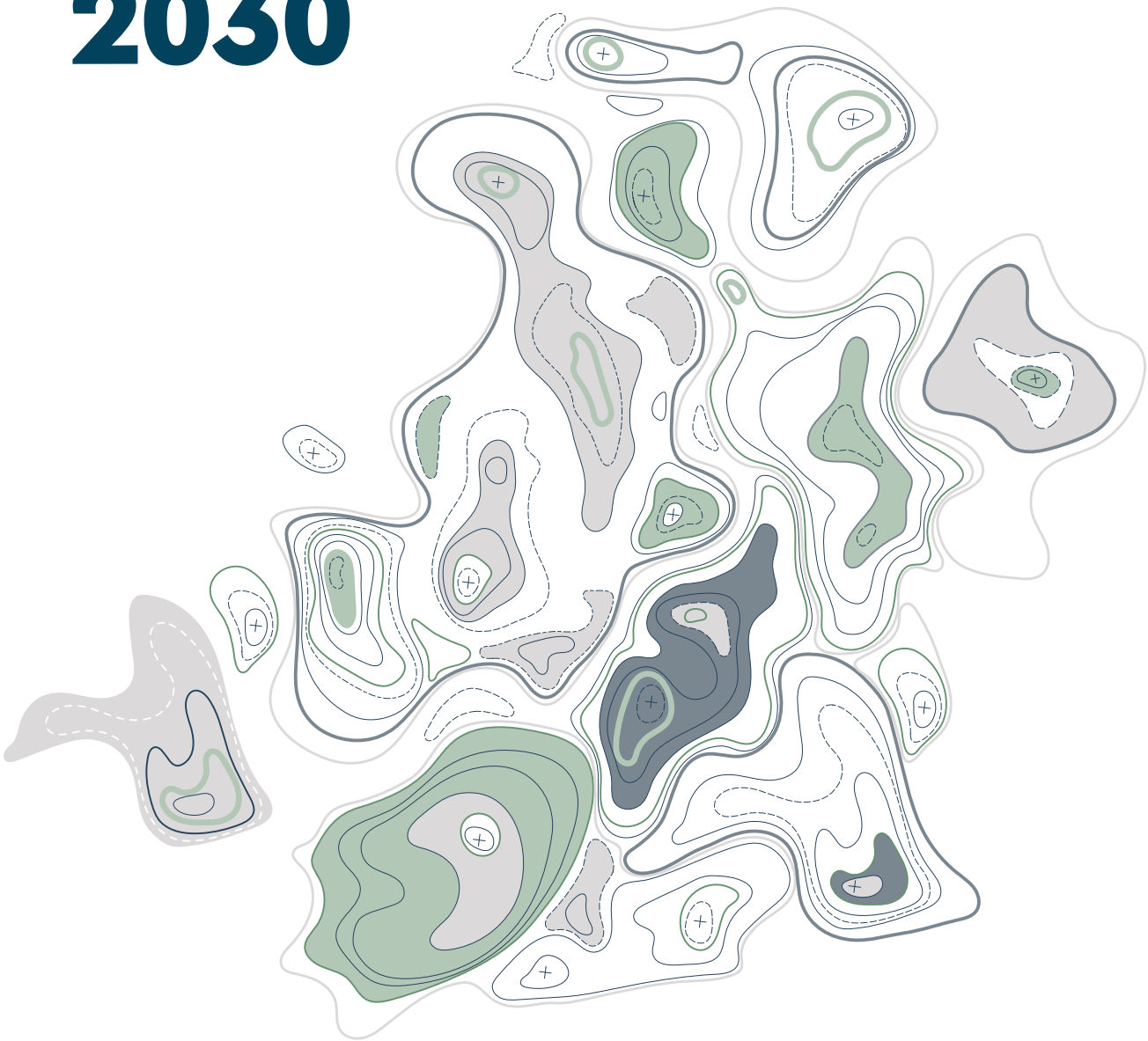
BASQUE SOIL PROTECTION STRATEGY 2030



EUSKO JAURLARITZA GOBIERNO VASCO

EKONOMIAREN GARAPEN, JASANGARRITASUN ETA INGURUMEN SAILA

DEPARTAMENTO DE DESARROLLO ECONÓMICO, SOSTENIBILIDAD Y MEDIO AMBIENTE

A bibliographic record of this work can be consulted in the catalogue
of the Basque Government Library Network:
https://www.bibliotekak.euskadi.eus/WebOpac

Original work:

Edition: June, 2022

Nº of copies: 400 copies

Internet: www.euskadi.eus

Editor: Eusko Jaurlaritzaren Argitalpen Zerbitzu Nagusia

Servicio Central de Publicaciones del Gobierno Vasco
Donostia-San Sebastián, 1 - 01010 Vitoria-Gasteiz

Design: Roberto Saenz Maguregui

Legal deposit: XXXXXXXXXXX

Protecting the soil, our future

Soil, an essential resource for the existence of humankind and all other species, gives us 95% of the food we eat. However, it has been one of the most neglected aspects of environmental protection for years. The damage that human activities are causing to the soil has long been overlooked, threatening an increasingly scarce natural resource of incalculable value with a central position between the geosphere and the biosphere.

Soil depletion leads to loss of ecosystem services, whose estimated value of 38 billion euros a year in the European Union. Erosion alone costs European farmers 1.25 billion euros every year.

In this context, soil protection, hitherto scattered among numerous sectoral policies and planning, has been gaining prominence in a new global and European scenario in which it has regained its rightful place in the urgent safeguarding of the ecological, social and economic values of our planet.

To achieve a sustainable territory, the Basque Country, in line with Europe, is firmly committed to soil preservation, which is why the Basque Government is applying advanced sustainability criteria in a broad range of areas such as spatial and urban planning; agriculture; livestock and forestry; the management of natural spaces; land development for industry and housing, and remediation of contaminated soils.

