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Inland Wetlands North of the Iberian Peninsula: Management and restoration of peatlands and wet environments.

LIFE-TREMEDAL, a joint project to manage peatlands and wet environments better.

Progress of the project in each territory:

- Navarre
- Galicia
- Basque Country
- Picos de Europa

To find out more...

Argintzu, in Baztan (Navarre)

INTRODUCTION

In 2012, a number of organisations from different Spanish Autonomous Communities joined forces to engage in a coordinated project to conserve wetlands in the north of the Iberian peninsula. These organisations included universities, research centres and also public administrations and public companies, making it possible to offer different approaches when it came to understanding the project. From the very outset, this aspect proved to be a feature that enriched the idea being addressed.

The project was submitted to **LIFE Nature and Biodiversity**, whose objectives are to protect, conserve and restore populations of species and habitats, and, in general, to guarantee that natural systems work properly and help brake the loss of biodiversity.

On the 18th of September 2012, the LIFE Programme confirmed definitive approval of the TREMEDAL project, relying at all times on co-financing from the public administrations. And so the project officially got under way and a few days later, on the 5th of October, the project's different partners and collaborators met in Pamplona-Iruñea to start to develop TREMEDAL in practice.

Why TREMEDAL?

The word **"tremedal"** (quaking place) is a term used locally in certain regions to refer to mires. It alludes to the movements and vibrations of the ground when you walk on mires, although the same "sensation" can be extended to other types of water-related habitats. In Álava and some parts of Navarre, the name "zapaca" is also used.

The scientists and technicians involved in the project considered it more suitable to use the local term "tremedal" instead of the more technical and, perhaps, more difficult to understand Spanish word "turbera" (peatland).

Tremedal also allows us to highlight the relationship between these habitats and the local populations living in the area, their culture and way of life.

All the actions proposed in the Tremedal project are directly related to the conservation and management of habitats and species of Community interest, in application of the **Habitats Directive**.

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Members of the Technical Committee visit the Vega de Comeya mires.

LIFE-TREMEDAL, a joint project to manage peatlands and wet environments better.

The project partners started to perform actions of the following types in their territories (Galicia, Picos de Europa, the Basque Country and Navarre) in 2013:

- Projects to **restore and conserve** wet habitats over time.

- Work to **enhance knowledge** concerning wet habitats and the sites the project covers.

- **Information and awareness**-raising actions to inform society as to the environmental values and services that inland wetlands provide.

The habitats to study and restore include:

- active raised bogs
- blanket bogs
- transition mires, calcareous fens with *Cladium mariscus*, and
- alkaline fens

The most notable species are *Eryngium viviparum*, *Spiranthes aestivalis* and *Narcissus pseudonarcissus subsp. nobilis.*

All these habitats and species are considered to be under particular threat in Europe and are included in the chief European Directive on the conservation of biodiversity, the **Habitats Directive**.

In the end, however, the true protagonists of the project are the sites, for while TREMEDAL covers wetlands of unquestionable importance from a natural point of view, the sites are also home to other values of a scientific, cultural, historical and, no doubt, landscape-based nature of no less importance.

Pictures of the sites to be restored in the TREMEDAL project:

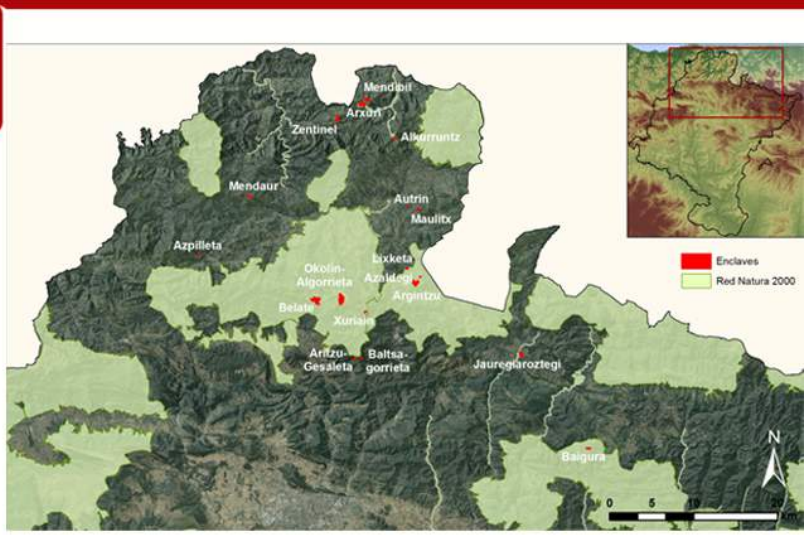
Lake of Caicedo-Yuso or Arreo, in Alava-Araba

