It was a successful program in terms of participation (45 participants, 96 online & 350 views in Youtube) helping in raise awareness about the effects of climate change on environmental risks, socioeconomic and impacts on biodiversity.

	Foreseen in revised proposal	Achieved	Evaluation
	The development of two different activities: 1. The Awareness Program Against Climate/Global Change. 2. The DIVAQUA Training Program.		E2.2. *DIVAQUA-FORMA training program* was composed by 2 different workshops with experts: 1) Nature-based solutions: Blue-Green Infrastructure Networks: *Reconnecting the rivers of Picos de Europa: elimination and adaptation of river obstacles to improve the conservation status of mountain rivers* and 2) An adaptation with principles: *With Amphibians: knowing and conserving in Picos de Europa.*
E3	**Objectives.** To promote the improvement of the conservation status of aquatic habitats and species through the participation of different stakeholders of DIVAQUA area. **Expected results:** 1. The participation of volunteers in conservation actions and camps. 2. The consecution of the workshops DIVAQUA-PARTICIPA.	Although the volunteer camp could not be completed as planned, alternative activities involving volunteers were successfully carried out. All other results and objectives were achieved, leading to the conclusion that **<u>80-85%</u>** of the action's objectives were met.	All these activities were highly successful, achieving notable participation levels: 1.E3.1 Volunteer Activities: Two activities were conducted with a total of 80 participants. 2.E3.2 DIVAQUA Collaboration and Agreement Program: Four activities were organized, involving a total of 73 participants. 3.E3.3 Social Participation in Aquatic Ecosystem Use Agreements: Six meetings were held, engaging 17 participants. 4.E3.4 DIVAQUA-PARTICIPA Sessions: These included five DIVAQUA-COOPERA meetings, with a total of 43 participants. 5.E3.5 Land Stewardship Agreements for Aquatic Ecosystems: DIVAQUA successfully established six land stewardship agreements. It is important to highlight that these activities took place in a mountainous area characterized by an aging and sparse population, where traveling between locations

	Foreseen in revised proposal	Achieved	Evaluation
			is significantly more challenging than in urban settings.
E4	**Objectives.** Develop a communication strategy with the managers of the DIVAQUA area and with other initiatives for the conservation of aquatic ecosystems in national and international mountain areas to export the different methods used in DIVAQUA to other regions. **Expected results:** 1. The establishment of a network for the management of mountain aquatic ecosystems (DIVAQUA-NETWORK). 2. Disseminate the results achieved in DIVAQUA and find out the opinion of the administrations to open a forum regarding the management of aquatic mountain areas; DIVAQUA-EXPORT Technical Conference.	Although DIVAQUA-NETWORK and DIVAQUA-EXPORT were implemented with some modifications compared to the original project proposal, the activities ultimately carried out under both subactions successfully achieved nearly all the expected results and objectives of this action, reaching approximately **80-85%** of the goals	E4.1. To achieve the different objectives of this subaction, we participate in 4 different networks: 1. We collaborate in the creation of The Iberian River Observatory (IberRios) network, a multidisciplinary initiative comprising over 80 scientists and practitioners in 7 regions of Spain and Portugal. 2. We are actively collaborating with the Spanish Ministry for the Ecological Transition, to define a unified methodology for long-term monitoring of mountain aquatic ecosystems in all Spanish mountain national parks. 3. We are collaborating with a European network of scientists to create a long-term biodiversity database aimed at assessing European aquatic ecosystems. 4. Maybe the most important achievement within this subaction was the inclusion of the DIVAQUA study area in the Long-Term Ecological Research (LTER) Spanish Network as a new node: LTSER Picos de Europa. E4.2. DIVAQUA EXPORT was conducted in Posada de Valdeón (León; 17 and 18 oct-2023; Fig. 36). A total of 23 presentations were presented in this event, 4 of them by FIHAC and UC-IHC personnel, who presented the most important results of DIVAQUA.
F1	**Objectives.** To establish the necessary organization and management mechanism to	We have completely achieved a correct management of the	The objectives has been fulfilled and the management of the project worked properly.

	Foreseen in revised proposal	Achieved	Evaluation
	guarantee the correct development of the project. **Expected results:** 1- The administrative and financial management of the project: Execution of financial and administrative compromises / Preparation and submission of economic and financial reports and preparation and submission of progress reports and deliverables. 2- The technical and scientific management has the following contents: Coordinate the technical staff of the project / Technical assistance / Review activities, work plans and objectives and Control the progress of the project and objectives fulfilment.	project following coordination meetings every 6 months, annual or required visits from CINEA, we have shared activities/task tables every 3 months to report the progress in the actions of all beneficiaries. We have also used an FTP server to save and share all important between all beneficiaries. We have complete internal technical reports every 6 months until January 2023.	
F2	**Objectives.** Monitoring the results of the project when finished and defining a strategy for the dissemination and communication of these results. **Expected results:** Post-LIFE Plan.	This action was completed at **100%**.	The post-DIVAQUA Plan is a strategic framework designed to ensure the conservation and monitoring of the DIVAQUA project results over the next 5 years, after the project conclusion (2025-2030). This comprehensive plan outlines the measures, tasks and responsibilities of all beneficiary partners, ensuring a long-term sustainability and dissemination of the project's outcomes.

Indicate which project results have been immediately visible and which results will only become apparent after a certain time period.

The results of the preparatory, monitoring, dissemination and management actions (A, D, E and F) will be immediately visible, because they are related with the development of documents, meetings, cartography, predictive models, etc. Almost all the results generated in these actions are included in a deliverable.

Regarding conservation actions, almost all the results are immediately visible except for the next subactions:

- *C1.1. Habitat 91E0* improvement.* This subaction will require a development period of 5-10 years to reach completion, as the 91E0* plantation was established using 1-2 years old trees (n > 400) with initial heights ranging from 50 to 150 cm. During this period, we expect the various trees and other plant species to form a structured habitat 91E0* within the selected plots, and then, it´s expected that this riparian habitat can increase its distribution along the entire Cares River section (2.1 km) by itself.
- *C2.1. Solutions to sediment runoff from settling mining ponds in the Duje River.* One of the two tasks successfully implemented under this subaction -the protection of the sediment pond at the antique mine of Las Mánforas through fencing- is expected to yield visible results within the next 3–5 years. While the fence has effectively prevented livestock from entering the sediment pond since its installation, it is estimated that several years will be required for vegetation to fully establish over these sediments. Once developed, this vegetation will play a crucial role in visibly reducing sediment erosion and halting the transport of sediments from the pond to the Duje headwaters.

If relevant, clearly indicate how a project amendment led to the results achieved and what would have been different if the amendment had not been agreed upon.

Since the Mid-Term Report was submitted in July 2021, DIVAQUA has requested for two amendments.

The first one was prompted by changes in the operations of one of DIVAQUA beneficiaries, Navarro Generación S.A.U., which sold all its facilities located in the DIVAQUA area to ALTANO. Consequently, this amendment was required to replace Navarro Generación by ALTANO in the DIVAQUA consortium.

The second amendment was necessary, mainly because ALTANO notified to the consortium about a delay in the completion of the subaction *C4.5 Connectivity improvement of Restaño Dam, Dobra River*. This delay was attributed to an unexpected event, information which had not been previously communicated to the coordinating beneficiary (UC). Consequently, this setback impacts the timely completion of subaction C4. The representative from ALTANO explained that the unforeseen event arose from a highly eroded and deteriorated retaining wall located adjacent to the fish passage. Addressing this issue necessitated the construction of a new retaining wall. Although the problem has been resolved and the new retaining wall has been built, the overall construction work has been delayed. Thus, in this amendment a project extension was granted, from Feb-2024 to Sep-2024.

In this context, both amendments were crucial for the successful completion of conservation subaction C4.5. Additionally, the project extension, from Feb-024 to Sep-2024, significantly enhanced other monitoring activities (Actions D). These included tasks requiring eDNA techniques and wetland monitoring, as the fieldwork for the Botanical Report—aimed at evaluating the outcomes of subactions C1.3 and C2.3 on CI habitats—was conducted in July 2024. The extension also benefited the socio-economic impact assessment of DIVAQUA (Action D3.1), as phone interviews and surveys were conducted at the end of summer 2024.

Describe the results of the replication efforts.

No replication efforts were done.

Indicate the effectiveness of the dissemination activities and comment on any major drawbacks.

Dissemination actions were successfully finished. Some indicators of their effectiveness are:

1- Three presentation sessions in each one of the 3 DIVAQUA regions, attended by 14 municipal majors and neighbourhood meetings.

2- Closing session (Santander, 17/09/2024). More than 80 people attended in person and online.

3- DIVAQUA website (open to the public at spring-2020). Final numbers: 39.479 visitors (11.191 users and 18.465 open sessions). During the project lifetime, a total of 98 posts were written and published in the news section of the website.

4- Social Media: 1) Facebook: 414 followers, 443 post, 95.462 audience and 27.856 interactions. 2) YouTube channel: 7 videos (>2.250 views).

5- Traditional media: 92 publications (8 printed, 74 digital, 7 interventions on radio and 3 on TV).

6- Information panels: 8 information panels with QR codes were installed in strategic places of the PENP to inform about the aquatic species that inhabit the area.

7- Since the beginning of the project 22 notice boards were designed and installed.

8- Layman's report. Published in Spanish and English in sep-2024 (printed and digital). Available in www.lifedivaqua.com.

9- Awareness program against global change. Three meetings: one online session "*Nature vs. Climate Change*" and two face-to-face meetings "*DIVAQUA-CAMBIA*" and "*DIVAQUA-CAMBIO*", in Cantabria and Asturias, with 45 participants and 96 online (more than 350 views on YouTube).

10- DIVAQUA-FORMA training program. Two workshops with experts and a total of 41 participants.

11- Activities with volunteers, with a participation of 80 volunteers.

12- DIVAQUA collaboration and agreement program. Four thematic workshops with field visits. A total 73 attendees participate in these workshops (local socioeconomic agents and neighbours, rangers and national and international students).

13- Generation of social participation in the agreement of aquatic ecosystems uses. Six meetings were held in Asturias (1), Cantabria (2) and León (3) with a total of 17 participants.

14- DIVAQUA-PARTICIPA sessions with the total participation of 43 people.

Main drawbacks were at the beginning of the project due to social restrictions as a consequence of the COVID-19 pandemic.

Policy impact

The main project actions are in concordance with the conservation objectives of the management plans of the ZEC included within the DIVAQUA area (*e.g*. Decreto 18/2017 for Cantabria SAC) to comply with the HD, as well as with the objectives of the Spanish Hydrologic Plan, in regards to the WFD. Moreover, all the DIVAQUA conservation action are also alienated with the objectives of the European Green Deal (Comission Comunication 11/12/2019) and the new Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024 on nature restoration and amending Regulation.

