

Proceedings of the seminar on erosion prevention and adaptive practices

Bilbao, 5th July 2022



1- Executive summary

This document summarises the presentations given at the fourth seminar of the INTERREG MONTCLIMA project held in Bilbao, specifically at the Euskalduna Conference Centre, on 5th July 2022. The aim of this seminar, which is part of the MONTCLIMA project, was to provide information on existing local and international strategies for soil protection in SUDOE mountain areas. In addition to learning more about MONTCLIMA's pilot experiences on soil erosion reduction strategies and to gain a better understanding of the steps involved in the design of soil-based carbon offsetting mechanisms: the role of soil in climate neutrality, monitoring systems, and verification systems.

The conference was carried out in a hybrid format, giving the possibility to follow it both in person and through the Zoo platform, this format allowed conference to be recorded so that it could be attached to the INTERREG MONTCLIMA project website. In the same way, and to facilitate the European scope, simultaneous translation was provided in Spanish, French, Portuguese and English. The event was attended by a total of 95 people, 50 people in person and 45 online.

The event can be followed at the following two links:

Part 1: <https://youtu.be/3aTjuvzn0uw>

Part 2: <https://youtu.be/ewtj8qbSlgs>



2- Summary of presentations

09:00-09:15 WELCOME AND INSTITUTIONAL OPENNESS

- Eva García-Balaguer (Head of the Coordination of the Pyrenean Climate Change Observatory). First video 00:02:53.

Presentation of the Project, of the event and of this first section welcome and institutional opening.

- Leire Barañano (General Manager of NEIKER). First video 00:08:16.

This project and this conference are of great interest to NEIKER and to technicians and researchers, but also to farmers and forest owners who are the managers of the territory and those who really know how important its protection is. This conference should be a meeting point for the main professionals, researchers, technicians and students specialised in the study of soil on the national and international scene. It is considered that the transfer of knowledge that takes place in this type of event is fundamental. A brief presentation of the subsequent speakers will be made.

- Isabel Roger (Director of the Joint Programme Secretariat Interreg. Sudoe). First video 00:14:31.

A presentation of the INTERREG SUDOE 2014-2020 programme, which has financed more than 90 cooperation projects and in which more than 807 beneficiaries have participated. More than 50 projects are still underway under this call. Since 2015, four calls for projects have been managed under this programme. The SOILTAKECARE project stands out due to its innovative methodology. The new INTERREG SUDOE 2021-2027 programme, which is in the process of being approved by the Commission, will soon begin. This new programme will be divided into four priorities and one of the objectives will be based on risk prevention.



- Ainara Jauregi (General Directorate of European Relations. Basque Government. Current Presidency of the Pyrenees Working Community). First video 00:24:45.

The Pyrenean Climate Change Observatory is presented and the importance of its work in mountain areas where the increase in temperature is more pronounced than in flat areas. Climate change is an important factor that increases the main problems affecting mountain areas: depopulation, changes in land use and lack of generational replacement in the primary sector.

9:15-10:15. SECTION 1. SOIL PROTECTION: CASE STUDIES OF PROJECTS.

Moderator Eva García-Balaguer.

- Carlos Garbisu (Scientific Director at NEIKER-Instituto Vasco de Investigación y Desarrollo Agrario). First video 00:33:40.

HEALTHY SOIL FOR A HEALTHY PLANET

This presentation defines various concepts related to soil health and the health of the planet. In terms of soil health, a distinction should be made between functions, services and processes. It is proposed to talk about ecological attributes, including vigour, resilience and organisation. A variety of interesting bibliography is offered to explain the evolution of different currents of thought, ranging from the concept of natural capital, the paradigms of planetary boundaries, ecological deficit, "one health", "earth's critical zone", etc. It is emphasised that our species is increasingly alone on the planet and that the different visions we have had of the planet are generally very anthropocentric. As an important message: "Soil biodiversity is the biological infrastructure of the soil, which supports many soil processes that underpin key ecosystem services, ecosystem services on which our civilisation depends for its survival, well-being and health. This is one aspect of planetary health" (Figure 1). Finally, scientists have a duty to raise awareness among society, politicians, business people, etc. to protect our planet and within it the soil.