Vega de Liordes, in Picos de Europa

In Navarre

The Government of Navarre has backed studies on the state of peatlands and mires since 2005.

In 2006, the "Cartography and Technical Bases for the management of peatlands and mires" (P. Heras et al.) was produced in Navarre and included all the wetlands to be studied and restored in Tremedal.



The results of this work have proved fundamental to the Navarrese component of Tremedal because they have allowed us to work with a general typology of peat-based environments and a diagnosis of the state of conservation and threats of each specific mire and its associated habitats.

In 2013, work was performed on three of the sites included in Tremedal in Navarre: **Belate, Lixketa and Alkurruntz.**

The projects performed at the three sites have included very similar techniques and actions, the details of which have been adapted to the peculiarities of each location.

The following actions were carried out at the three sites:

- **Sampling**, using permanent quadrats with which to monitor some of the habitats of interest.
- Restoration of conditions affecting hydrological functioning by building **wooden dikes** to increase the level of humidity in certain areas in order to create potential zones for the development of plant communities specific to mire environments.
- **Selective scrub clearing** (in Belate and Alkurruntz), removing gorse brush by hand to favour the propagation of peat moss species in these areas.
- Activities to **make traditional farming compatible with the conservation** of the values present at the sites: reconditioning of gates and fencing, repairing tracks, etc. In Alkurruntz and Belate, in consensus with the parties involved, guidelines have been written up to make farm management compatible with the conservation of the habitats and species present.

Information panels are going to be fitted at all the sites at which work is being performed in order to publicise the values of the location and the objectives of the project itself.

< Permanent quadrat to monitor habitats in Lixketa

One of the three wooden gates built in Alkurruntz >

In Belate, trees belonging to exotic species (*Chamaecyparis lawsoniana*) growing in an area of running spring water have been removed and use has been made of the felled trunks to create **cordons** to retain humidity in an area on a slope.

Another technique used in Belate for the same purpose as the dikes is that of **blocking channels with earth.** This is another way to increase the degree of humidity in certain potential areas for the development of species specific to mires.

Trunks have also been used to create dikes in small brooks downstream from the wetland (Alkurruntz).

Detail of a cleared area in Alkurruntz and the livestock fencing put up.

Restoration projects of this kind will continue to be implemented at other sites included in the project in 2014: Arxuri, Xuriain, Okolin, Mendaur and Maulitx.

In Galicia

The Regional Government of Galicia, the Provincial Council of Lugo, the Tragsa group and the University of Santiago de Compostela have been performing different types of work to conserve the upper basin of the River Miño since 1997, giving rise to projects such as inventorying and monitoring Galicia's wetlands (2003), the production of the Natural Resource Organisation Plan for the Site of Community Importance Parga-Ladra-Támoga (2005), the Restoration of the Wetland of Cospeito (1997-2000), the reports to declare Terras do Miño a Biosphere Reserve (2002) and the implementation of actions as part of a LIFE project between 2000 and 2005 (SCI Parga-Ladra-Támoga: The recovery of woodland prone to swamping and its dystrophic lake area). These last three projects provide the basis on which the current LIFE+ TREMEDAL is organised in Galicia, lending continuity to the initiatives started over the last two decades.

In 2013 in Galicia, work was performed on two of the sites in the Tremedal project: the **Wetland of Cospeito** and the **Island of San Roque**.