To harmonise the entire intervention, the Basque Country has produced the **Basque Soil Protection Strategy 2030** which proposes fulfilling the objectives by collaborating and coordinating all the stakeholders involved in protecting this natural resource. The strategy gives an overarching vision of today's environmental concerns, such as climate change and biodiversity loss, linked to those that have traditionally received more attention, such as deteriorating water and air quality. The final result is the sum of integrators that address environmental protection while incorporating social and economic arguments.

The challenge is to reclaim degraded soils and to reduce potential land degradation and occupation to zero in net terms. Healthy soil is essential for achieving climate neutrality, a clean, circular economy, reversing biodiversity loss, producing healthy food, protecting human health and halting desertification and soil degradation.

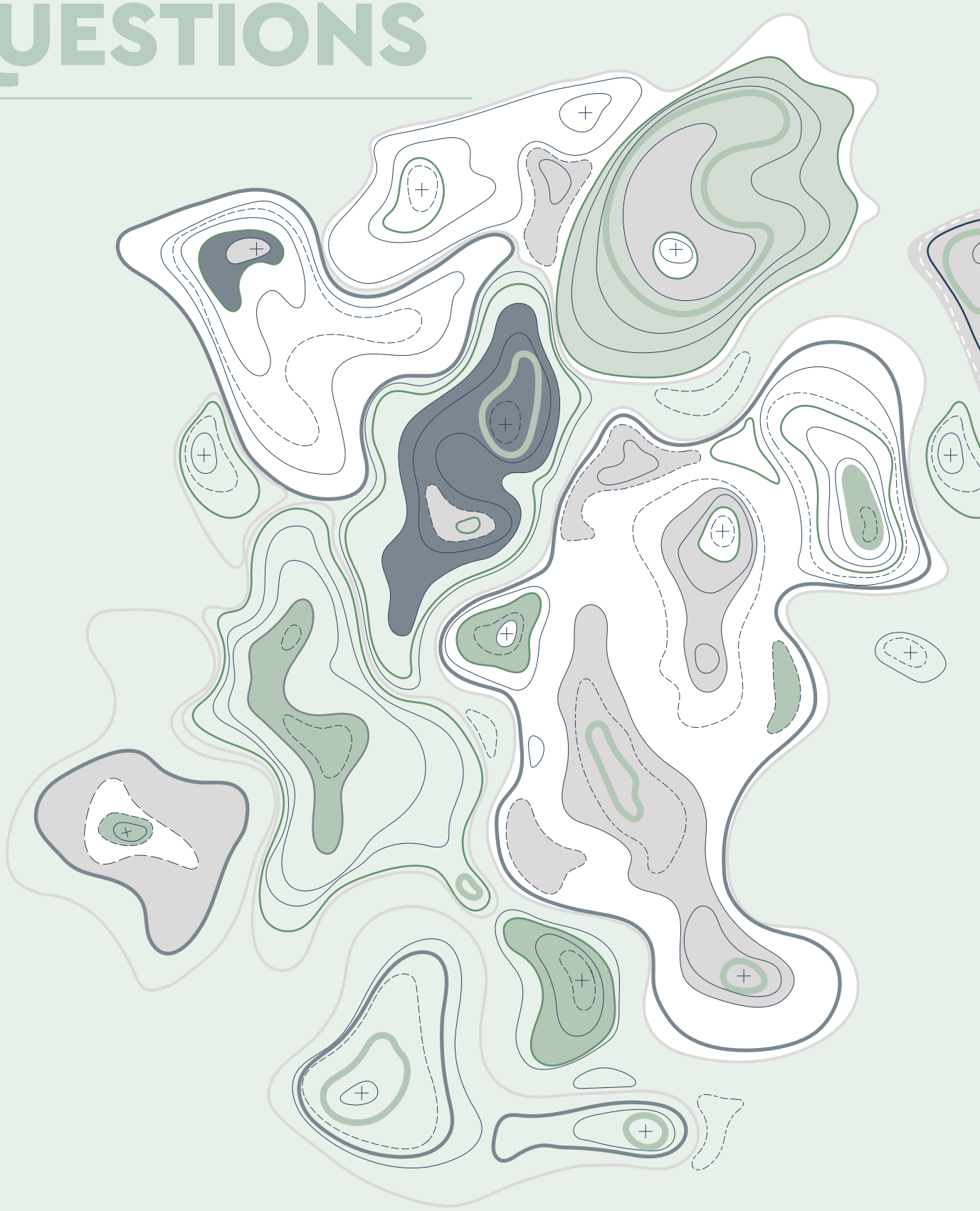
Like all the living things that share the planet, human beings need direct contact with the soil, with the earth, with terrestrial ecosystems. Encroachment on green spaces is depriving us of this contact, making us forget that beneath the asphalt and concrete lies the planet's second largest reservoir of organic matter, an environment teeming with life that is home to 25% of the planet's biodiversity.

Arantxa Tapia

Minister for Economic Development,
Sustainability and Environment
Basque Government

INDEX

01.
KEY QUESTIONS



1.1

Soil, a key component of the environment for mankind

Along with water and air, soil is probably the environment's most precious component due to the exceptional importance of the functions it performs. Far from being a mere physical support, soil is the source of a variety of functions which are vital for human beings and ecosystems.

In recent decades, our society has witnessed the gradual and worrying degradation of our ecosystems, the effects of which have interfered with the main biogeochemical cycles that support the functioning of the biosphere. A wide variety of human activities have contributed decisively to this scenario, including, burning of fossil fuels, emission of pollutants, unsustainable consumption of raw materials and overexploitation of natural resources, among others. Consequently, maintaining soil functions is currently so compromised that the results are difficult to predict.

Soil protection, whose health is inextricably linked to the survival of our species, has systematically been ignored for a long time. Historically, contamination has been the only threat addressed by specific policies given the extent of this problem in developed countries, particularly in the most industrialised ones. The serious threat of contamination to human health and the functioning of the ecosystem have led to significant resources being invested in restoring contaminated soil **(see Figure 1)**.