The main policy difficulty was related with the different administrations that we have to deal with for the development of the project. DIVAQUA area is located in the territory of 3 different regions (Cantabria, Asturias and Castilla y León), so we have to deal with each regional (and

local) government for the implementation of the different actions. Moreover, we also have to include the water management agency (*Confederación Hidrográfica del Cantábrico*) to ask for the different permits in order to be able to execute the proposed project actions.

Describe how the project delivered the results foreseen in the Grant Agreement

Regarding HD all the DIVAQUA results were delivered to the managers of the PENP, that is, to the *Consorcio Interautonómico del Parque Nacional de Picos de Europa*, where the 3 regional administrations, responsible of the implementation of the HD, are represented by one member (3 co-directors of the PENP). Thus, Cantabria, Castilla y León and Asturias had all the information developed in DIVAQUA regarding habitats and species of CI and ZEC (habitat cartography, eDNA results, etc.) though the PENP Government Organism. Additionally, we have delivered specific information to these Regional Governments upon request (*e.g.* results of eDNA for several species, such as *G. pyrenaicus*).

Other conservation actions targeting the physical elements of the fluvial ecosystems (hydromorphological elements as defined by the WFD), such as the removal or permeabilization of river barriers (dams and weirs), were coordinated with the *Confederación Hidrográfica del Cantábrico*, the entity responsible for implementing the WFD in the Deva-Cares and Sella basins. A report detailing the monitoring results of these actions will be submitted to this institution in the coming months.

Moreover, the experience acquired during the development of DIVAQUA, and also in previous works, has been very useful to collaborate with the *Organismo Autónomo de Parques Nacionales*, (Spanish Ministry for the Ecological Transition) to define a unified methodology for long-term monitoring of aquatic ecosystems in all mountain national parks across Spain.

6.4. Analysis of benefits

1. Environmental benefits

a- Direct/quantitative environmental benefits:

DIVAQUA conservation actions have restored, created or protected several habitats and have increased the distribution of species of CI.

- Species. DIVAQUA generated 6 new colonies of *W. radicans*, a fern species of CI present in northern Spain, by collecting bulbs from wild populations of Cantabria. Bulbs were germinated in a plant nursery, resulting in 98 plants used to create the new colonies in the localities of Ponga, Casaño, Tanarrio, Basieda, Cimiano and Navedo. We can conclude that all the colonies have been successfully developed in this period, showing new reproductive structures in the last visits. On the other hand, the improvement of the connectivity of fluvial ecosystems in Sella, Deva and Cares basins (actions C3 and C4) have increased the distribution area of fish species of CI as *S. salar*, at least in 20 km, as this species has been found upstream of Depuradora de Potes for the first time. We expect to increment further the distribution of the species as it takes several years for salmonids to recolonize new areas. The improvement of river connectivity as well as the other conservation actions implemented, such as C2.3 and C2.4 to restore lentic water bodies are expecting to yield more environmental benefits in the coming years, for example to improve the status or increase the distribution of other species of CI such as *C.lusitanica* or *G. pyrenaicus*.
- Habitats. Under subaction C1.1 we have created 3.3 ha of priority habitat 91E0*. The improvement of river connectivity and restoration of the natural hydrological regime

under actions C3 and C4 will further enhance the expansion of this priority habitat. By the execution of actions C1 and C2 we have restored 5.1 ha of priority habitat 7140 (Transition mires and quaking bogs) and also restored other priority habitats such as 7230 (Alkaline fens) (see botanical report in annex 4 of D4- Technical document with the results of Key Performance Indicators (KPIs)).

Other actions proposed to improve the water quality of aquatic ecosystems in the DIVAQUA area (C.1.3 and C2.1) follow the same objectives that proposed in the Spanish Hydrologic Plan, regarding the WFD. We have results of the water quality parameter ¨ammonium¨ in Ercina lake and the preliminary data indicate a reduction on ammonium concentration, possible due to the fence installed in Ercina lake under actions C1.3.

b- Qualitative environmental benefits

Several actions of DIVAQUA involved qualitative environmental benefits, summary of these benefits is detailed below:

- Hábitats: Besides the habitat restoration of 91E0 in 3,3 ha, within the DIVAQUA project we have done several actions that help further the recovery of habitat 91E0:
  -The removal of river barriers reconnects rivers with floodplains, promote sediment transport while restoring natural hydrological regimes.
  -Engaging local communities and stakeholders providing education and outreach to raise awareness as stated in deliverable ¨D3-Quantification of the socioeconomic impact of DIVAQUA¨. In addition, we have done and analysis of land use/land cover under current situation and in a future scenario in the DIVAQUA area and it is expected that due to the abandonment of agricultural practices, forest extension will increase by 2049 in more than 50% (subaction E2.1 Programa sensibilización frente al cambio climático – Annex 3, slide 6- Deliverable D4- Results of KPIs).
  For the reasons detailed above, although the habitat 91E0* in the Cantabric region has an unfavourable-bad conservation status (according to European Environment Agency https://eunis.eea.europa.eu/habitats/10198) we expect that the habitat trend of habitat 91E0* will increase beyond 5 years at a rate of 4% annually Gotelli, 2008; Penman et al., 2003). Based on this, the total area of 91E0* beyond 5 years will be 1249.74 + 270.76= 1,520.50 ha
  The distribution area of the habitat 7140 is largely unknown in the DIVAQUA area. From the Natura 2000 SPA sites present in the DIVAQUA area, this habitat has an area of 86.32 Ha. In the DIVAQUA project we have restored 5.1 ha of this habitat in the wetlands of Vegacomeya, Ercina Lake, Las Salgardas, Vegabaño and Pedabejo. The presence of this habitat in these areas has been confirmed in the botanical report of 2021 (Annex 4 deliverable D4-Results of KPIs). Beyond 5 years it is expected at least an increase of 1.46 ha more for the protection of this habitat in the wetland Toyellu that PRINCAST is intended to realize (PRINCAST Presentation of the 7th coordination meeting, Annex 2 D4-Results of KPIs). Habitat condition for this habitat is favourable and we expect to remain this way. We expect an increasing trend of recovery taking in account the actions executed in the DIVAQUA and the one expected beyond 5 years.

- Species:
  Salmo salar: The current distribution of *S. salar* in the Deva-cares basin is around 46km (BASES TÉCNICAS PARA LA REDACCIÓN DE LOS PLANES DE GESTIÓN DE LOS ESPACIOS TERRESTRES DE LA RED NATURA 2000 EN CANTABRIA. IH Cantabria), although its potential distribution area reaches at least 76 km. Within actions C3 and C4 we have removed 4 dams in the Deva-Cares basin and improve 3

fish passages (2 in the Deva-Cares and 1 in the Sella basin). The actions taken in DIVAQUA have increase the habitat of *S. salar* in at least 20 km more for 1 dam removal. Considering that we have removed 4, it is expected a higher habitat increase beyond 5 years. In addition, a 5th weir is expected to be demolished in the coming years (Niserias dam, increasing in 30 km more the habitat of *S. salar*). The project for this demolition has been done during DIVAQUA lifetime and the estimated cost is 21,602 € (Annex 10 -Page 58 Deliverable D4-Results of KPIs), it is expected that the public administration PRINCAST together with CHC (Confederación Hidrográfica del Cantábrico) execute this action within the next 5 years.
The conservation status of *S. salar* in the Spanish Atlantic region is unfavourable-1 (U1) and we expect to remain this way beyond 5 years. Habitat trend was decreasing at the beginning of the project but we the actions taken in DIVAQUA the habitat trend will increase in the coming years.
Woodwardia radicans: The precise distribution of *W. radicans* in the DIVAQUA area is unknown, although we do know the existence of the species in 5 different colonies in the DIVAQUA area. The distribution area is estimated based on a 10x10 km grid per colony. Within the DIVAQUA project we have doubled the number of colonies of *W.radicans* in the project area. After DIVAQUA there are 11 colonies, ca 1000 km^2. (See deliverable ¨D1. Evaluación del resultado de las actuaciones de restauración realizadas en C1 y C2¨). Due to the reasons explained above, regarding expected increasing trend of 91E0*, we expect the species trend to increase after the project ends.

Besides the results on habitats and species, DIVAQUA has other qualitative environmental benefits:

- Restoration of the river natural hydrological regime: Results of the monitoring of actions C3 showed how fluvial processes has been restored. For example, results showed how sediments accumulated upstream of each weir were mobilized and transported to downstream sections after demolitions. In terms of river functioning, the estimation of metabolism indicates a reduction in heterotrophy post-demolition, leading to lower CO_2 emissions from the water column to the atmosphere. The restoration of these fluvial processes and the natural hydrological regime will benefit not only the species of CI, it is an improvement at ecosystem level, providing positive impacts for algae, macrophytes, bacteria and also riparian vegetation.
- Updated information on habitats and species distribution. Within action A2, we have updated the distribution of several species of CI, pathogen and invasive species. From many of these species, their distribution was completely unknown. Thanks to the results presented in DIVAQUA (see section 6.1 Action A2 of this report and deliverables A2), we have now updated maps with the distribution of these species, providing a valuable information for the public administration of the autonomous communities involved, Cantabric Hydrographic Confederation and the national park. In addition, combining the updated distribution of species and the physic-chemical information, we have performed an evaluation of water bodies to prioritize conservation actions in all the different water bodies existing in DIVAQUA: Lakes, wetlands, water troughs and lotic ecosystems.

  Within action A3.1 we have provided a cartography of habitats that was not available before for the DIVAQUA area see deliverables A3. Distribution maps of terrestrial and aquatic habitats in the DIVAQUA area. Also, we have obtained a botanical report with detailed information of the distribution of habitats present within or near DIVAQUA

wetlands and lakes, see annex 4 deliverable D4-Evaluacion de indicadores de rendimiento.

- New tools and approaches for sustainable management of the area DIVAQUA. The DIVAQUA project has developed numerous methodologies and valuable tools for managing the area that were previously unavailable. Below is a description of each new tool and its methodological innovations:

- Inventory and Mapping of Lentic Bodies: The DIVAQUA area includes numerous small water bodies that were not previously mapped. Having an inventory and mapping of these bodies is crucial for ecosystem management, connectivity measures, sampling, monitoring, and estimating current and future water availability. The physical characterization of lentic water bodies was carried out using GIS technology. A total of 285 lentic water bodies, including wetlands and lakes/ponds, were identified and inventoried in the DIVAQUA area.