- ❑ SOIL **BIODIVERSITY**, soil's **biological infrastructure**, SUPPORTS THE MANY SOIL **PROCESSES** UPON WHICH KEY SOIL ECOSYSTEM **SERVICES** RELY (ECOSYSTEM SERVICES UPON WHICH OUR CIVILIZATION DEPENDS FOR SURVIVAL, WELL-BEING AND HEALTH; one aspect of Planetary Health)

Biodiversity has many facets:

- ✓ Richness
- ✓ Evenness
- ✓ Composition
- ✓ Phylogenetic relatedness
- ✓ Alpha, beta, gamma
- ✓ Structural, functional, interactions (**look for / discard patterns!**)
- ✓ Spatial and temporal



- ❑ SOIL **BIODIVERSITY** IS THE FOUNDATION OF **SOIL FUNCTIONING / SOIL HEALTH**
- ❑ SOIL **BIODIVERSITY** SUPPORTS THE **STRUCTURAL AND FUNCTIONAL NETWORKS** (soil's **ecological infrastructure**) THAT CONFER **ECOSYSTEM ATTRIBUTES** (emergent properties). BIODIVERSITY CONFERS **RESISTANCE AND RESILIENCE** THROUGH A WIDER REPERTOIRE OF PROCESSES, A HIGHER NUMBER OF INTERACTIONS AND A GREATER FUNCTIONAL REDUNDANCY
- ❑ SOIL **BIODIVERSITY AND PROCESSES** ARE ESSENTIAL FOR **BIOSPHERE INTEGRITY** WHICH, IN TURN, IS CRITICAL FOR **PLANETARY HEALTH**

Figure 1: Image of one of the slides of the presentation explaining the importance of maintaining soil biodiversity.

- Olatz Unamunzaga (Head of the Department of Conservation and Natural Resources at NEIKER). First video 01:08:00.

SOIL MANAGEMENT BY COVER CROPS IN VINEYARDS

The results of a pilot experiment carried out in a vineyard in Rioja Alavesa thanks to the MONTCLIMA project are presented. It is shown that the use of cover crops in vineyards significantly reduces erosion (Figure 2). Thus, the treatment in which tillage was carried out to eliminate weeds showed soil losses due to erosion of 17.8 t of soil/ha/year compared to the treatment with plant cover in which the losses were 2.1 t/ha/year. This type of experience is very interesting because a significant percentage of the vineyards in Rioja Alavesa have steep slopes and the soil is usually managed with tillage.