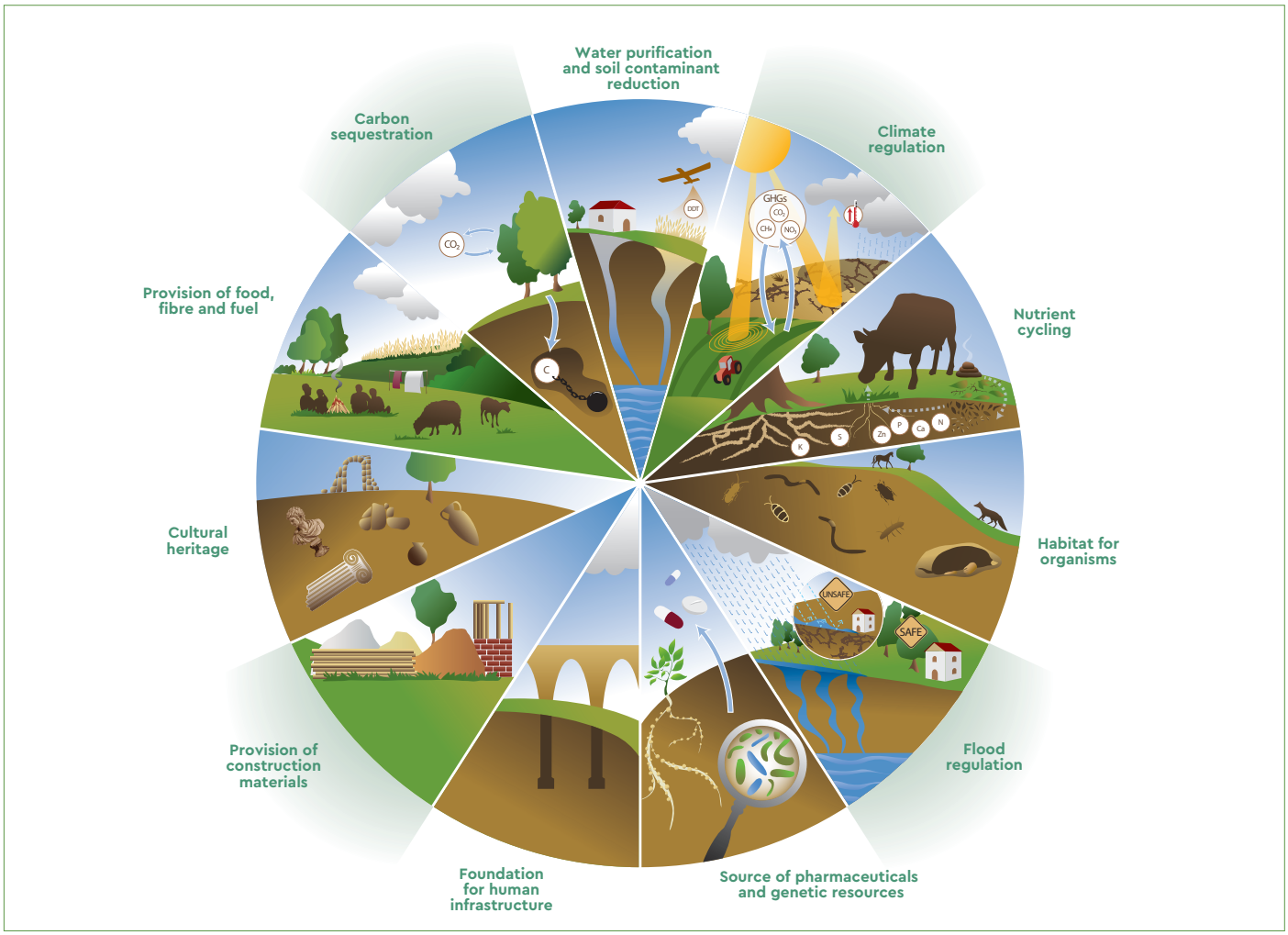
However, beyond contamination, there are other threats to the functional integrity of the soil ecosystem, such as erosion, sealing, salinisation, compaction, depletion of organic matter and biodiversity or landslides, which must not be forgotten when the objective is integrated protection of the environment. A global soil protection strategy must address each and every threat that has an adverse effect on the health of our soil and, consequently, the ability to develop its functions, bearing in mind that some of them, such as erosion or landslides, which are inherent in natural dynamics, may originate or be fostered or exacerbated by human activity.

Soil is a non-renewable natural resource which regenerates far more slowly than it is extracted or the goods and services that it provides are used. Therefore, sustainable management is the only path to preserving its long-term functionality.

Faced with this scenario, it is clear that the current strategic framework for soil protection, not exclusively but rather significantly focused on chemical contamination arising from industrial activity, is in need of a review and projection that safeguards soil in the medium and long term through a global and integrated approach, which slows down the land occupation and deterioration rate and promotes multi-functionality in the broadest sense. After all, the sustainability of the biosphere and hence the ecosystems on which our survival and economy depend, is subject to the functioning of the whole package, rather than on parts of it and fragmentation, which are inoperable in this context. It must not be forgotten that soil is an important and often overlooked element of the climate system as the second carbon sink after the oceans **(see Table 1)**.

Soil deserves an integrated protection framework that can only be achieved based on the redefinition of the concept of soil itself, recognising the diversity of elements that is encompassed by this term and its multi-functionality, beyond its mere role as a physical support. It is a complex system, in terms of both its structure and its dynamics and functions, whose functioning is subject to a complex, yet delicate system of balances for the full expression of its functions. Its preservation is a challenge that is not easy to face and requires complex efforts in knowledge development and integration, disciplines, competences, regulations, criteria and management models.