  -Inventory of Hydraulic Infrastructures: A novel inventory of hydraulic infrastructures was created, including descriptive files for each structure and an assessment of their passability. This work was critical for identifying barriers to remove and fish passages to restore, as detailed in the deliverable on hydraulic infrastructure in the Sella and Deva-Cares basins.

  -Characterization of Riparian Habitats: Riparian habitats in the DIVAQUA area were mapped at physiognomic and phytosociological levels using distribution models based on remote sensing data. This work distinguished between Eurosiberian forests (91E0* and 9160) and Mediterranean forests (92E0) with over 70% model accuracy.

  -Mapping Terrestrial Vegetation Using Remote Sensing: Predictive vegetation mapping models based on environmental variables and remote sensing techniques (satellite imagery and LIDAR) were developed. The models accurately estimated the areas of occupation (AOO) for various habitat types, achieving validation precision of 67.6%, with some habitat types exceeding 80% accuracy.

  -Modeling the Natural Hydrological Regime: The SPHY hydrological model was applied to assess the future availability of water under climate change scenarios. Results indicate generalized reductions in water flow in the Deva-Cares and Sella basins by 21.2% and 18.7%, respectively. This highlights the potential impact on agriculture, livestock, and tourism sectors dependent on aquatic ecosystems.

  - Proposal for Environmental Flows: To sustain the ecological integrity of aquatic ecosystems, minimum flow regimes were proposed for 17 study points in the DIVAQUA area, considering anthropogenic pressures like water extraction for hydroelectric power, human consumption, and irrigation.

  - Ecosystem Services Assessment and Future Scenarios: Using the Common International Classification of Ecosystem Services (CICES), the project assessed current ecosystem services and those under future climate change scenarios. Services mapped included: Hydrological services (runoff, floodplain water storage, freshwater provisioning); Regulation of erosion and sediment transport; Water temperature regulation; Provision of grazing areas; This analysis is crucial for maintaining ecosystem health, maximizing societal benefits, and supporting conservation and management strategies. The full methodologies and management tools are compiled in the deliverable A3. Methodological Guide for the Conservation of Aquatic Diversity in Mountain Areas.

2. <u>Economic benefits</u>

The implementation of the eDNA technique in the aquatic ecosystems of the DIVAQUA area could be identified as a business opportunity. By using this novel technique to precisely identify the key organisms of the project (protected species, pathogens, species of commercial interest, etc.) it is possible to decrease the costs, and increase the accuracy of taxonomical assignments. As a result, it is a potential and highly valuable tool to be used in the management of aquatic ecosystems.

The increment in the distribution of key species (e.g. *Salmo salar*) will bring economic benefits to the DIVAQUA area for example by the increment in demand-derived services based on human values (fishing). In addition, the increment in the distribution area of key species of the DIVAQUA project will increment ecosystem services such as ecosystem functioning and resilience.

Attending to the jobs, the development of the DIVAQUA project has helped to generate 5 different work contracts in the UC (three of them in force), 2 in ITAGRA (both in force), 3 in CAMBERA (one of them in force) and 2 contracts in CSIC. Moreover, the project also helps to consolidate several employments in FIHAC, ITAGRA and CAMBERA. The total FTEs created in the project are 2.5. (See detailed information in deliverables D4- Technical document with the results of Key Performance Indicators (KPIs) and D4-Evaluation of Key Performance Indicators (KPIs)).

The executed budget of the items “external assistant” and “travel” has had a positive impact in companies and freelance people of the regions where the DIVAQUA area is located (Botanists, instrumental maintenance technics, hostelry, etc.).

3. Social benefits

The cooperation that took place between the associated beneficiaries of DIVAQUA represent a social benefit. This is because the project was able to connect people from very disparate disciplines such as scientists, land managers, farmers in a way in where they can cooperate to protect aquatic ecosystems while at the same time, the needs of the local people are listened. This occurred for example, in the restoration of cattle drinking troughs. We have developed a cattle trough design to assure there is always water resources available to maintain amphibian populations but at the same time, we have cooperated with the farmers to restore or set up the drinking troughs that are most convenient for them. We have implemented compensatory measures to integrate socio-economical uses in the area as farming (these measures were land brushing and paddocks restoration in Asturias and Castilla y León). By doing that, farmers were happy with the measures implemented and they respect the fences and restoration actions done in DIVAQUA. DIVAQUA was a project with a high present in the area, before each of the conservation actions were executed we have talked with neighborhood council, land managers, farms and local guards. Little by little, the project was getting noticed and acceptance of the project improved. Another example is that land managers have asked us to create a DIVAQUA species guide so it can be used for tourists that visit the park every year.
DIVAQUA have reached 15,878 people via dissemination actions and the rest of communication activities such as meetings, workshops and volunteer work. Based on the results of the interviews, we have found that around 75% of interviewed people now how more knowledge regarding aquatic ecosystems and awareness rose thanks to the communication activities done within DIVAQUA (see deliverable E3. Quantification of the socioeconomic impact of DIVAQUA). In addition, the activities that obtained the higher score were all the activities related to dissemination and communication.
With all these synergies, we have created a social benefit because all the different parties involved in the territory are connected and integrated enabling a sustainable use of the

DIVAQUA area. Besides, the DIVAQUA project has created already 10 jobs, while always taking in account gender equality/religion/ethnic integration in to account.

4. Replicability, transferability, cooperation:

For the DIVAQUA project, the cooperation with external entities and the replicability and transferability of project techniques and results is a key aspect, and therefore this was contemplated in two actions of the project (A3 and E4). The development of a methodological guide for the conservation of aquatic diversity in mountain areas (Action A3) will be used to export the results of the project to other mountain regions at national and international level. For example, during a meeting with Daniel Guinart working in LIFE Trito Montseny, we have shared the DIVAQUA methodological guide because he is interested in applying hydrological and land use models to his project and future ones (we are in touch for preparing a new LIFE proposal). Besides the possible replication in Parque Natural y Reserva de la Biosfera de El Montseny, Marta Valle Agudo from another LIFE Project that is currently ongoing in the DIVAQUA area, Steps for LIFE, have contacted us to share our experience and recommendations for implementing conservation area in wetlands close to Fuente Dé. We are also preparing a meeting with Anna Kirk Larsen from Greater Copenhagen EU Office. They are currently developing a nature restoration project that will apply for LIFE funding in September 2025 together with three Danish municipalities and one Swedish county. The project seeks to create ecological corridors both within and outside Natura 2000 sites, targeting a relatively wide range of species and habitats, including aquatic ecosystems. She wants to learn from our restoration approach, particularly regarding the innovative use of monitoring tools and eDNA.
Within action E4, we have participated in an international network of long-term research, LTER platform. We have contacted all entities working in the DIVAQUA area (Research institutes, Universities) to create the LTSER node of Picos de Europa. eLTER catalyzes scientific discovery and insights through its state-of-the-art research infrastructure, collaborative working culture, and transdisciplinary expertise. This long-term research and cooperation with natural areas and national park at national and at European level will promote the cooperation and transferability of restoration and monitoring actions taken in DIVAQUA. In addition, LTSER involves a socio-ecological platform, in where we combine our socio-ecological approach in studying integrated human-nature systems and our commitment to integrating stakeholder knowledge. Thanks to the work carried out in DIVAQUA and the long-term monitoring we are carrying out in the area, DIVAQUA scientists are now developing, together with other European scientists, protocols for standard observations in LTER nodes, aiming in contribute to policy recommendations for routine sampling and monitoring of mountain aquatic ecosystems. In addition to this, we are getting new financing from the governments of Cantabria, Asturias and Castilla y León to continue the monitoring and research activities done in DIVAQUA (water physic-chemical characterization, monitoring of key species with eDNA and traditional methods) during summer 2024 and it is expected to get this financing every year.

5. Best Practice lessons:

The best practice measures of the project are the realization of methods and techniques that has been proved successful for conservation purposes. For example, through the hydrological model that we have developed, we have proposed appropriate environmental flows to apply in the DIVAQUA area, according to different scenarios of climate change and in compliance to the Spanish legislation of hydrological planning (ORDEN ARM/2656/2008). Another example

of best practice lessons was the permeabilization of dams/weirs done under actions C3 and C4. To carry out these actions, each infrastructure was analysed independently and we have implemented methodologies that has been proven successful in similar construction works (e.g. RIVERLINK - LIFE12 ENV/ES/001140). Similarly, in action C2, we have restored wetlands and peatbogs, following the methodology applied in the project LIFE TREMEDAL (LIFE11 NAT/ES/707). Action D3 (Evaluation of socio-economic impact and ecosystem services) also took in account the results of other European projects, for example AQUACROSS from the H2020 program or PESFOR a project from the COST program. Following AQUACROSS, for the development of models of action D3 we have selected their tools for the spatial evaluation of ecosystem services.

6. Innovation and demonstration value:

The DIVAQUA project has an important demonstration value because its implementation is based on a multidisciplinary methodology that combines the restoration of the physical and biological environment in aquatic lentic and lotic systems as well as the inclusion of novel techniques such as environmental DNA and novel modelling techniques. The proposed strategy for the restoration of aquatic ecosystems in the DIVAQUA area can be replicated in to other aquatic ecosystems in mountain areas with a similar environmental issue.
The technique that we have applied in preparatory action A2 based on eDNA is a novel technique that is implemented in the DIVAQUA area for the first time. This technique has provided the DIVAQUA project with novel insight about species distribution that has never been done before. As a result, the species distribution maps that came out as an output of the project updated the current information about the 25 key species that are the focus of the project (including key species, invasive and pathogens). Besides, the technique is more cost-effective than traditional methods for the characterization of aquatic fauna that are based on traditional sampling and taxonomical identification. The methodology applied in the technique of eDNA have followed the latest research and updates published under the European Cost Action DNAqua-Net, in which members of UC-IHC also contribute.
Additionally, under preparatory action A1 and A3, a novel methodology has been applied based on the information obtained by multispectral image processing provided by satellite programs (Landsat-8, Sentinel-2A y -2B, y DEIMOS-1 y -2) and LIDAR information. For this, the achievements of the ALICE project from the INTERREG SUDOE program (in where UC-IHC is a coordinating beneficiary) have been taken in to account

7. Policy implications:

The development of the DIVAQUA conservation actions (particularly those where construction works were needed) inside the limit of the public aquatic domain is being one of the main threats of the DIVAQUA project. This is because the long time that take to obtain the permits, the paper work needed and also because some of the information we have counted in with at the beginning of the project about the concession of granting rights were out of date. As a result, we have found that some of the aquatic barriers that we have planned to demolish during the project had a granting right in force. These circumstances made us to change some of the original plans for barrier permeabilization. In addition, the implementation of some actions took longer than expected due to the long bureaucratic issues for example in order to get the permits (subaction C2.1).