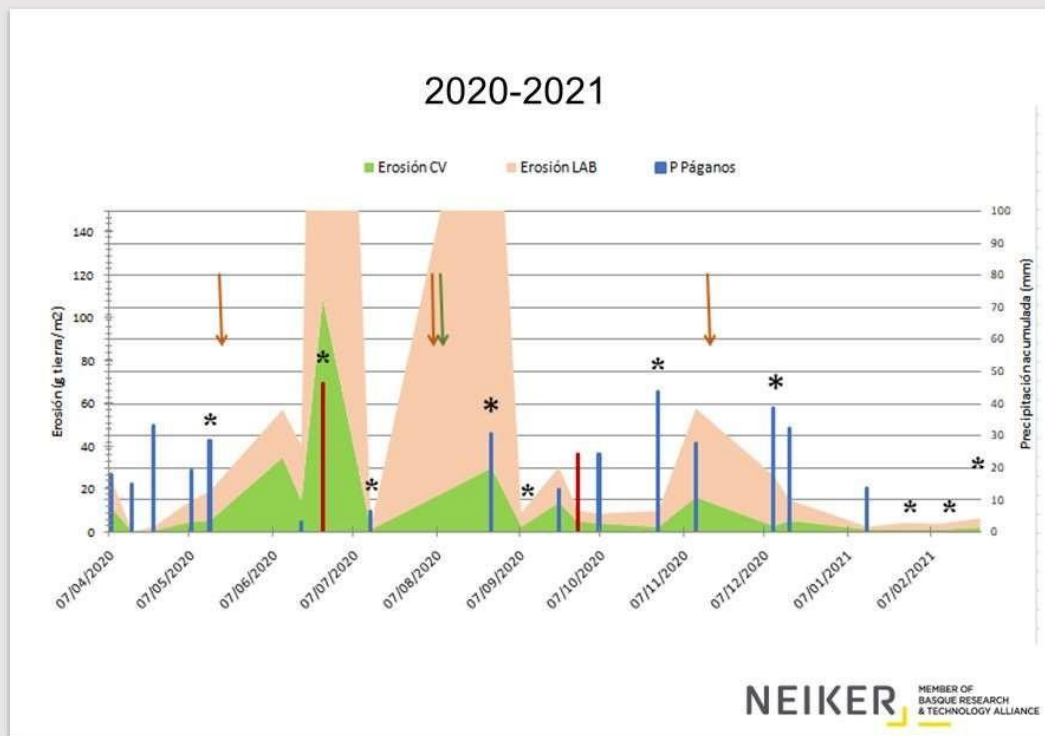


Figure 2. Image of one of the graphs presented.

- Etienne Ebrard (RTM-ONF). Firts video 01:21:00

EROSION MEASUREMENTS AFTER A FIRE. EXPERIMENTAL DEVICE IN THE MUNICIPALITY OF CERVERA.

It shows how the consequences of a fire on hydraulic and erosive risks during subsequent rainfall can be quantified locally. Three measuring devices were installed, two on burned plots and one in a non-fire area. The erosion rate was 10 times lower in the non-fired area. This type of test is interesting because with climate change the risk of fire increases (Figure 3).



Type de parcelles :

- Parcelles Feu 1 et Feu 2 : mesure de l'érosion sur sols incendiés
- Parcelle Témoin : référence sur sol non incendié
- opérationnalisation : 21/10/2021

Caractéristiques des parcelles (surface; pente):

- parcelle Feu 1 : 115 m² ; 44 %
- parcelle Feu 2 : 107 m² ; 53 %
- parcelle Témoin : 114 m² ; 56 %

Distance au pluviomètre :

- parcelle Feu 1 = 130 m
- parcelle Feu 2 = 40 m
- parcelle Témoin = 70 m



Figure 3. Image of one of the slides presented detailing some of the measures taken in the pilot project.

- Jordi Deu (FORESPIR-SILVAGRINA). First video 01:35:00.

CONTROL OF SURFACE WATER EROSION: THE EXAMPLE OF REVEGETATION IN HIGH MOUNTAIN AREAS (ANDORRA)

Jordi presents his experience in the use of biotechniques for environmental restoration based on solutions adapted to the territory. Thus, it is interesting to note the use of sheep as a means of holding the land in very steep areas without vegetation after a strong storm event in which the land slipped and the vegetation was lost. This created a major problem for the drinking water used by a municipality below. The planting of a rustic species that is a Pyrenean endemism called *Festuca eskia* was also tested as a way to control erosion. This species works well, but it has been found that maintenance is necessary every 3-5 years. An estimated gain of about 460 t CO₂ eq/ha revegetated is estimated (Figure 4).



CONCLUSIONES

Desde la primavera 2017, coincidiendo con la germinación de la *Festuca eskia*, no ha habido nuevos cortes del suministro de agua potable. Las fajas no sembradas en 2022 se han autosembrado y tienen un recubrimiento del 20%, las sembradas del 70%.

En primavera de 2020 los microdiques están colmatados, con riesgo de que lleguen lavas al curso principal.

En los sectores con mayor pendiente para los que la fertilización fue escasa, al no haber hecho mantenimiento ha habido una alta mortalidad.

Los trabajos de ovinorremediación han dado resultados muy satisfactorios en armonía con el medio ambiente, y a bajo coste.



Una crisis puede acabar generando nuevas oportunidades rompiendo paradigmas

Figure 4. Image of the slide explaining the main findings of the pilot project.