Figure 1. Services delivered by soil ecosystems



Source: Soil Functions, FAO, 2015

Table 1. Services provided by soil ecosystems and functions that support these services

	ECOSYSTEM SERVICES	SOIL FUNCTIONS
Supporting services Services that are necessary for the production of all other ecosystem services. Their impact on people are often indirect or occur over a very long time.	Soil Formation	• Weathering of primary minerals and release of nutrients. • Transformation and accumulation of organic matter. • Creation of structures (aggregates, horizons) for gas and water flow and root growth. • Creation of charged surfaces for ion retention and exchange.
	Primary Production	• Medium for seed germination and root growth. • Supply of nutrients and water for plants.
	Nutrient Cycling	• Transformation of organic matter by soil organisms. • Retention and release of nutrients on charged surfaces .
Regulating Services Benefits obtained from the regulation of ecosystem processes.	Water quality regulation	• Filtering and buffering of substances in soil water. • Transformation of contaminants.
	Water supply regulation	• Regulation of water infiltration into soil and water flow within the soil. • Drainage of excess water out of soil and into groundwater and surface water.
	Climate Regulation	• Regulation of CO_2, N_2O and CH_4 emissions.
	Erosion regulation	• Retention of soil on the land surface.
Provisioning Services Products (goods) obtained from ecosystems for the direct benefit of people.	Food Supply	• Provision of water, nutrients and physical support for the growth of plants for human and animal consumption.
	Water supply	• Retention and purification of water.
	Fibre and fuel supply	• Providing water, nutrients, and physical support for plant growth for bio-energy and fibre production.
	Supply of soil/earth raw materials	• Provision of topsoil, aggregates, peat, etc.
	Physical support	• Supporting human settlements and related infrastructures.
	Refuge	• Habitat for soil animals, birds, etc.
	Genetic resources	• Source of unique biological materials (for example, medicines: antibiotics such as tetracycline or pyridomycin).
Cultural Services Non-material benefits which people obtain from ecosystems through spiritual enrichment, aesthetic experiences, cultural heritage preservation and leisure/ recreation.	Aesthetic and spiritual services	• Preservation of natural and cultural landscape diversity. • Source of pigments and dyes.
	Heritage	• Preservation of archaeological records.

Source: *Status of the World's Soil Resources. Main Report, FAO, 2015*

1.2

Definitions

Soil

Solid part of the earth's crust from the rock-bed to the surface, which includes its liquid and gaseous phases and the organisms that inhabit it, with the capacity to carry out natural functions and its use. However, those that are permanently covered by a layer of surface water shall not be considered as such.

(**Source**: *Law 4/2015, of 25 June on the prevention and correction of soil contamination in the Basque Country*).

Natural resource

All components of nature likely to be used by human beings to satisfy their needs and have an actual or potential value, such as: natural landscape, surface and groundwater; soil, subsoil and land for its greater capacity of use: agricultural, livestock, forestry, hunting and protection; biodiversity; geodiversity; genetic resources, and the ecosystems that support life; hydrocarbons; hydropower, wind, solar, geothermal resources and similar; the atmosphere and the radioelectric spectrum, minerals, rocks and other renewable and non-renewable geological resources.

(**Source**: *Biodiversity Strategy of the Basque Autonomous Community 2030*).

Natural heritage in the Basque Country

For the purposes of *Law 9/2021, of 25 November, on natural heritage conservation in the Basque Country*, natural heritage in the Basque Country is understood to be the set of ecosystems, species, goods, resources and services from nature, source of biodiversity and geodiversity, with essential value from the environmental, landscape, scientific or cultural point of view, located in land and maritime areas of the soil, subsoil and flight of the Autonomous Community .

(**Source**: *Law 9/2021, of 25 November, on natural heritage conservation in the Basque Country*).

Sustainable soil management

Soil management is sustainable if the supporting, provisioning, regulating, and cultural services provided by soil are maintained or enhanced without significantly impairing either the soil functions that enable those services or biodiversity. The balance between the supporting and provisioning services for plant production and the regulating services the soil provides for water quality and availability and for atmospheric greenhouse gas composition is of particular concern.

(**Source**: *World Soil Charter, 2015*).

Ecosystem services

Services and benefits that people obtain from these services in terms of the ecosystem and the landscape, including public assets related to the broader functioning of the ecosystem and the well-being of society.

(**Source**: *Haines-Young and Potschin, 2018; MA 2005*).

Healthy soils

Soils are considered to be healthy when they present a healthy chemical, biological and physical condition and can therefore continuously provide as many of the following ecosystem services as possible:

- Provide food and biomass production, including in agriculture and forestry.
- Absorb, store and filter water and transform nutrients and substances, thus protecting groundwater bodies.
- Provide the basis for life and biodiversity, including habitats, species and genes.
- Act as a carbon reservoir.
- Provide a physical platform and cultural services for humans and their activities.
- Act as a source of raw materials.
- Constitute an archive of geological, geomorphological and archaeological heritage.

(**Source**: *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions EU Soil Strategy*

for 2030 "Reaping the benefits of healthy soils for people, food, nature and climate" {SWD(2021) 323 final})

Soil degradation / degraded soil

(**Source**: *The Assessment Report on Land Degradation and Restoration, IPBES- Science-Policy Platform on Biodiversity and Ecosystem Services, 2018*)

Soil degradation

The numerous processes caused by the human being that lead to the decline or loss of biodiversity, functions or services of ecosystems in any associated land and water ecosystem.

Degraded soil

Status of soil that is the result of the persistent reduction or loss of biodiversity and the functions and services of ecosystems that cannot be fully recovered unaided in ten-year time frames.

(**Source**: *Biodiversity Strategy of the Basque Autonomous Community 2030*).

Land degradation neutrality

State in which the quantity and quality of land resources necessary to support ecosystem functions and services and enhance food security remain stable or increase within specified temporal and spatial scales.

(**Source**: *Decision 3/COP.12, UNCCD, 2015*).

Threats

(**Source**: *Status of the World's Soil Resources, 2015*)

Acidification. Reduction of soil pH due to the accumulation of hydrogen ions and aluminium in the soil and the associated loss of base cations, such as magnesium, potassium and sodium, from the soil as a result of leaching or the extraction of these elements.