7. Key Project-level Indicators

Within the DIVAQUA project, we have reported the results of several KPIs belonging to the sections: area/length and population affected by the project (code 1.5 and 1.6), environmental and climate action outputs and outcomes (codes 2.2; 2.3.2; 2.3.7; 7.3; 7.4; 7.5.2; 8.2), societal outputs and outcomes (codes 10.2; 11.1;11.3; 12.1) and economic outputs and outcomes (codes 13; 14.1;14.2.1; 14.3; 14.4.1). The table below (Fig. 42) shows the results of all the KPIs of the project.

COMPOUND CONTEXT	CODE	INDICATOR NAME	FIRST LEVEL DESCRIPTOR	START	END	BEYOND	UNIT
DIVAQUA intervention area	1.5	Project area/length	Area of environmental/climate actions	0	187771	387378	ha
Lotic ecosystems	1.5	Project area/length	Area of environmental/climate actions	0	120	160	km
Lentic ecosystems	1.5	Project area/length	Partial reduction of specific pressures/threats	0	50.91	64.37	ha
DIVAQUA intervention area	1.6	Humans (to be) influenced by the project	Persons whose lives were directly, positively impacted	0	20	20	Nº of residents
DIVAQUA intervention area	1.6	Humans (to be) influenced by the project	Persons who may have been influenced via dissemination	0	45000	60000	Nº of non-resident persons regularly present
DIVAQUA intervention area	1.6	Humans (to be) influenced by the project	Persons whose lives were directly, positively impacted	0	5000	10000	Nº of residents within or near the project area
DIVAQUA intervention area	1.6	Humans (to be) influenced by the project	Persons who changed their behaviour	0	12	12	Nº of residents within or near the project area
DIVAQUA intervention area	1.6	Humans (to be) influenced by the project	Persons who may have been influenced via dissemination	0	15878	18787	Nº of non-resident persons regularly present
Lotic ecosystems	2.2	Aquatic extent affected by the pressure	Aquatic extent affected by the pressure or risk addressed	193	73	33	km
Lentic ecosystems	2.2	Aquatic extent affected by the pressure	Aquatic extent affected by the pressure or risk addressed	170.5	147.95	147.95	ha
Lentic ecosystems	2.2	Aquatic extent affected by the pressure	Aquatic extent affected by the pressure or risk addressed	170.5	119.59	106.13	ha
Lotic ecosystems	2.2	Aquatic extent affected by the pressure	Aquatic extent affected by the pressure or risk addressed	193	40	40	km
Lotic ecosystems	2.3.2	Dams, barriers and locks	Other	193	125	95	km
Lotic ecosystems	2.3.2	Dams, barriers and locks	Other	99	95	94	Nº of barriers removed or altered
Lotic ecosystems	2.3.2	Dams, barriers and locks	Energy-hydropower	193	52	52	km
Lotic ecosystems	2.3.2	Dams, barriers and locks	Energy-hydropower	6	3	3	Nº of bypasses built
Lotic ecosystems	2.3.2	Dams, barriers and locks	Energy-hydropower	26	23	22	Nº of bypasses built
Lotic ecosystems	2.3.2	Dams, barriers and locks	Other	73	10	0	km
Lotic ecosystems	2.3.2	Dams, barriers and locks	Other	4	1	0	Nº of barriers removed or altered
Lotic ecosystems	2.3.2	Dams, barriers and locks	Energy-hydropower	193	141	131	km
Lentic ecosystems	2.3.7	Diffuse source pollution	CAS_14798-03-9 – Ammonium	10.35	0	0	ug/L
Lentic ecosystems	2.3.7	Diffuse source pollution	CAS_14798-03-9 – Ammonium	1.01	0	0	kg/year
DIVAQUA intervention area	7.3	Natural and semi-natural habitats	Annex I Habitats Directive-7140-Transition mires and quak	5.1	5.1	6.56	ha
DIVAQUA intervention area	7.3	Natural and semi-natural habitats	Annex I Habitats Directive-91E0-Alluvial forests with A. glu	1246	1256	1256	ha
DIVAQUA intervention area	7.3	Natural and semi-natural habitats	Annex I Habitats Directive-7140-Transition mires and quak	1	1	2	ha
DIVAQUA intervention area	7.3	Natural and semi-natural habitats	Annex I Habitats Directive-91E0-Alluvial forests with A. glu	0	3.3	270.76	ha
DIVAQUA intervention area	7.4	Wildlife species	EU Habitats Directive Annex IV *W. radicans*	500	1000	1500	km2
Lotic ecosystems	7.4	Wildlife species	EU Habitats Directive Annex V *S.salar*	46	56	66	length of inhabited feature in km
Lotic ecosystems	7.4	Wildlife species	EU Habitats Directive Annex II *S. salar*	16.3	20	20	nº of subadults
DIVAQUA intervention area	7.4	Wildlife species	EU Habitats Directive Annex IV *W. radicans*	5	10	15	nº of colonies
DIVAQUA intervention area	7.4	Wildlife species	EU Habitats Directive Annex IV *W. radicans*	500	1000	1100	km2
Lotic ecosystems	7.4	Wildlife species	EU Habitats Directive Annex II *S. salar*	25	35	45	length of inhabited feature in km
DIVAQUA intervention area	7.4	Wildlife species	EU Habitats Directive Annex IV *W. radicans*	5	10	11	nº of colonies
Lotic ecosystems	7.4	Wildlife species	EU Habitats Directive Annex V *S.salar*	1200	1200	1200	nº of adults
Lotic ecosystems	7.4	Wildlife species	EU Habitats Directive Annex V *S.salar*	46	66	76	length of inhabited feature in km
Lotic ecosystems	7.4	Wildlife species	EU Habitats Directive Annex V *S.salar*	1200	1400	1400	nº of adults
Lotic ecosystems	7.5.2	Other threats	wild species				
Lotic ecosystems	7.5.2	Other threats	wild species				
Lotic ecosystems	8.2	Carbon sequestration	Aquatic natural	0	11826	11826	kg/ha/year
DIVAQUA intervention area	8.2	Carbon sequestration	Carbon capture and storage site (CCS)	15000	18000	18000	kg/ha/year
DIVAQUA intervention area	10.2	Involvement of (NGOs), other stakeholders	Volunteers	0	60	80	nº of individuals
DIVAQUA intervention area	10.2	Involvement of (NGOs), other stakeholders	Private for profit	0	3	3	nº of stakeholders
DIVAQUA intervention area	10.2	Involvement of (NGOs), other stakeholders	NGO	0	5	5	nº of stakeholders
DIVAQUA intervention area	10.2	Involvement of (NGOs), other stakeholders	NGO	0	20	25	nº of stakeholders
DIVAQUA intervention area	10.2	Involvement of (NGOs), other stakeholders	Volunteers	0	80	80	nº of individuals
DIVAQUA intervention area	10.2	Involvement of (NGOs), other stakeholders	Public body/bodies	0	7	7	nº of stakeholders
DIVAQUA intervention area	10.2	Involvement of (NGOs), other stakeholders	Other civil society organisations	0	5	5	nº of stakeholders
DIVAQUA intervention area	11.1	Website (mandatory)	No. of unique visits	0	25000	80000	Nº of unique website visits
DIVAQUA intervention area	11.1	Website (mandatory)	No. of unique visits	0	11191	14191	Nº of unique website visits
DIVAQUA intervention area	11.3	Surveys carried out regarding awareness	Individuals	0	180	180	nº of individuals surveyed
DIVAQUA intervention area	11.3	Surveys carried out regarding awareness	Individuals	0	132	132	nº of individuals surveyed
DIVAQUA intervention area	12.1	Networking (mandatory)	Members of interest groups / lobby organisations	0	2000	3000	Nº of individuals
DIVAQUA intervention area	12.1	Networking (mandatory)	Professionals - experts in the field	0	3	4	Nº of individuals
DIVAQUA intervention area	13	Jobs	Jobs	0	20	10	Nº of FTE
DIVAQUA intervention area	13	Jobs	Jobs	0	2.45	2	Nº of FTE
DIVAQUA intervention area	14.1	Running cost/operating costs during the pr	Running cost/operating costs during the project and expec	0	2361506	3004255.04	€
DIVAQUA intervention area	14.1	Running cost/operating costs during the pr	Running cost/operating costs during the project and expec	0	2361506	2430000	€
DIVAQUA intervention area	14.2.1	Capital expenditure expected in case of co	Capital expenditure expected in case of continuation/replic			68494	€
DIVAQUA intervention area	14.2.1	Capital expenditure expected in case of co	Capital expenditure expected in case of continuation/replic			642749.04	€
DIVAQUA intervention area	14.3	Future funding	Beneficiary own contribution			473499.04	€
DIVAQUA intervention area	14.3	Future funding	Grants, subsidies			50000	€
DIVAQUA intervention area	14.3	Future funding	Grants, subsidies			169250	€
DIVAQUA intervention area	14.4.1	Entry into new entities/projects	Continuation				
DIVAQUA intervention area	14.4.1	Entry into new entities/projects	Replication				
DIVAQUA intervention area	7.3	Natural and semi-natural habitats	Habitat Trend	- (declining)	= (stable)	+ (improving)	
DIVAQUA intervention area	7.3	Natural and semi-natural habitats	Habitat Trend	x (unkonwn)	= (stable)	+ (improving)	
DIVAQUA intervention area	7.3	Natural and semi-natural habitats	Habitat Condition	unfavourable -	unfavourable	unfavourable	
DIVAQUA intervention area	7.3	Natural and semi-natural habitats	Habitat Condition	unfavourable -	unfavourable	unfavourable	
DIVAQUA intervention area	7.3	Natural and semi-natural habitats	Habitat Trend	x (unkonwn)	+ (improving	+ (improving)	
DIVAQUA intervention area	7.3	Natural and semi-natural habitats	Habitat Condition	favourable	favourable	favourable	
DIVAQUA intervention area	7.3	Natural and semi-natural habitats	Habitat Trend	- (declining)	= (stable)	+ (improving)	
DIVAQUA intervention area	7.3	Natural and semi-natural habitats	Habitat Condition	favourable	favourable	favourable	
Lotic ecosystems	7.4	Wildlife species	Species Trend	- decrease	0 stable	0 stable	
Lotic ecosystems	7.4	Wildlife species	Species Status	unfavorable -	unfavorable	unfavourable	
Lotic ecosystems	7.4	Wildlife species	Species Trend	- decrease	- decrease	0 stable	
DIVAQUA intervention area	7.4	Wildlife species	Species Status	unfavourable -	unfavourable	unfavourable	
Lotic ecosystems	7.4	Wildlife species	Species Status	unfavorable -	unfavorable	unfavourable	
Lotic ecosystems	7.4	Wildlife species	Species Status	unfavourable -	unfavourable	unfavourable	
Lotic ecosystems	7.4	Wildlife species	Species Trend	- decrease	- decrease	- decrease	
DIVAQUA intervention area	7.4	Wildlife species	Species Trend	x unknown	x unknown	x unknown	
DIVAQUA intervention area	7.4	Wildlife species	Species Trend	x unknown	x unknown	x unknown	
DIVAQUA intervention area	7.4	Wildlife species	Species Status	unfavourable -	unfavourable	unfavourable	

Figure 42. Snapshot summary of project KPIs

The DIVAQUA Project had the following specific objectives:

- Restore numerous aquatic species and habitats to a favourable conservation status.
- Reduce human pressure on biological diversity.
- Promote the sustainability of productive, educational, cultural, and tourist activities, minimizing their impact on aquatic ecosystems.
- Develop new tools and approaches to improve the characterization, monitoring, assessment, and management of species and habitats.