10:45-12:00. SECTION 2. STRATEGIES FOR SOIL PROTECTION.

Moderator Sebastian Chauvin (FORESPIR). First video 00:02:18:00

- Mirco Barbero (Soil Protection and Sustainable Land Use Team Coordinator, DG Environment, EU). Second video. 00:03:00.

EUROPEAN THEMATIC STRATEGY FOR SOIL PROTECTION

The EU Green Pact is presented with emphasis on the new strategy for soil protection 2030 presented in November 2021 and the soil health law that is intended to be launched during 2023 to improve the state of soils in 2050. The values that establish what constitutes healthy soil and the assessment of impacts taking into account costs and benefits are currently being defined. It provides several worrying figures to assess the problem, including that 60-70% of European soils are currently unhealthy. Healthy soils contribute as key solutions to our major challenges such as a circular and clean economy, reversing biodiversity loss, safeguarding human health, halting desertification and reversing land degradation. Some short-term (2030) and some long-term (2050) targets are proposed (Figure 5). Several key actions (a total of 16) are proposed and detailed, such as assessing the status of peatlands, joining the 4 per 1000 initiative, introducing the carbon farming initiative, proposing a carbon sequestration certificate, promoting the soil sequestration hierarchy, proposing guidelines and exchange of experiences to reduce soil sealing, closing the carbon and nutrient loop through safe bio-waste recycling and soil biodiversity assessment, antimicrobial resistance, improving digital knowledge, soil monitoring and research, and ultimately enabling the transition to healthy soil with private and EU funding and through soil literacy and social engagement. Finally, the benefits of the new law for farmers, authorities, industry and economic operators and society at large are presented.





Figura 5. Imagen de una de las diapositivas presentadas por Mirco Barbero donde se explican los desafíos relacionados con la salud del suelo.

- Loli Lorenzo (IHOBE- Basque Government Public Company for Environmental Management). Second video 00:20:19.

EUSKADI SOIL PROTECTION STRATEGY 2030.

The Basque Country Soil Protection Strategy 2030 is presented, which is in line with the European strategy presented in the previous presentation. Intensive work has been done on detecting sites potentially containing contaminated soil due to industrial activity. In total there are 12,444 potentially contaminated plots covering more than 9,000 ha. As a result of the work carried out in 2015, Law 4/2015 on soil was published, which focuses mainly on contaminated soils, but which already envisaged a future soil protection strategy that has finally been published during this year 2022. The objectives of this strategy are: to reduce soil consumption, manage land use, protect soil from harmful impacts, restore degraded soils, and improve awareness and knowledge. This strategy focuses on seven areas which are translated into 69 actions (Figure 6). Some are cross-cutting actions such as the monitoring network, diagnosis of areas vulnerable to threats, design and implementation of a research programme, definition of a system of indicators for soil monitoring and protection policies, etc.





Figure 6. Slide explaining the areas of action of the Basque Land Protection Strategy.

- Thomas Jacques (President of the French Association for Soil Research AFES). Second video 00:47:00.

ALLIANCE OF SOILS OF THE PYRENEES (ASPIR).

The Pyrenees Soil Partnership (Aspir), which derives from the Global Soil Partnership and the European Soil Partnership and was established in 2021, is presented. The list of members of the alliance is presented, as well as the general objective, which is soil conservation and the maintenance and improvement of soil quality through the application of sustainable management practices. This alliance is based on five basic pillars: soil management, research, dissemination, data reporting and standardisation. Three working groups have been set up within the partnership: soil information, dissemination and soil degradation.



Interreg Sudoe
European Regional Development Fund

MONTCLIMA

Objectifs des alliances - *Objetivos de las alianzas*

Améliorer la gouvernance et promouvoir la gestion durable des sols aussi bien pour les utilisateurs des terres que pour les décideurs politiques.