Flooding. Despite the fact that many ecosystems are well adapted to natural flooding and many of them depend on it for their development, such as ecosystems that are located on the fertile plains of rivers, flooding can also be considered as a threat to soil. This threat encompasses two different phenomena: waterlogging/flooding that affect soil properties and its functions (when the soil moisture is extremely high and the oxygen in the pore space is insufficient or concentrations of other gases like carbon dioxide or ethylene are too high for the plant roots to respire properly), and flooding significantly affects soil conditions related to problems such as erosion, contamination, nutrient leaching, severe crop losses, etc.

Compaction. Increase in the density and reduction in the macroporosity of soil as a result of the application of pressure on its surface. Compaction impairs the function of soil on and below the surface: root penetration and water and gaseous exchanges. The threat is not limited to crop land but is also prevalent in meadows and pastures, and even in natural non-disturbed systems. The compaction process may be initiated by the use of heavy agricultural or construction machinery, or as a result of trampling by wildlife while grazing, preferably in high moisture conditions.

Contamination. In general, this term is defined as the addition of chemical products or materials to the soil that have a significant adverse effect on organisms or soil functions. A contaminant can be defined as any chemical substance or foreign material present in concentrations that are considered to be higher than normal. More specifically, Basque legislation defines contaminated soil as that which presents an anthropogenic alteration, in relation to its chemical properties, that is incompatible with its functions due to the fact that it poses or may pose an unacceptable risk to the health of people or the environment, in the event of a change of use.

Nutrient Imbalance. This threat occurs when the input of nutrients, through the addition of chemical compounds and organic fertilisers or other sources, is:

a. insufficient to enable the crops to reach their development and yield or
b. excessive during the harvesting of crops.

Nutrient deficiency contributes to food insecurity whilst an excess contributes to the deterioration of the quality of water and the emission of greenhouse gases (particularly nitrous oxide (N_2O)) to the atmosphere from agricultural sources.

Desertification. Desertification is defined as land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities.

(**Source**: *United Nations Convention to Combat Desertification*).

Its main causes are the climate, erosion and human action (overexploitation or logging, clearing, overgrazing or elimination of vegetation, uncontrolled tapping of water, etc.) whilst the main effects include ecological imbalances, extinction of species and ecosystems, exacerbation of phenomena such as salinisation, erosion, flooding or climate change, destruction and reduction of natural resources, depletion of fertile soil and land, effects on food safety and impact on life quality.

Landslides. Landslides or slipping occur when masses of rock or earth move down a slope due to the force of gravity. The term landslide includes a wide range of land movements, such as rockfalls, circular sliding in clay soils, flow of sludge and level or translational sliding.

(**Source**: *Guía sobre deslizamientos del Colegio Oficial de Geólogos del País Vasco* (*Landslide Guide by the Official Association of Geologists of the Basque Country*), *2014*)

Landslides may be caused by natural factors, such as groundwater pressure, loss of vegetation cover, erosion of the foot of a slope, saturation due to snow melt or heavy rain and earthquakes, or by human causes, such as deforestation and the elimination of vegetation cover, cultivation, construction and changes in the morphology of slopes.

Biodiversity Decline. The *Millennium Ecosystem Assessment* defines biodiversity as the variability among living organisms in terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part. It includes the variability within species, the variability among species and the diversity of ecosystems. In the case of soil, this threat is interpreted as a reduction in the diversity of the micro and macro organisms present in soil.

(**Source**: *Millennium Ecosystem Assessment Synthesis Report, 2019*).

In terms of the ecosystem, the main pressures on soil biodiversity derive from changes in land use, over-exploitation of resources, changes in the climate and hydrological regime, as well as changes in geochemical properties.

Soil Organic Carbon (SOC) Loss. This concept is defined as the decline of organic carbon stock in soil. Organic matter plays a crucial role in maintaining soil functions and preventing its degradation. It influences the soil's ability to hold water, its structure, the provision of nutrients and control of soil-transmitted pathogens. Furthermore, this parameter is a strategic element to offset greenhouse gas emissions.

Salinisation. Accumulation of salts (sodium, potassium, magnesium and calcium, chloride, sulphate, carbonate and bicarbonate) in soil. Primary or natural salinisation involves salt accumulation through natural processes due to high salt content of the parent material or in groundwater, or the long term accumulation of salts in rainwater. Secondary or human induced salinisation is caused by human interventions, such as inappropriate irrigation practices.

Sealing. Permanent covering of the soil surface with impermeable artificial materials, (such as asphalt and concrete in buildings and roads, for example). This threat is related to land take /development, which is considered to be the increase in the area occupied by settlements over time. Part of this threat includes the development of dispersed settlements in rural areas, urban sprawl, the transformation of soil within an urban area (densification), as well as the expansion of transport infrastructures, such as roads and railways.

The most adverse effects of this phenomenon are related to soil consumption, loss of high quality agricultural soil, destruction of habitats, fragmentation of ecosystems, contamination of soil, water and air and the alteration of microclimates. Soil sealing is a major concern as the soil formation process is extremely slow and it may take centuries to create a single centimetre.

Development

Urban condition of land with a development classification of urban or land for development, as well as the general systems of land not for development.

Land classification

Land classification is understood to be the link between the structural urban planning system of specific areas to the regime inherent in the following classes: urban, land for development and land not for development.

(**Source**: *Law 2/2006 on Land and Urban Planning, Art. 10*).

Land qualification

Land qualification is understood to be the planning assignment of the different global uses and detailed uses to the different areas into which all or part of the municipality is divided.

(**Source**: *Law 2/2006 on Land and Urban Planning, Art. 15*).

1.3

The Participatory Process for the Formulation of the Strategy

La The increasing importance of soil protection in recent times, together with the determination to advance towards an integrated management model, highlight the need to involve different actors from the administration and the private and social sphere and make them co-responsible, with the aim of contributing towards the preservation and recovery of our soils, bearing in mind extremely diverse perspectives.