The actions carried out so far on the **Island of San Roque** have been to do with reinforcing the species of daffodil under threat (*Narcissus pseudonarcissus subsp. nobilis*), planting bulbs belonging to the species.

< Tragsa group workers preparing the land in order to plant *Narcissus pseudonarcissus subsp. Nobilis* bulbs on the Island of San Roque.

Bulbs belonging to the species *Narcissus pseudonarcissus subsp. nobilis*, obtained by technical staff from the University of Santiago de Compostela, were used to bolster the daffodil population on the Island of San Roque. This is the largest daffodil in Galicia and is considered a species of Community interest. >

Pictures by Boris Hinojo Sánchez

Different actions have been carried out in the **Wetland of Cospeito** to enhance the diversity of its wet environments and favour the establishment of species of endangered aquatic flora, with a special emphasis on the priority specie *Eryngium viviparum*, the "cardiño das lagoas".

The topography of the terrain has been modified in order to maintain a degree of flooding to allow different types of wet environments to establish themselves. A number of pools have also been created, in which it is hoped that the wetland's endangered aquatic flora may find a habitat suitable for growth.

Individuals of the species Eryngium viviparum are also in the process of being obtained using in-vitro cultivation techniques in order to strengthen the populations in the pools previously created.

The actions at the Wetland of Cospeito have also involved the removal of exotic tree species from the area, more specifically rooted *Pinus radiata* and *Eucalyptus nitens*.

The first rains of autumn fill the pools created at the Wetland of Cospeito with water. These pools will be home to populations of endangered aquatic flora species, such as the **"cardiño das lagoas"** (priority specie *Eryngium viviparum*).

Detail of one of the **pools** created at the Wetland of Cospeito with the machinery used (small backhoe loader and dumper).

Picture of the Wetland of Cospeito before (left) and after (right) **cutting down exotic species** (*Eucalyptus nitens* and *Pinus radiata*). The pines grew around the bird observatory and the eucalyptus had taken hold deeper in the site in a small wood of birch and willow trees.

The **Life Tremedal** project will continue to be implemented through restoration actions at the three sites of action in Galicia: the **Wetland of Cospeito**, the **Island of San Roque** and **Ollos de Begonte**.

Imágenes de Boris Hinojo Sánchez

In the Basque Country

Three Basque wetlands are taking part in **LIFE TREMEDAL:** Jaizkibel and Usabelartza in the province of Gipuzkoa, and the Lake of Caicedo-Yuso, also known as the Lake of Arreo, in the province of Alava.

Jaizkibel. The geology of this coastal mountain creates very special conditions in certain small areas in which an abundance of water throughout the year maintains two types of ecosystem: acid mires and calcareous mires.

The acid mires are scattered all over the coastal face of Jaizkibel, associated with small springs or waterlogged areas in which organic material (capable of creating peat) accumulates. They are home to specialised flora and fauna, including extremely endangered species.

Coastal face characteristic of Jaizkibel.

Detail of a drosera in acidophilus mire of Jaizkibel.

Plants with striking ecological strategies populate these areas: insectivorous plants, such as the drosera or sundew (the plant which serves as TREMEDAL's logo).

By trapping insects, these plants survive in the harsh conditions of the acid soils they live in, which are very poor in terms of nutrients.

The calcareous mires are similar, although in this case the conditions of the wetland mean that minerals accumulate. Specialised plants, some of which are listed as endangered, live in these conditions. Jaizkibel is the only place in Gipuzkoa that is home to this unique habitat.

In 2013, work was carried out at two of the three sites in the Basque Country included in TREMEDAL:

- **Usabelartza**. Restoration work was completed.
- **Lago de Caicedo -Yuso**. Preliminary evaluation of the red swamp crayfish population (allochthonous) and an autochthonous woodland planting test.