Mejorar la gobernanza y promover la gestión sostenible del suelo tanto para los usuarios como para los responsables políticos.

en

- Fédérant les parties prenantes d'un territoire
- Encourageant la coopération
- Mettant en œuvre des actions

en

- *Reunir a las partes interesadas de un territorio*
- *Fomentar la cooperación*
- *Aplicación de las acciones*

Figure 7. Slide presentation by Thomas Jacques presenting the objectives of the partnership.

12:00-14:30. SECTION 3: SOIL STRATEGIES. PROTECTION.

Moderator Carlos Garbisu

- María José Sanz (Scientific Director of BC3- Basque Centre for Climate Change). Second video 00:56:00.



THE ROLE OF SOIL IN CLIMATE NEUTRALITY

The global carbon (C) cycle shows the importance of soil as a reservoir of C, constituting some 1700 Gt, which is greater than that of vegetation, some 450 Gt. This pool must therefore be preserved and enhanced. C accumulation models are very uncertain, but the EU target is for net C emissions to be zero by 2050. The increase in soil C is important not only from the point of view of curbing emissions to the atmosphere, but it has a number of other functions that should also be taken into account. IPCC Working Group 3 has established climate change mitigation estimates associated with soil that have a high uncertainty, but determine a technical potential that decreases when socio-economic factors are taken into account. In the sixth IPCC report in which these data appear, for the first time it also takes into account the co-benefits of C. All these calculations consider a C price of about 100 \$/t C. However, in the C market up to now the prices paid have varied between 5-10 \$/t, especially for avoided deforestation. There are several practices that can reduce emissions or increase soil C sequestration, and they are cited in this presentation. However, there is a problem of how to measure these variations of C in soil due to several reasons. Among other gaps (Figure 8) mentioned, a standardised basis for monitoring has yet to be built, modelling needs to be improved because the uncertainty is very high, we do not know how climate change impacts on soil C, and we also need to know how the increase in C affects other soil functions (co-benefit) and what is the importance of these functions in each region. There are many initiatives aimed at increasing soil C, such as the 4 per 1000 initiative, which now has a more global viewpoint than it originally had and which takes into account more factors than just C accumulation. Different land use payment schemes are also shown where prices, duration requirements of the practice being paid for, discounts, etc. are specified. The case of Australia is made more concrete: to support this scheme they have had to initially pay \$10,000 to farmers for them to share data, and they have also invested in a 2022 research programme of 20 million Australian dollars on soils, dedicated to improving estimates. In order to generate soil C credits, a consensus is needed on how C stocks are defined and how changes in C stocks are verified through measurement and permanence of C in soils. Soil C sequestration has the potential to help mitigate climate change, and can also provide co-benefits, but it needs to be done well and is a big challenge. However, it is important not to use the C sequestration capacity of soils to avoid other actions to decarbonise other sectors that may be more complicated. Soil C cannot be the only way out, action is needed on all fronts.



Algunas lagunas...

La **incertidumbre** en las emisiones y sumideros contemporáneos dentro de AFOLU sigue siendo alta.

Se necesita con urgencia un mejor monitoreo del balance de CO₂ de la tierra, y **conciliación de resultados de modelos y contabilidad nacional**.

Los **impactos futuros del cambio climático** en los sistemas terrestres son muy inciertos.

Se necesita investigar los **sistemas de contabilidad y las opciones de políticas** que permitirán que el carbono de los suelos agrícolas y los bosques **se utilicen como compensaciones (voluntarias o reglamentarias)** para aumentar el financiamiento de los CDR basados en la tierra.

Es necesario mejorar las **estimaciones del potencial de mitigación**, ya sea que se deriven de estudios sectoriales o IAM para tener en cuenta los efectos climáticos biofísicos y los impactos del cambio climático futuro (por ejemplo, la permanencia de la mitigación), la pérdida de biodiversidad y las reacciones correspondientes.

Los **escenarios modelizados** no tienen en cuenta muchas de las ventajas y desventajas de la pobreza, el empleo y el desarrollo, que son muy específicas del contexto y varían enormemente según la región.

La comprensión profunda de las **interacciones entre la mitigación y los ODS** es fundamental para identificar opciones de mitigación que maximicen las sinergias y minimicen los trade-offs.