To achieve these objectives, we have performed the following actions:

Improve knowledge of the distribution of species and the structure of CI habitats:
Habitats: The project mapped the vegetation of terrestrial and aquatic habitats in the DIVAQUA area. This mapping established the baseline for monitoring actions and generated habitat change models using data from remote sensing (e.g., LiDAR, multispectral imagery), environmental variables (e.g., topography, climate), and spatial modeling.

OUTPUT	Update the Inventory and mapping of habitats of CI in the Natura 2000 SAC within the DIVAQUA area

Comparison to Proposal: No deviations from the original proposal.
Species: Environmental DNA techniques improved the understanding of the distribution of several CI species, including the Iberian desman (*Galemys pyrenaicus*), European crayfish (*Austropotamobius pallipes*), and amphibians. Positive detections of the Iberian desman in new localities were particularly significant. Amphibian habitats like troughs were also highlighted for restoration to support reproductive success.

OUTPUT	Update the distribution of aquatic species of CI in Sella and Deva-Cares basins SAC
OUTPUT	Prioritization of actions in different water bodies and drafting of safety protocols

Comparison to Proposal: No deviations.

Enhance river connectivity by removing barriers in the Deva-Cares and Sella River basins: Actions included removing four weirs and improving three fish passages, resulting in 120 km of improved river connectivity (expected to reach 160 km with further actions). Salmon were detected upstream for the first time since the existing records.

OUTPUT	Definition of environmental flow regimes for the rivers in these 2 basins.
KPI	Fluvial extent affected by the pressure (Barriers) have been reduced from 193 km to 73 km
KPI	Increase of potential area for *Salmo salar* in 20 km
KPI	Number of dams/weirs decreased from 99 to 95
KPI	Fluvial extent affected by the pressure (Barriers) have been reduced from 193 km to 125 km
KPI	Number of fish passage to be restored from 26 to 23
KPI	Fluvial extent affected by the pressure (fish passage) have been reduced from 193 km to 141 km

Comparison to Proposal: The original proposal specified improving connectivity across 185 km in these basins, including restoring the channelled Corbera River. However, due to actions that could not be carried out (C1.4 Corbera River, C4.4 Cain fish passage improvement, and

modifications to C4.5 and C4.6 for the Restaño fish passage), the connectivity improvement totals 120 km at the project's conclusion.

Reduce anthropogenic impacts on aquatic ecosystems and improve water quality by addressing runoff issues in the Duje River.

Efforts included constructing a sediment retention dam and fencing a perimeter to promote vegetation growth in the Duje river. However, vandalism and structural failures hindered full success.

OUTPUT	Improve sediment retention in 250 m^3 in the Duje river (Deva-Cares basin)

Comparison to Proposal: Sediment retention succeeded, but other measures were less effective, (see action C2.1 in this report). As a result, this action was partially completed and we weren't able to assess improvements in water quality.

Enhance the structure and functionality of riparian forest habitat 91E0* and associated species (Woodwardia radicans).

Riparian forest habitat increased by 3.3 ha in the Cares river. Six new colonies of *W. radicans* were established.

OUTPUT	Increment of area of habitat 91E0* from 1246.44 ha to 1249.74 ha
OUTPUT	Reintroduction of *W. radicans*
KPI	Increment from 5 to 11 the number of colonies of *W. radicans*
KPI	Increment from 5000 to 10000 km^2 the area of W. *radicans*

Comparison to Proposal: The other actions originally planned to improve habitat 91E0*, specifically C1.2. Improvement of habitat 91E0 in the Duje River* and sub-action C1.3. Establishment of protection for the Lakes of Covadonga, could not be carried out as previously explained in the final report and the corresponding deliverables for these actions. However, as a result, it was possible to increase the total restored area by 45,6% of the originally planned area (7.23 ha). Due to technical and social reasons, the restoration of this habitat could not be achieved in the headwaters of the Duje River or around the lakes, as these areas are used for livestock grazing. The results and indicators for sub-action C1.6 were implemented as originally planned.

Improve the conservation status of lentic habitats through restoration of mountain lakes (Lagos de Covadonga), springs, wetlands, and cattle troughs.

Considering sub-actions C1.3 and C2.3, the DIVAQUA project covered a total area of 49.22 ha (detailed in the deliverable D4 - Technical Document with the Results of Key Performance Indicators).

Regarding the number of water bodies, following the priorities established in the botanical report (see Annex 4 in deliverable D4), the project acted on 7 wetlands and 1 spring. For the watering troughs, a total of 26 troughs were improved (6 in Cantabria, 13 in Asturias, and 7 in Castilla y León), and ramps were installed in 11 water tanks. The interventions on watering troughs went beyond merely installing ramps. In most of them, a basin with a grill was added

to prevent livestock from drying up the trough, ensuring water availability for amphibians and supporting their reproduction.

OUTPUT	Ecological restoration in a total of 8 water bodies (1 mountain springs and 7 wetlands) mostly affected by anthropic alterations related to cattle grazing (water abstraction, cattle trampling, overgrazing, etc.).
OUTPUT	Reduction of the siltation and eutrophication in Covadonga lakes related to cattle grazing and trampling by protection fences of Charca de la Mina and Ercina Lakes
OUTPUT	Restoration of 26 cattle drinking troughs and installation of ramps in 11 water firefighting tanks
OUTPUT	Ecological restoration of 6 fens/bogs (habitat 7140) mostly affected by anthropic alterations related to cattle grazing (cattle trampling, overgrazing, etc.)
KPI	Aquatic extent affected by the pressure from 170.5 to 121.28 ha
KPI	Diffuse source pollution from 10.35 ug/L ammonia to 0 ug/L in Ercina (Covadonga Lake)
KPI	Restored habitat 7140 from 86.32 ha to 91.42 ha

Comparison to Proposal: According to the botanical report generated for the project, the interventions focused on the spring/source at Vega Comeya and the wetlands of Vegabaño **(**2), Pedabejo, Las Salgardas (2), and Vega Comeya (2)**.** This slightly differed from the originally planned 5 wetlands and 5 springs.
Regarding the watering troughs, interventions were carried out on a greater number than initially proposed—26 troughs, compared to the originally planned 15, along with ramps installed in 11 water tanks.
For wetlands, the proposal included interventions in 5 wetlands hosting habitat type 7140. All wetlands where interventions occurred, except for Pedabejo, host habitat type 7140 (see Annex 4 in deliverable D4), accounting for a total of 6 wetlands, thereby fulfilling the requirements of the original proposal.
The originally proposed actions for the Lakes of Covadonga could not be fully executed, as detailed in the final report for sub-action C1.3**.**

Develop tools and methodologies to monitor, determine conservation status, and manage SACs (Special Areas of Conservation), habitats, and CI species.

Within the project, we have generated several tools and developed novel approaches that enhance the information on habitat and species and have generated new cartography (habitat, lentic water bodies, barriers…) and models (ecosystem services, habitats).

OUTPUT	Inventario y cartografía de cuerpos lénticos
OUTPUT	Inventario de infraestructuras hidráulicas
OUTPUT	Caracterización de los hábitats riparios de las cuencas del Deva-Cares y Sella
OUTPUT	Cartografía de la vegetación de hábitats terrestres mediante teledetección
OUTPUT	Modelado del régimen hidrológico natural
OUTPUT	Propuesta de caudales ecológicos para las cuencas del Deva-Cares y Sella
OUTPUT	Detección de especies clave mediante la técnica de ADN ambiental

OUTPUT	Valoración de servicios ecosistémicos y generación de escenarios a futuro

Comparison to Proposal: All tools and approaches planned in the original proposal has been generated.

Increase community engagement in habitat and species conservation through specific participation and dissemination plans.

DIVAQUA counted with an extensive dissemination and awareness program. Within action E2 ¨Awareness and training program¨ we have organized 2 meetings-seminars, 1 online seminar and two workshops with a participation of 86 people that attended in person and 96 online. Within the citizen participation program, we have organized 11 meetings aimed to inform stakeholders, foster social participation and create an atmosphere of acceptance. In addition, we wanted to promote open dialogue with a participatory dynamic to encourage debate and establish lines of future work. We also organized volunteer camps that: 1) spent 3 days in restoring 5 wetlands (installation, maintenance and dismantling of temporary fences; and 2) participated in a clean-up activity along one-km stretch of the Casaño River, where 2,5 tons of trash were removed. In total with the activities organized in action E3 we had 213 participants. Lastly, we managed to obtain 6 land stewardship agreements, allowing us to carry out conservation actions essential to ensure the success of the conservation actions results in the medium, and long term. These agreements, signed between jan-2021 and jun-2023 were in ZECS of Asturias (2), Cantabria (2), and León (2). The agreements were carried out between CAMBERA and different landowners, including local councils and community livestock associations from each of the 3 Picos de Europa regions. These agreements involved 12 people.