Therefore, the *Soil Protection Strategy 2030* has been drawn up with the participation of the different levels of the administration, stakeholders and social agents of the Basque Autonomous Community related to soil management. The following table sums up the overall objectives pursued in this process.

OBJECTIVES OF THE JOINT CONSTRUCTION PROCESS OF THE SOIL PROTECTION STRATEGY 2030

- **A.** Understand the participating players' relationship and ties with soil protection.
- **B.** Obtain a qualitative idea of each participant's assessment of the situation.
- **C.** Compile demands, suggestions and contributions from each of the agents.
- **D.** Identify possible priority actions.
- **E.** Explore new potential work areas for the future..
- **F.** Make participants commit and take joint responsibility for the fulfilment of the challenges through recognition of the need for joint work.

PHASE I. Formulation of the bases of the strategy

The aim of this phase was to bring about an initial approach that would enable an opportunities map and action bank to be generated with potential for their subsequent development. The following tools were used in this process:

— ***Nine semi-structured personal interviews***, conducted face-to-face.

— ***Four group working sessions*** with 8-10 participants, to identify the core elements of soil assessment in the Basque Country and understand the perception of the stakeholders regarding what public intervention should address in the field of soil protection.

The main conclusions of this initial phase of the participatory work are summarised below.

GENERAL NEEDS

- Increased political impetus is required to strengthen the transversal role of soil protection.
- It is essential to generate permanent meeting and work spaces.
- At a technical level, it is vital to create joint work teams as a formula for project implementation.

MEASURES TO BE INCORPORATED IN THE STRATEGY

- The specific initiatives considered as a base for discussion in each of the sessions were previously evaluated by the participating entities, and many of them can be directly transferred to the work plan. However, it must be pointed out that the actions were not examined in-depth (goal setting, time frames, responsibilities, specific tasks) so once the initial work plan has been defined, it is necessary to maintain the relationship and generate specific action sheets, which are incorporated into annual plans.
- Due to the volume of initiatives, a new opportunities map will need to be drawn up.
- Action in relation to all of the threats, except soil contamination, which already has its own action framework, requires thorough work to establish the bases of action in each and every one of them, including them in the overall objectives of soil protection.
- Following on from the work carried out with the different actors, the need to address soil protection from an integrated perspective, with different plans and aspects will be considered.

In short, there is an evident need for a shift in the way of moving forward; soil protection targets can only be reached through shared and collaborative work. Soil is present in the different activities of the government, other public administrations, entities and stakeholders. Therefore, the initial work should focus on organising, structuring and coordinating to make sense of this interrelationship. The path to be travelled in this respect is long and the vision is ambitious, but the structures and the joint work model that Basque institutions and society have opted for enables the journey to continue decisively towards this new scenario.

PHASE II. Formulation of the first draft of the strategy

In this second phase, the aim was to formulate a preliminary draft of the strategy based on the elements identified in the previous phase. To do so, two essential tools were used in the process:

— ***Technical Committee.*** The involvement of the different Departments of the Basque Government has been key in the formulation of the first draft of the strategy, and more specifically, in the identification of the lines of action that will lay out the actions for the coming years and the priority actions to be initially integrated as part of the strategy. They have all striven to identify their areas of involvement, prioritise actions and assume their implementation.

— ***Participation in the IREKIA Platform.*** This open platform has been used to call for the participation of all stakeholders in the formulation of the *Soil Protection Strategy 2030*.

PHASE II: TECHNICAL COMMITTEE. PARTICIPANTS

Department of Economic Development, Sustainability and the Environment

- Environmental Management Division
- Agriculture and Livestock Division
- Natural Heritage and Climate Change Division
- ELIKA, Basque Foundation for Food Safety
- HAZI, Rural, Coastal and Food Development
- IHOBE, Public Environmental Management Company
- NEIKER, Basque Institute for Agricultural Research and Development
- SPRILUR
- URA, Basque Water Agencya

Department for Regional Planning, Housing and Transport

- Regional Planning and Urban Agenda Division
- VISESA, Vivienda y Suelos de Euskadi, S.A.

Department for Health

PHASE III. Contrasting the Strategy

In the final phase of the participation, the aim was to contrast and agree on the draft formulated in the previous phase, and to do so, Provincial Councils, municipalities, associations and diverse stakeholders added other points of view and opinions through different work sessions, significantly enriching the document. More specifically, the document has been contrasted with the following agents:

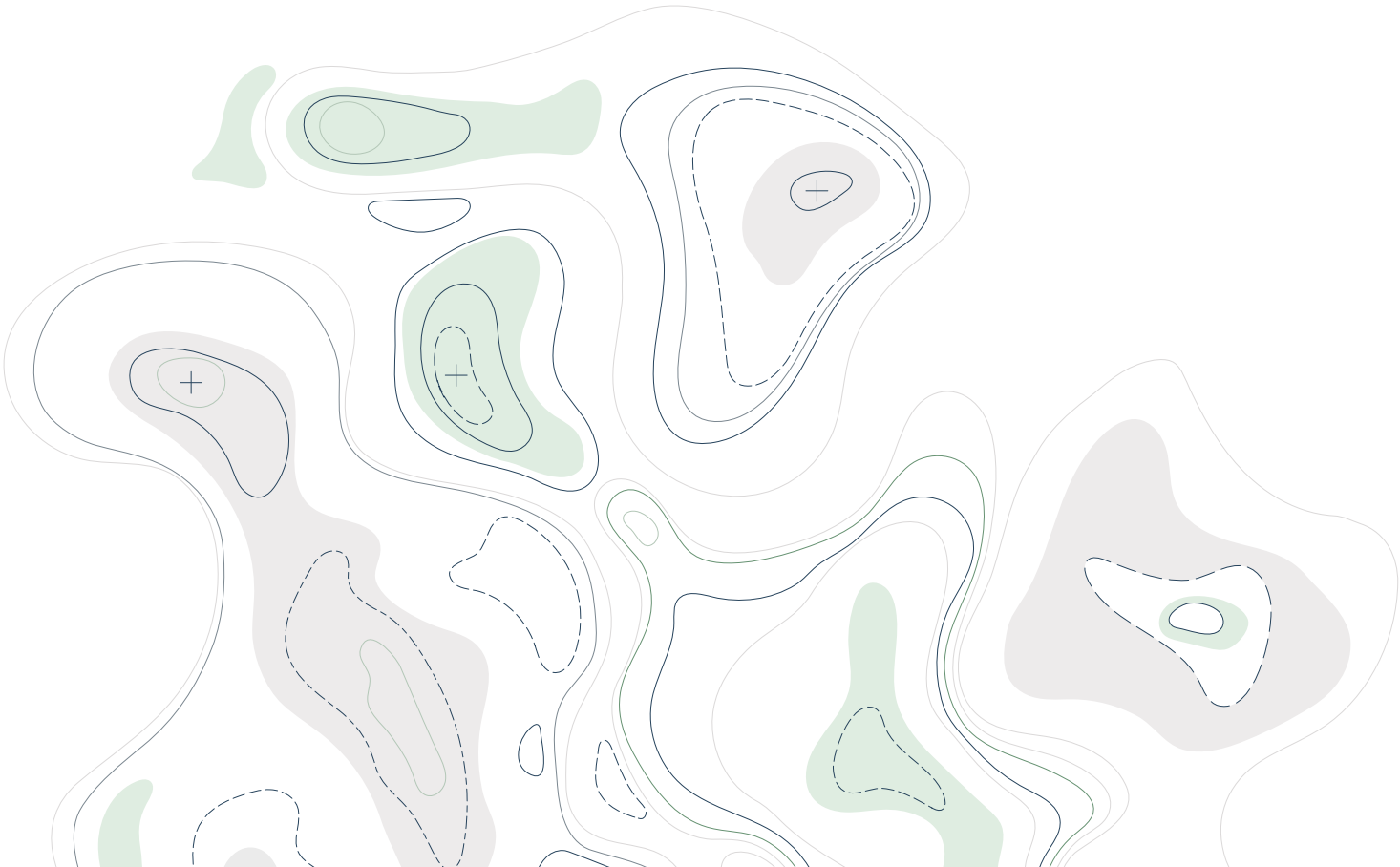
1. **Municipalities through the UDALSAREA 2030 network.** In order to compile contributions from municipalities.

2. **Provincial Councils.** The *Soil Protection Strategy 2030* was presented to Provincial Councils on 16 June 2021 in a specific session, detailing its scope and facilitating the draft document to make any contributions, where appropriate.

Furthermore, it was presented to the Environment Advisory Council of the Basque Autonomous Community and the Basque Environmental Committee on 24 May 2021, highlighting the main objectives of the strategy along with the main lines of action.

As an action to kick off the participation process with society, a session, *Joining forces to protect soil in the Basque Country*, was held within the scope of the European Green Week to put on the table the position of the different stakeholders to the challenge of neutrality in land development.

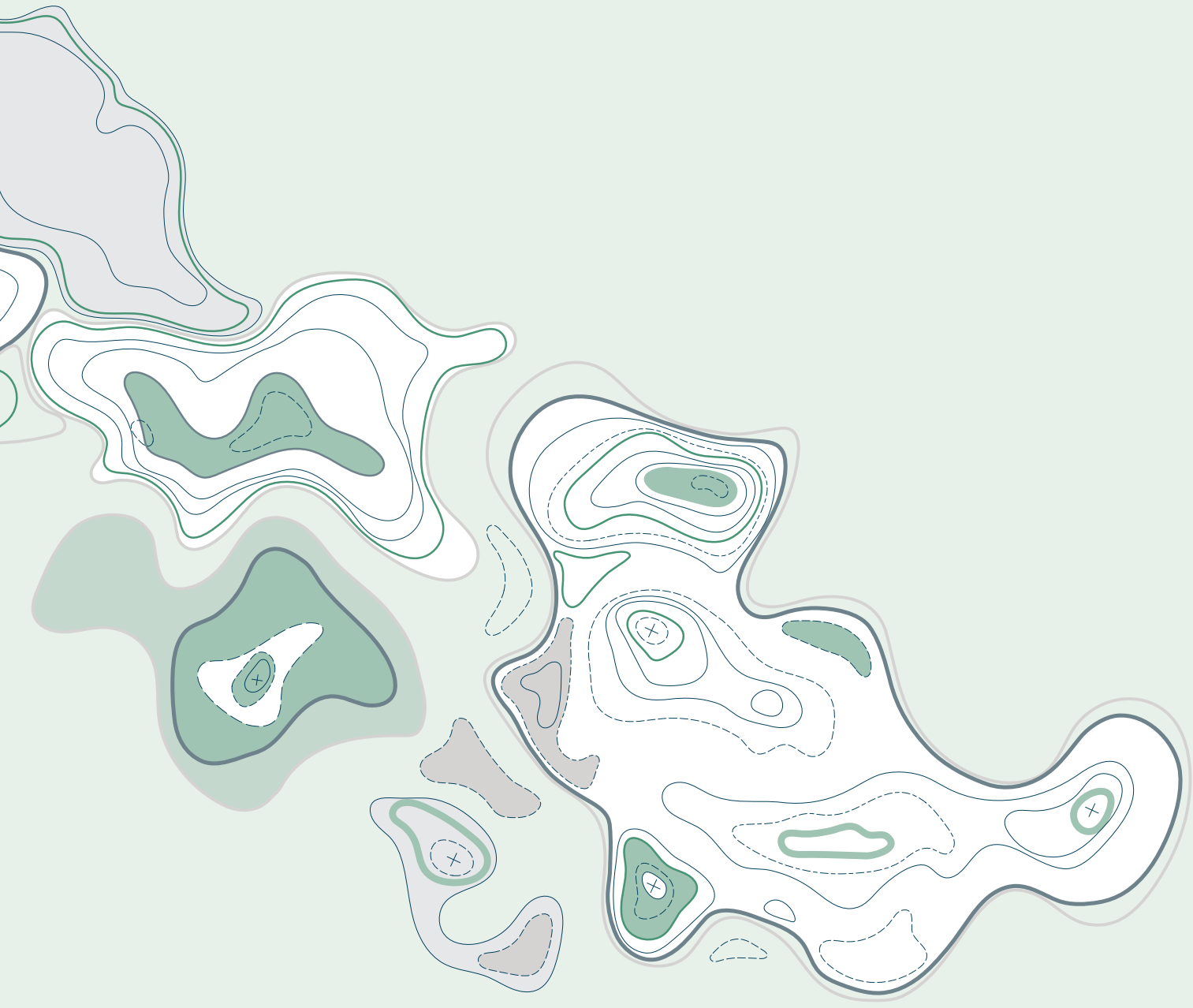
On the other hand, the opening of a second participation round on the IREKIA platform intended to offer citizens a second chance to participate in a more advanced stage of the strategy formulation. In this case, the contributions focused on two of the areas that are defined as priority by the strategy: forests and contaminated sites. On one hand, the need to change forestry exploitation that leads to significant erosion derived from traumatic actions on sloped land with the subsequent loss of fertile soil was indicated. On the other hand, the obligation of remediating contaminated sites and keeping a register of all of the exposed activities, including gardens or vegetable patches has been proposed.