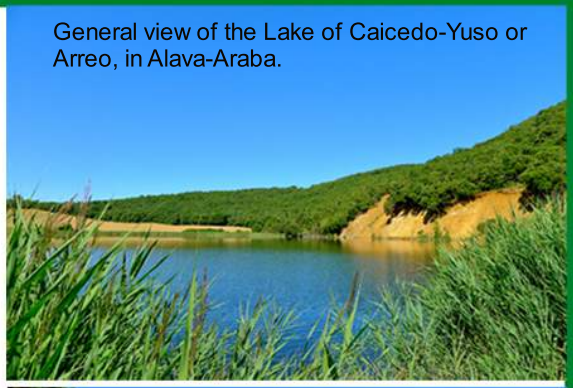
Usabelartza. This site, located on the way up Mount Adarra near Andoain, is home to Gipuzkoa's only true peatland and one of the Basque Country's finest examples of a habitat of this kind.

Its characteristics (acid soils and a large build-up of organic material) are similar to those of the acid mires on Jaizkibel, but in this case, there is a deposit of peat exceeding a metre and a half in depth in some areas.

Conditions are very hard, making for highly specialised plant life in Usabelartza, some examples of which employ strategies to harness nutrients such as that described for the drosera, which also lives in this wetland.

In 2013, the Provincial Council of Gipuzkoa completed restoration work at this site, focusing on correcting different elements (tracks, drainage, ditches) which exposed this mire to the danger of drying out.

Lago de Caicedo-Yuso. Located in the district of Caicedo-Yuso, a village belonging to the municipal district of Lantarón in the south of the province of Alava, the lake is also known as the Lake of Arreo. Caicedo-Yuso is the only natural lake in the Autonomous Community of the Basque Country, and one of the only two on the Peninsula, formed on salt chimneys. It is fed by run-off from its basin, the outflow from several aquifers and a spring of brackish water, responsible to a large extent for its unique nature.


General view of the Lake of Caicedo-Yuso or Arreo, in Alava-Araba.

The lake forms part of the so-called "Diapir of Añana", a geological structure covering some 14 km2, created by the emergence of sediments from the Triassic period consisting of evaporites of gypsum, clays and salts, with incrustations of ofites and carniolas, between more modern strata, which create a unique hydrogeology, including the Valle Salado (Salt Valley) of Añana to the north.


Brackish water spring (Lake of Caicedo-Yuso).

The lake has a water surface area of 15 ha and a maximum depth of 24 m. In origin, it is a doline produced by some of the materials of the diapir, gypsum and salts, dissolving and collapsing, and then filling with water.

These processes of emergence from the diapir and dissolution are still active, and it is believed that some of the water in this lake is connected to the brine springs that give rise to the salt flats of Añana, an architectural, archaeological, cultural and historical location, unique in terms of biodiversity, that forms the Valle Salado (Salt Valley) and has been exploited since the Bronze Age.

The lake and its surrounding area are home to habitats ranging from reed beds, bulrush beds and mires in shallow waters to agricultural farmland, dry grassland, and Portuguese and holm oak groves. On its banks, ecosystems greatly influenced by the mineral content of the lake's water, such as calcareous mires, thrive. Minerals are also deposited on plants and deposits of petrified vegetation more than 6 metres deep have formed. These deposits have made it possible to document changes in the climate, vegetation and what life was like next to the lake more than 2,500 years ago.

This rich mosaic provides a home for numerous species of fauna and flora, and habitats of interest. The only Iberian population of the aquatic coleopteron *Gyrinus paykulli* is worthy of note. Only one autochthonous fish species lives in the lake, the tench (*Tinca tinca*), clearly in decline. The waters of the lake have been invaded by other exotic species such as the black-bass (*Micropterus salmoides*), the common carp (*Cyprinus carpio*), the common sunfish or pond perch (*Lepomis gibbosus*) and the red swamp crayfish (*Procambarus clarkii*). These species, in addition to contributing to the disappearance of the autochthonous fauna, are also contributing to the gradual deterioration of the lake's entire aquatic ecosystem.


Removal of allochthonous crayfish from the banks of the lake. Photos by: Ramiro Asensio.