E1	E1.1	Jornada presentación	14 asistentes	
		Jornada clausura	33 presenciales (los que firmaron la hoja, pero fueron 40) y 41 online en directo (161 visualizaciones actualmente)	
	E1.2	Logo		
	E1.3	Web	39.479 visitas	
			11.191 usuarios	
			18.465 sesiones	
			98 noticias subidas	
		Facebook	414 seguidores	
			443 publicaciones	
			95.462 alcance	
			27.856 interacciones	
		YouTube	2.253 visualizaciones en 7 vídeos	
		Medios de comunicación	92 publicaciones en 50 medios	
			8 ediciones impresas	
			74 ediciones digitales	
			7 intervenciones en radio	
			3 apariciones en tv	
	E1.4	Material divulgativo	500 dosieres informativos	
			5 lonas	
			2.500 guías	
			24 infografías	
			15 boletines a 1.000 destinatarios	
	E1.5	Paneles informativos	11 paneles informativos	
			3 paneles informativos completos	
			8 con QR	
	E1.6	Tablones de anuncios	22 tablones de anuncios	
	E1.7	YouTube	2.253 visualizaciones en 7 vídeos	
	E1.8	Layman	¿No sé si hicisteis copias impresas al final?	
E2	E2.1	Naturaleza frente al cambio	96 online en directo (329 visualizaciones actualmente)	45 presenciales y 96 online en directo (329 visualizaciones actualmente)
		DIVAQUA-CAMBIA	29 participantes	
		DIVAQUA-CAMBIO	16 participantes	
	E2.2	DIVAQUA-FORMA Blue-Green Infrastructure Networks	16 participantes	41 participantes
		DIVAQUA-FORMA An adaptation with principles	25 participantes	
E3	E3.1	Voluntariado Casaño	40 voluntarios	80 personas voluntarias
		Voluntariado Las Salgardas	21 voluntarios	
		Voluntariado Vegabaño	19 voluntarios	
	E3.2	Taller bosque de ribera	17 participantes	73 participantes
		Taller humedales	20 participantes	
		Taller ríos	10 participantes	
		Taller ilustración científica	26 participantes	
	E3.3	Participación social	17 personas responsables propietarios	17 participantes
	E3.4	Jornada técnica	7 participantes	43 participantes
		Mesa sectorial Cantabria	9 participantes	
		Mesa sectorias Asturias	11 participantes	
		Mesa sectorial León	9 participantes	
		Jornada mixta	7 participantes	
	E3.5	Acuerdos de custodia	6 acuerdos de custodia	12 participantes

Figure 43. Data of all participants and visualizations of social media and dissemination activities carried out in DIVAQUA.

Taking in account all the people reached with communication and dissemination actions (E1, E2 and E3, Fig 43)), we believe we have reached 15,878 people. (For more details see deliverable D4- Technical document with the results of Key Performance Indicators (KPIs)).

KPI	Persons who changed their behaviour or practices due to the project actions: 12
KPI	Persons whose lives were directly, positively impacted by MAIN envir. Actions: 20
KPI	Persons who may have been influenced via dissemination: 15878
KPI	website No. of unique visits: 11191
KPI	Surveys carried out to 132 people
KPI	Involvement of Private companies: 3
KPI	Involvement of Private other civil society organizations: 5
KPI	Involvement of Public bodies: 7
KPI	Involvement of NGO: 5
KPI	Volunteers: 80

Comparison to Proposal: As explained in the section E3.1 of this report, the volunteer camp suffered from some deviations in relation to the original plan (please see there) but we provided alternatives and the rest of communication, dissemination and participation actions were as expected.

Establish a network of managers, technicians, and scientists to enhance the management of mountain aquatic ecosystems and optimize future biodiversity and ecosystem conservation actions through national and international cooperation networks.

Within action E4.1, we stablished 4 different networks

- We collaborate in the creation of The Iberian River Observatory (IberRios) network, a multidisciplinary initiative comprising over 80 scientists and practitioners
- We are actively collaborating with the Autonomous Organism of National Parks (OAPN) of the Spanish Ministry for the Ecological Transition, to define a unified methodology for long-term monitoring of aquatic ecosystems in all mountain national parks across Spain. Our most recent progress was showcased at the *XII Seminar on Long-Term Monitoring in the National Parks Network: Assessment of the Status of Monitoring Initiatives at the Network Level and Specific to Each National Park*, held in Valsaín, Segovia, in October 2023
- We have also collaborated with a European network of scientists from different institutions to create a long-term biodiversity database aimed at assessing European aquatic ecosystems. This information has contributed to several scientific publications, including a notable paper published in Nature in 2023 (see https://doi.org/10.1038/s41586-023-06400-1). This paper has received the prestigious Frontiers Planet Prize in its second edition, awarded by the Senckenberg Society for Nature Research. In addition to this one, we have published 10 scientific papers.

Within action E4.2 we were part of a technical workshop conducted in Posada de Valdeón within the *I Research Conference of the Picos de Europa National Park* A total of 23 presentations were exposed in this event, 4 of them by FIHAC and UC-IHC personnel, who presented the most important results of DIVAQUA (see section 6-Action E4 and deliverable E4. Publication of scientific papers and participation in scientific conferences). The total number of congresses and technical events were 9:

1. Participación en las Segundas Jornadas Técnicas de Conservación del Desmán Ibérico. Celebradas los días 1 y 2 de diciembre de 2021 en el CENEAM del Ministerio

2. Participación en el IX Iberian Congress of Ichthyology. Celebrada en oporto del 20 al 23 de junio de 2022.
3. Participación en la Jornada Presentación Proyectos Europeos de Innovación en el Medio Rural. Celebrada en Oviedo el 23 de febrero de 2023
4. Participación el XII Seminario de Seguimiento a Largo Plazo en la Red de Parques Nacionales. Celebradas en Valsaín los días 9, 10 y 11 octubre de 2023
5. Participación en las Primeras Jornadas De Investigación Del Parque Nacional De Los Picos De Europa. Celebradas en Posada de Valdeón los días 17 y 18 de octubre de 2023
6. Participación en el LIFE Platform Meeting: Amphibian & Reptile Conservation. Celebrada en Santander el 22, 23 y 24 de mayo de 2024.
7. Participación en el Workshop Bahía de Santander 2030. Celebrado en Santander el 24 de mayo de 2024.
8. Participación en la Jornada INFODAY-Programa LIFE-Cantabria. Celebrado online el 16 de mayo de 2024.
9. Participación en el XXII AIL Meeting. Celebrado en Vigo del 23-28 de junio de 2024.

One of the most important milestones regarding the establishing a network of managers and scientists was becoming part of one of the biggest and relevant networks for the monitoring and long-term research of nature areas in Europe. Thanks to the efforts dedicated within DIVAQUA, the Picos de Europa National Park is now an LTSER platform. Being member of this community, insure the long-term monitoring of the aquatic ecosystems of Picos de Europa. Being in the node, we will provide scientific knowledge about the long-term functioning of socio-ecologic processes in the area and receive and exchange scientific knowledge with other LTER nodes in Spain and Europe.
eLTER fields a variety of tools and services that will be of use to researchers, students and policymakers such as the Dynamic Ecological Information System (DEIMS) that provides information from 1211 sites worldwide; the eLTER Information System on data analysis and forecasting; the Data Integration Portal for dynamic near real time data; the Common controlled vocabulary for keyword tagging and discovery. LTER Europe counted with 26 national site networks, 500 LTER sites and 50 LTSER platforms.
As part of the new LTSER node Picos de Europa, we are also contributing in developing the eLTER Standard Observations (SOs). SOs comprise the minimum set of variables and their associated method protocols that can characterise adequately the state and future trends of the Earth system. They were selected and designed to fulfil three key functions: determining the system's state and development, providing sufficient spatiotemporal coverage, and offering high impact, high feasibility, and relatively low cost of implementation. We are transferring and replicating monitoring schemes and protocols designed in DIVAQUA (eDNA sampling protocol, chlorophyll a…etc) and incorporating them in the SOs, so these methods will be continuing being applying in the DIVAQUA area and in other areas of Spain and Europe.

Dr. *José Barquín Ortiz*
Instituto de Hidráulica Ambiental de la Universidad de Cantabria
Don *Rodrigo Suárez Robledano*
Parque Nacional Picos de Europa
Responsables de la coordinación del nodo LTSER Picos de Europa

4 de Abril de 2023

Estimad@s compañer@s,

Es un placer comunicaros que el Comité Científico de LTER-España **ha aceptado la candidatura del Observatorio del Cambio Global en los Socio-Ecosistemas de Picos de Europa, presentada conjuntamente por el Instituto de Hidráulica Ambiental de la Universidad de Cantabria y el Parque Nacional Picos de Europa para pertenecer a la Red LTER-España.**

Figure 44. Letter of acceptance of Picos de Europa and DIVAQUA area in LTSER platform.

OUTPUT	Collaborate in the creation of The Iberian River Observatory (IberRios) network
OUTPUT	Collaborating with the OAPN to define a unified methodology for long-term monitoring of aquatic ecosystems in all mountain national parks across Spain
OUTPUT	We have also collaborated with a European network of scientists from different institutions to create a long-term biodiversity database aimed at assessing European aquatic ecosystems
OUTPUT	Publication of 11 scientific papers
OUTPUT	Oral presentations in 9 technical congresses-seminars
OUTPUT	Became a member of LTER nodes: Picos de Europa LTSER platform
KPI	Networking: 3 individuals in specific meetings/ 2 organizations: IBERRIOS - LTER Platform

Comparison to Proposal: we successfully stablished a network of managers and scientists beyond the one proposed in the original plan.

Economic indicators

The whole project budget has been spent during DIVAQUA project 2,361,506 €. Beyond 5 years, we expect the demolition of an extra barrier (Niserias). The project for this demolition has been done during DIVAQUA lifetime and the estimated cost is 21,602 € (Annex 10 -Page 58 Deliverable D4-Results of KPIs), it is expected that the public administration PRINCAST together with CHC (Confederación Hidrográfica del Cantábrico) execute this action within the next 5 years. PRINCAST also informed us during our 7th coordination meeting, that is planning to execute new conservation actions in the next 5 years to extend the protection fences in Enol Lake, Ercina Lake and Tolleyu wetland. The estimated costs of these conservation actions are 251,897.04 € (See annex 2 Deliverable D4-Results of KPIs). The government of Castilla y Leon informed us of the intention of executing the action of Cain after DIVAQUA with an estimated budget of 200.000 € (Personal communication). In addition, we had

conversations with the local administrations and government of Asturias, Cantabria and Castilla y Leon to continue financing aquatic ecosystems monitoring in the DIVAQUA area after DIVAQUA ends. A prove of these fruitful conversations, is the financing we get in 2024 to carry out the monitoring of aquatic organisms (macroinvertebrates, fishes, algae and macrophytes) though traditional techniques and eDNA together with the monitoring of river functional and physico-chemical parameters to continue the work carried out in DIVAQUA. The budget we got in 2024 was 33,850 € (Contract under Docket number 016/24 Consorcio Interautonómico Parque Nacional Picos de Europa). We expect to get this amount every year, so beyond 5 years we will get a total amount of 169,250 €. Thus, with the expected interventions of the government of Asturias and Castilla y León, together with the subsidies we get from the three autonomous communities in the area, we expect to get a total amount of 3,004,255.04€.