IPCC AR WGIII

Figure 8. Image of the slide explaining some of the gaps in the carbon farming mechanism.

- David Robinson (Soil Researcher - Centre for Ecology and Hydrology, UK).
Second video 01:21:00.

WHY IS A SOIL OBSERVATORY NECESSARY?

David is responsible for the soil monitoring system in the UK where they have been doing this for 40 years. In Wales it is now being monitored, but in a more detailed way and taking into account the whole ecosystem. They do stratified random sampling that takes into account climate, relief, parent material, etc. The basic unit is 1 km² with 5 random samples in each square. A wide range of different properties are measured, such as C, pH, bulk density, total N, P, heavy metals, organic compounds in soil, etc. During all this time, they have studied the relevance of the properties to be measured according to their effect on ecosystems. They have improved the way to detect what happens and why things happen. The data in the case of the Welsh monitoring are available to the whole public, not only the administration but also farmers and the general public. Some interesting things are observed with respect to C, which remains stable in Wales as opposed to the rest of the UK where it has fallen, especially in woodland, by up to 10% (Figure 9). The pH however is recovering since the 1970s when there was a problem caused by acid rainfall. Phosphorus, on the other hand, has decreased in the soil and this is a reflection of the success of policies aimed at this end. Overall, when the indicators from the Wales sample are aggregated, most of the ecosystem indicators have been maintained or improved over the last 40 years. Attempts are being made to integrate all these data for modelling and to try to estimate what will happen in the future.

- Panu Torniainen (CEO at ZERTICARBON- Block chain Certified). 01 :48 :00



ZERTICARBON: AFFORESTATION-DIGITISATION-MONETISATION

The Finnish forestry sector, comprising some 620,000 forest owners who harvest about 150,000 ha/year, is profiled. These landowners sometimes feel cornered by European policies. ZERTICARBON identifies each certified tree, guarantees that it will not be felled and guarantees what happens through a Blockchain system that does not depend on a single administrator, but on several people. In this way, the owner is not forced to cut down the forest in order to have a guaranteed income. According to this system, damage caused by frost, snow, etc. is reported, assessed and, with the insurance that is taken out, it is guaranteed that replanting will be carried out. As a summary, it is specified that this system connects forest owners with investors, companies, etc. It is an attractive system for foresters in terms of income. It is an optimal solution for the environment because it protects forests, it promotes the creation of new forest areas, it is a true fact-based solution, it is a smart way to manage forests while respecting biodiversity, it does not allow green washing, there is no double counting. It is an economical solution to operate because there is no need for middlemen and it is transparent at all stages.

- Inazio Martínez de Arano (Director at Mediterranean Regional Office of EFI-European Forest Institute). Second video 02:19:00.

OPEN INNOVATION TO OVERCOME THE CHALLENGES OF THE FUTURE

An open innovation system is proposed that favours external flows to the company, region or sector, trying to favour the meeting of the challenge with the solution.

It serves to attract investment or to export our own results. Open innovation is important because it increases the capacity to identify and implement innovation, mobilises the research community, creates positive mindsets and involves new actors, promotes research and innovation networks, attracts talent and recruits start-ups, and improves support services for entrepreneurship in the bioeconomy. In this respect, it should be noted that in the Basque Country there are few start-ups dedicated to the world of the bioeconomy, with the exception of some dedicated to the world of pharmaceuticals or food-tech. They structure their action on 3 pillars, one of which is the Open Innovation Hub. In this sense, the open innovation challenge was presented with the aim of tackling regional challenges. The challenges are now being defined through stakeholder interviews. One that emerges very clearly is carbon farming in the forestry sector. A challenge will be launched in this regard, but there are still many uncertainties, and issues to be resolved on which solutions are being studied. What is offered to the owners of the solutions in this challenge is to tell them if their idea fits in, networking, also a remuneration is offered which 10.000 euros to maybe make a business model, training, etc. Its aim is to be a benchmark for open innovation in the forest bioeconomy sector.