The actions to carry out in the framework of the LIFE+ TREMEDAL project are:

- Purchase of 17 plots of land that frame the lake (some 12 ha) in order to replace agricultural land with natural vegetation to prevent displacement through soil erosion and widespread contamination from fertilisers and chemicals.
- Restoration and conservation of the natural habitats in the area: increase, in the event, of the water surface area and improvement of shallow environments and mires.
- Removal or maintenance to a controllable level of populations of invasive species of fauna.
- Improvement of the climatic characterisation of the area and the physical-chemical and hydrogeological parameters of the lake and stream.
- Regulation of public use by preparing a parking area, designing perimeter paths and limiting access to the lake.

In Picos de Europa (Asturias, Castilla y León)

The Inter-Autonomous Community Consortium of the Picos de Europa National Park and the University of Oviedo, through the Institute of Natural Resources and Land-use Planning (INDUROT), are working together on the Tremedal project to favour the conservation of the largest areas of mire in the National Park, located in Vega de Comeya (Asturias) and Vega de Liordes (Castile and Leon).

The territory of the Picos de Europa National Park forms part of the Natura 2000 network as a Site of Community Importance (SCI) and a Special Protection Area (SPA), and has been declared a Biosphere Reserve by UNESCO.

The actions carried out in Picos de Europa in 2013 focused on the Comeya site.

Livestock grazing in the grasslands and wet areas of Vega de Comeya.

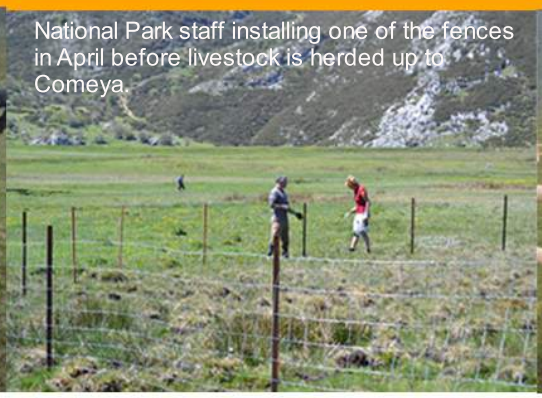
At both sites in the National Park, Comeya and Liordes, the state of conservation of the mires is affected by livestock farming, meaning that it is necessary to modify livestock management at these sites to prevent the loss of mire surface area and ensure the functionality of these ecosystems in the long term, without detriment to the use of the pastures.

In order to achieve this objective, the National Park installed a set of experimental fences to prevent the livestock from entering the areas of mire. Later, the technicians from Indurot (University of Oviedo) started monitoring the development of the habitats inside and outside the fenced plots, something they will continue to do throughout the project.

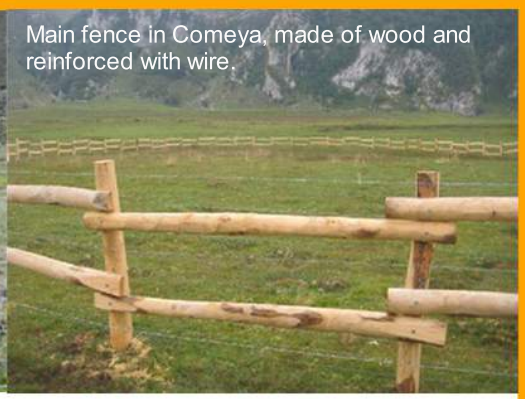
The installation of the fencing and the first stages of monitoring, corresponding to 2013, have been completed at the Vega de Comeya site, where two electric fences, covering some 750 m2, and a wooden fence with barbed wire, covering around 1,300 m2, have been installed.

View of Vega de Comeya in the Asturian sector of the Picos de Europa National Park.

Technicians from INDUROT and the National Park in Comeya measuring and marking out the plots of land selected for fencing off (Liordes).



National Park staff installing one of the fences in April before livestock is herded up to Comeya.



Main fence in Comeya, made of wood and reinforced with wire.

Monitoring the vegetation with 1x1m sampling quadrats and 10x10cm mesh.

The first monitoring of the habitats was carried out in the summer of 2013. Sampling quadrats were used to record data on a range of aspects concerning the ground cover, inside and outside the fencing, in order to analyse the possible influence of farming on the normal development of the mire.