Comparison to Proposal: The main deviation was an over cost of conservation action C4.5, see Section 6 action 4.5 in this report. Partners of the project have the intention to continue with conservation actions as explained before and we successfully got new funding to continue monitoring the aquatic ecosystems in the DIVAQUA area.

8. Comments on the financial report

8.1. Summary of Costs Incurred

PROJECT COSTS INCURRED				
	Cost category	Budget according to the grant agreement in €*	Costs incurred within the reporting period in €	%**
1.	Personnel	1.058.223,00 €	1.315.511,42 €	124%
2.	Travel and subsistence	136.653,00 €	78.150,66 €	57%
3.	External assistance	796.583,00 €	921.888,31 €	116%
4.	Durables goods: total non-depreciated cost		1.023,96 €	
	- Infrastructure sub-tot.			
	- Equipment sub-tot.		1.023,96 €	
	- Prototype sub-tot.			
5.	Consumables	188.081,00 €	154.962,16 €	82%
6.	Other costs	27.650,00 €	46.950,08 €	170%
7.	Overheads	154.316,00 €	**176.292,26 €**	114%
	TOTAL	2.361.506,00 €	**2.694.778,84**	114%

8.2. Accounting system

Brief presentation of the accounting system(s) employed and the code(s) identifying the project costs in the analytical accounting system. All beneficiaries have displayed internal systems for reliable accounting of LIFE DIVAQUA expenses. The IT systems used by them can show that all the expenses and incomes of the project bear the reference to the Grant Agreement LIFE18

NAT/ES/000121. All the beneficiaries have sent the extracts and screenshots of their internal accountancy in relation to the project and that a unique accountancy code for the project exists:

UC-IHC uses a project internal code (56.X259.64500) which is univocally linked to project contract reference LIFE18NAT/ES/000121 and performs separate accounting for all project costs, which allows reconciliation of declared costs with accounting records and supporting documentation (Fig. 45).

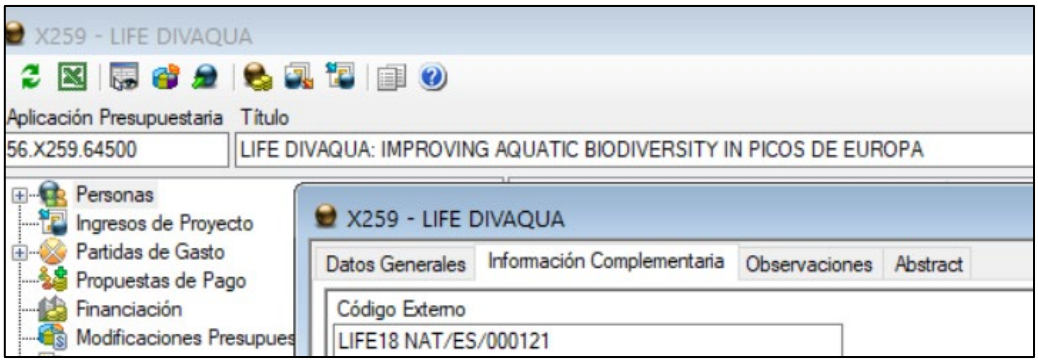


Figure 45. Accounting system used by the Coordinating Beneficiary, UC-IHC.

ALTANO S.A.U. has recorded all project costs under the description name DIVAQUA, allowing to identify every accounted costs for the project assumed by Restaño hydroelectric power plant headquarters.

Fecha regist	Tipo docume	Fecha emisi	mporte inicia	ocumento ext	Descripción	Nº documento	Nombre proveedor	Nº proveedo	Importe	Fecha vencimiento
27/03/2024	Pago	27/03/2024	41.985,32		LIFE DIVAQUA	OP0000008	GLOBAL TEKTIA, S.L	P10171	41.985,32	27/03/2024
22/03/2024	Factura	31/01/2024	-41.985,32	01-58	LIFE DIVAQUA	FC24-00173	GLOBAL TEKTIA, S.L	P10171	-41.985,32	01/03/2024
30/01/2024	Pago	30/01/2024	58.589,07		LIFE DIVAQUA	OP0000004	GLOBAL TEKTIA, S.L	P10171	58.589,07	30/01/2024
31/12/2023	Factura	31/12/2023	-58.589,07	2023/966	LIFE DIVAQUA	FCR2300840	GLOBAL TEKTIA, S.L	P10171	-58.589,07	31/12/2023
27/12/2023	Pago	27/12/2023	55.084,65		LIFE DIVAQUA	DPGO23-00063	GLOBAL TEKTIA, S.L	P10171	55.084,65	27/12/2023
04/12/2023	Pago	04/12/2023	71.289,87		LIFE DIVAQUA	OP0000001	GLOBAL TEKTIA, S.L	P10171	71.289,87	04/12/2023
30/11/2023	Factura	30/11/2023	-55.084,65	2023/917	LIFE DIVAQUA	FCR2300737	GLOBAL TEKTIA, S.L	P10171	-55.084,65	30/12/2023
30/11/2023	Factura	31/10/2023	-71.289,87	2023/843	LIFE DIVAQUA	FCR2300712	EXCAVACIONES GONZALEZ VE(	P10171	-71.289,87	30/11/2023
30/11/2023	Factura	30/09/2023	-73.404,22	2023/764	LIFE DIVAQUA	FCR2300711	EXCAVACIONES GONZALEZ VE(	P10171	-73.404,22	30/10/2023
16/11/2023	Pago	16/11/2023	73.404,22		LIFE DIVAQUA	DPGO23-00016	EXCAVACIONES GONZALEZ VE(	P10171	73.404,22	16/11/2023
									0,00	

Figure 46. Accounting system of Altano.

CAMBERA is using a project code for all the expenses made for the project. Costs are classified under the different costs categories. The IT system displayed also allows extracting the balance sheet of expenditures and revenues over a defined period (Fig. 36).

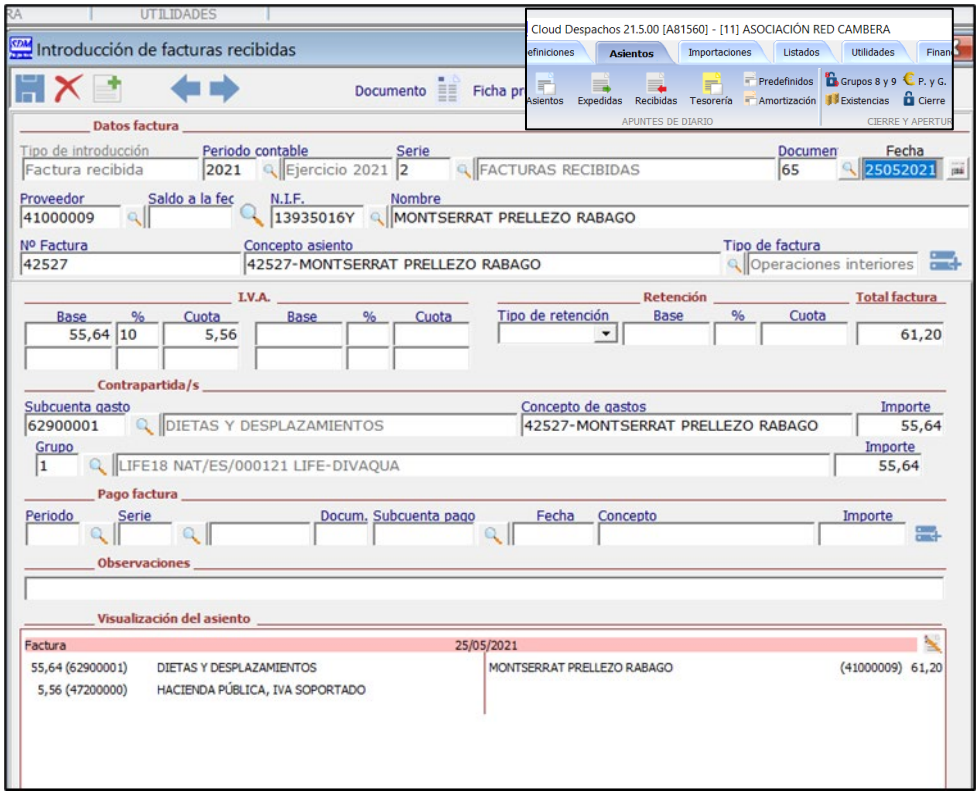


Figure 47. Accounting system of RED CAMBERA

CSIC uses an analytical project code to keep trace of the individual economic development of the project. The internal code is Código: OPE01924 and the reference to the project is made under code reference: LIFE18 NAT/ES/000121 (Fig. 37).

Figure 48. Accounting system of CSIC

FIHAC runs a financial project ERP system (Navision Microsoft) where all the analytical accounting is carried on so that the financial information is tracked for each project and assigned to the different cost categories. The project analytical code for this project is: FIH20.00132, being currently run under the analytical software already explained above. This code is shown in the timesheets (Fig. 38).

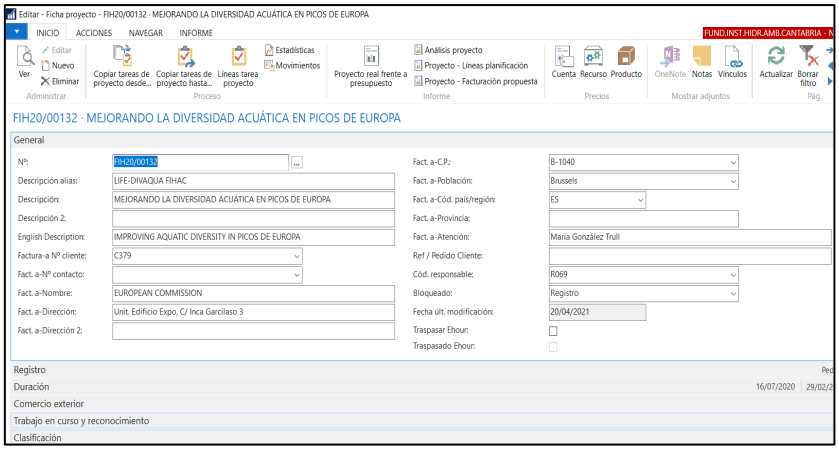


Figure 49. Accounting system of FIHAC

ITAGRA carries out an analytical accounting system in order to record project expenditure, where each accounting entry is assigned to the specific project. In relation to the LIFE DIVAQUA project, the code with which each accounting entry related to the project is identified is the following: 004.DIVAQU (Fig. 39)

ITAGRA.CT20
Fecha
20-11-20
Condiciones
PROYECTOS : 004DIVAQU / 004DIVAQU PERIODO : 01-01-20 / 30-11-20
Sage SP ContaPlus
Página
1