Data on the microtopography of the terrain were also collected in the first year of monitoring using laser-scanner techniques in order to analyse, come the end of the project, whether livestock treading on the terrain has any significant effect on the surface morphology of the mire.

Analysis of possible microtopographical variations to the mire is performed using a laser-scanner.

The first observations, following the monitoring performed in Comeya in 2013, reveal that a number of species have bloomed a great deal inside the fenced plots, compared to outside these areas, due to the absence of grazing. One of the species most to benefit is Arnica montana.

In Liordes, initial prospecting work on the wetland, selection of the most suitable sectors for the actions involved in the project and preliminary marking of the plots to fence off have been carried out. The fences will be installed at the end of spring/start of summer 2014, when the snow has thawed.

Vega de Liordes, in the Leon part of the Picos de Europa National Park, is a glacier-karst depression at an altitude of some 1,800 metres, often covered with snow until the beginning of the summer. Access is complicated as it is necessary to pass the peaks surrounding it, which is only possible on foot or horseback.

To find out more...

www.lifetremedal.eu

One of TREMEDAL's transversal actions is the collection, storage and conservation of germplasm, which involves collecting seeds (or cuttings) of peatland plants and plants from other wet environments from the locations selected for the project, and storing, conserving, germinating and cultivating them in the Plant Germplasm Bank at the Atlantic Botanical Gardens (BGV-JBA).

This action will allow us to conserve germplasm of the structural and endangered species from the habitats covered by the project and have plants which can be used in the proposed restoration work and possible reinforcement work to be performed in the mid-to-long term in order to guarantee the conservation of these habitats and species.

To date, and in collaboration with the different Tremedal teams, an intense collection drive was carried out over the summer and beginning of autumn of 2013, gathering material pertaining to 13 species and involving the relevant germination tests, nine of which have already been completed. Germination protocols are also being designed for each of the species, a task which could last until the early months of 2015, depending on the results of the germination trials.

Two documents have also been produced, one on the characterisation of the two target species and another detailing the methodology of the entire process and describing the protocols applied for the collection of germplasm and its treatment, conservation, germination and cultivation.

The field work performed by Tremedal has led to the location of the Baigura site (Navarre), a new mire mire covering approximately 10,000 m2 at an elevation of 1,100 m. The land is a communal property and is included in the Natura 2000 network, in the area Sierra de Artxuga, Zarikieta and Montes de Areta (ES0000129).

This new mire has been identified as type "7140 Transition mires and quaking bogs" and the characteristic species it is home to include: *Trichophorum cespitosum subsp. germanicum*, *Eriophorum angustifolium*, *Narthecium ossifragum*, etc.

TREMEDAL celebrates World Wetlands Day with events in the different territories

In Galicia, IBADER celebrated World Wetlands Day with the pupils from the CEIP Santa Maria do Valadouro infant and primary school, who learned about the different types of wetlands that can be found in the natural areas in the north of the province of Lugo and the Tierras del Miño Biosphere Reserve.

In Asturias, the day was celebrated on the 1st of February at the Picos de Europa National Park Visitor Reception Centre in Cangas de Onís. The event, organised by the Inter-Autonomous Community Consortium of the Picos de Europa National Park and INDUROT (University of Oviedo), and chaired by the Director General of Natural Resources of the Principality of Asturias, consisted of a presentation on Wetlands and Agriculture, and ended with a brief explanation of the Life+ Tremedal project and the actions carried out in Picos de Europa. Bad weather meant it was not possible to visit the Comeya site as planned to round off celebration of World Wetlands Day.

The Day was not celebrated in **Navarre** until the 16th of March, when a guided tour of the **Arxuri mire in Baztan** was organised. The tour of the site lasted approximately three hours and ended with a presentation of the Tremedal project and its progress for locals and all-comers.

After lunch, on the way back to Pamplona/Iruñea, part of the group briefly stopped off at the Belate mire to see how work was coming on at the site.

Photo of the group at the end of the tour of the Arxuri mire.

Find out more and see the details of the project at: **www.lifetremedal.eu**

Drosera rotundifolia L.

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