ASIEN.	FECHA	DOCUMENTO	SUBCUENTA	DESCRIPCION	CONCEPTO	DEBE	HABER
788	05-05-20		5720008	CUENTA CORRIENTE CAJAVIVA (5	Ingreso UNIVERSIDAD DE CA	45.866,70	
788	05-05-20		7470008	AYUDAS UE. PROYECTOS LIFE	Ingreso UNIVERSIDAD DE CA		45.866,70
850	29-05-20		6230007	Servicios Varios para Proyect	FCO. JAVIER SANZ RONDA	1.617,00	
850	29-05-20		4751000	H.P. Acree. Reten. Practicada	FCO. JAVIER SANZ RONDA		242,55
850	29-05-20		4100003	SERVICIOS DE PROFESIONALES	FCO. JAVIER SANZ RONDA		1.374,45
897	01-06-20		4100003	SERVICIOS DE PROFESIONALES	PAGO JAVIER SANZ RONDA	1.374,45	
897	01-06-20		5720008	CUENTA CORRIENTE CAJAVIVA (5	PAGO JAVIER SANZ RONDA		1.374,45
1.033	23-06-20		4720021	HP IVA SOPORTADO 21%	s/Factura 081 ZENIT INGEN	630,00	
		S Nº F.= 0		CI/Pr=6230007	B.Imp.=630,00	IVA= 0.00%	
1.033	23-06-20		6230007	Servicios Varios para Proyect	s/Factura 081 ZENIT INGEN	3.000,00	
1.033	23-06-20		4100168	ZENIT INGENIERIA Y CONSULTORI	s/Factura 081 ZENIT INGEN		3.630,00
1.147	30-06-20		4100168	ZENIT INGENIERIA Y CONSULTORI	PAGO ZENIT INGENIERIA Y C	3.630,00	
1.147	30-06-20		5720008	CUENTA CORRIENTE CAJAVIVA (5	PAGO ZENIT INGENIERIA Y C		3.630,00
1.515	31-08-20		5525026	JAVIER SANZ (DIVAQUA)	PAGO JAVIER SANZ	74,20	
1.515	31-08-20		5720008	CUENTA CORRIENTE CAJAVIVA (5	PAGO JAVIER SANZ		74,20
1.607	11-09-20		6290001	Gastos de Desplazamientos	FCO.JAVIER SANZ RONDA	839,80	
1.607	11-09-20		5525026	JAVIER SANZ (DIVAQUA)	FCO.JAVIER SANZ RONDA		839,80

Figure 50. Accounting system of ITAGRA

JCYL applies a separate accounting method that can be displayed on their accounting software. All LIFE DIVAQUA project costs are recorded under the specific unique code 2021/000757 LIFE18/NAT/ES/000121 DIVAQUA (Fig. 40).

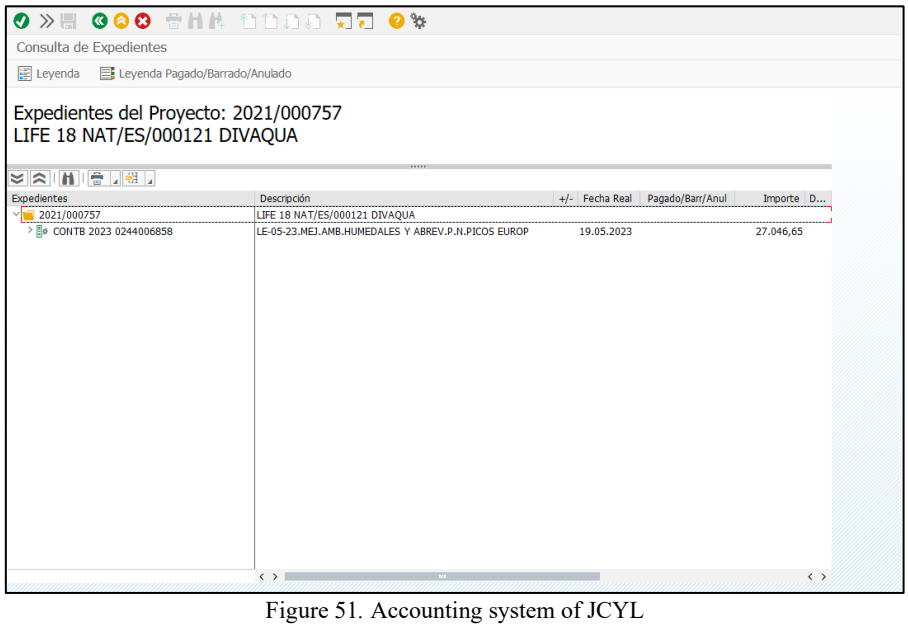


Figure 51. Accounting system of JCYL

PRINCAST rely on the separate accounting method, where the internal accounting system allocates incurred costs to the project.

REPSOL costs are based on SAP software (cost-centre method). The allocation of expenses (*e.g.* purchase delivery) is recorded one by one with explicit reference to the code LIFE18 NAT/ES/000121 (Fig. 41).

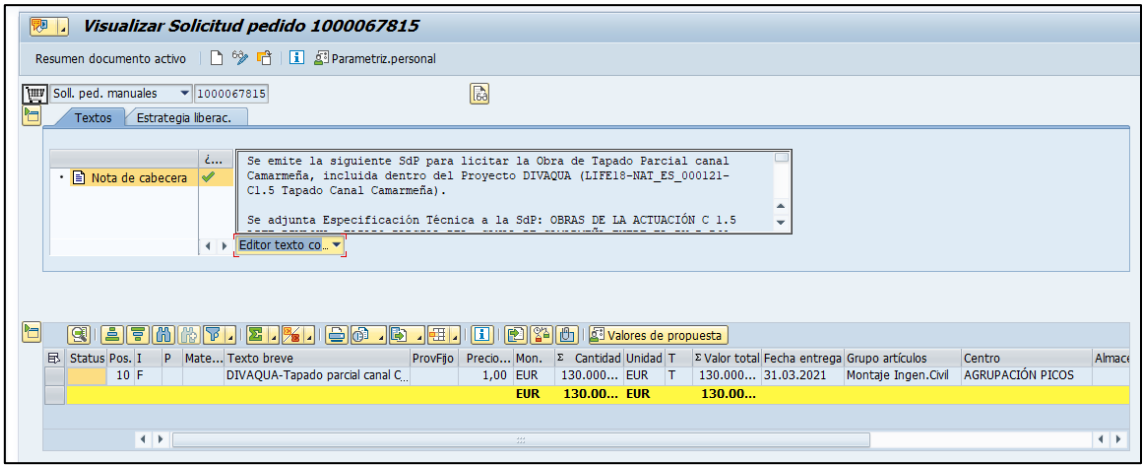


Figure 52. Accounting system of the REPSOL.

Brief presentation of the procedure of approving costs. The Coordinating Beneficiary revised periodically all the costs to be incurred by project beneficiaries, taking into account the eligibility conditions set out on Article II.19.1 and Annex X of the GA. When in doubt concerning the eligibility of costs, the External Monitor has been consulted. Concerning personnel costs, for staff not considered as own personnel, the approved costs under the Grant Agreement were used as the basis for distribution among different actions. Most beneficiaries selected Method 1 for declaring staff costs, which involves calculating the hourly rate based on actual hours worked, being the cost-hour calculation formula as follows:

Hourly cost: X+Y/H; where

- X: Remuneration paid to the employee in the year. For non-calendar years, the sum of gross wages indicated in the payroll is considered.
- Y: Annual employer contribution to Social Security for the employee, calculated according to the Contribution Base (indicated in the TC2 models) and multiplied by the final coefficient of the beneficiary's contribution to Social Security for the employee.
- H: Annual hours worked by the employee, as declared in work reports.

For own personnel working for DIVAQUA for a small contractually defined percentage of time (only ALTANO, JCYL and PRINCAST), reported personnel costs were calculated using the gross salary/1720 annual productive hours calculation method. The same hourly rate calculation method was also followed for personnel working full time for the project.

Type of time recording system used. Project beneficiaries implemented time registration systems based on the model proposed by the LIFE programme, which records all hours work on a daily basis.

Brief presentation of the registration, submission and approval procedure/routines of the time registration system. Timesheets are checked and verified at the end of each month by the supervisor of the work carried out by the employee and are also signed by the employee concerned. The time registered on the project is periodically revised and verified for consistency.

Brief explanation on how it is ensured that invoices contain a clear reference to the LIFE project showing how invoices are marked in order to show the link to the LIFE project. The Coordinating Beneficiary has instructed all beneficiaries that all invoices must clearly reference the agreement number and the project acronym, ensuring exclusive linkage to DIVAQUA. For those invoices which did not bear the project reference, a stamp with the project number was distributed by the Coordinating Beneficiary and was used by every project beneficiary.

8.3. Partnership arrangements (if relevant)

The financial transactions between the Coordinating Beneficiary and the Associated Beneficiaries were done on the basis of Article I.4.8. of the Grant Agreement (Payments to be made), which is the baseline for the arrangements made for transferring the pre-financing, interim and final payments of the project, and which are also displayed on the Partnership Agreement. Payments were made by the Coordinating Beneficiary to the bank accounts stipulated on the Partnership Agreement. Concerning payment distribution, the final payment will be based on the Agency´ s assessment of the final statement of expenditure and income and on the accepted eligible costs of the project.

In relation to the final financial report and statement of costs and income, associated beneficiaries are required to furnish the coordinating beneficiary with a dated and signed "participant cost statement summary" no less than 30 days prior to the submission deadline of the final report to the Agency/Commission.

Regarding internal project reporting, financial progress reports and related financial documents (e.g., time-record sheets, invoices, payment documents) were requested by the Coordinating Beneficiary every six months to identify any potential deviations. These have been submitted alongside Progress Technical Activity Reports. The procedure for collecting and sending data was preferably conducted electronically, except for documents requiring signed versions. If necessary, original paper versions are sent by conventional mail.

8.4. Certificate on the financial statement

Not applicable to the DIVAQUA project, as no external audit has been conducted either during its implementation or upon its completion.

8.5. Estimation of person-days used per action

Action type	Budgeted person-days	Estimated % of person-days spent
All projects when applicable Action A: Preparatory actions	2094	76%
NAT projects Action C – Concrete conservation actions	1547	132%
NAT and CLIMA projects Action D: Monitoring and impact assessment	1336	89%
NAT and CLIMA projects Action E: Communication and Dissemination of results	1081	142%
NAT and CLIMA projects Action F: Project management (and progress)	858	93%
TOTAL	6916	103%