PARTICIPATION PROCESS. SUMMARY OF THE QUESTIONS POSED BY TOWN HALLS

1. **Role of Town Halls in soil protection.**
   - Municipalities play a major role through their competences in regional planning.
   - The General Plan and its developments are the key tool for sustainable intervention on soil.
2. **Most significant threats.** Perception of threats is extremely different depending on the characteristics of each municipality; development and sealing, point-source and diffuse contamination, erosion, loss of organic matter and biodiversity and changes of use.
3. **Opportunities and areas for improvement for the implementation of an effective soil protection policy at a municipal level.**
   - Opportunities:
     - Reviews of the General Plans in accordance with the Regional Planning Guidelines and the 2030 Agenda.
     - Commitment to minimising land take.
     - Measures for adaptation to climate change.
   - Areas for Improvement:
     - Information on the different aspects of soil protection for use in decision-making.
     - Raising awareness of the political and technical responsibilities of all departments. Perception of soil as a resource.
     - Integrated and transversal assessment of soil to optimise land take and the distribution of uses.
     - Consideration of soil protection in new policies.
     - Raising awareness of the need for protection of land not for development. Coordination with the competent administrations.
     - Implementation of the soil protection measures set out in agricultural and forestry policies.
     - Regeneration of abandoned industrial premises, proliferating in the crisis situation and accelerating the recovery process of contaminated soil.
4. **Instruments to optimise the contribution of Town Halls to soil protection.**
   - Supra-municipal policies and sectoral approaches that provide effective tools.
   - Inventory of vacant land for its reincorporation in the approach.
   - Mechanisms that foster the improvement of natural soils.
   - Demonstration projects as a way of fostering good practices.
   - Design of instruments and mechanisms that encourage Town Halls to be more active. Particular mention is given to the activation of specific subsidy lines.
   - Use of by-laws to incorporate specific aspects of soil protection.
   - Possibility of the acquisition of land by Town Halls for its protection and safeguarding.
   - Udalsarea 2030 as a platform to share good practices.
   - Setting up of a stable soil protection group to share concerns, experiences and solutions.

02.
REASONS FOR A NEW SOIL PROTECTION STRATEGY



2.1

A new context: the paradigm shift of the soil protection policy

The formulation of a soil protection strategy for the Basque Country, with the regulatory support of the Fifth Additional Provision of *Law 4/2015, of 25 June, for the prevention and correction of soil contamination in the Basque Country*, arises from the vital need to preserve a resource that is crucial and irreplaceable for society through a model that moves away from the fragmented management of stand-alone elements to embark on a new paradigm whose driving force is integration based on innovative concepts.

A first step towards this holistic vision of soil protection is the incorporation of the *Soil Plan referred to in Article 47 of Law 4/2015, of 25 June*, in this strategy, according to which *"at the proposal of the environmental body, the government of the Autonomous Community will approve a soil plan in order to establish the action guidelines in terms of prevention and correction of soil contamination, in accordance with the criteria of this law"*.

Consistent with this need for integration, among the initiatives of this 12th legislative term, the *Government Programme 2020-2024* considers the promotion of the *Basque Soil Protection Strategy* as part of commitment 134, which refers to fostering the advanced environmental policy, improving the natural environment and the ecosystems through the defence of biodiversity and the main land and marine habitats, guided by a spirit of commitment to the *Sustainable Development Goals (SDG)* set out in the *United Nations 2030 Agenda for Sustainable Development*.

Figure 2. The Soil Protection Strategy 2030 in the Government Programme 2020-2024

AXIS III	AREA 21	COMMITMENT 134	INITIATIVE 4
Planet	Conservation of the natural environment and biodiversity	Fostering an advanced environmental policy, improving the natural environment and the ecosystems through the defence of biodiversity and the main land and marine habitats	Promoting the *Basque Strategy for Soil Protection*

The nature of soil and its functions, together with the complicated overlapping of interests and objectives, force strategic actions to be based on a high degree of consensus, coordination and joint work.

A rapid review of the plans and programmes that are rolled out through Basque policies in diverse areas is suffice to verify that soil preservation must be a central concern for many of them, rather than a collateral question. With an eye to improving the natural environment and ecosystems, promoting the defence of biodiversity and the main land habitats, the actions to be carried out in the coming years will contribute to ensuring the health of people, the sustainability of the region, food production and agricultural practices, the resilience of the region and the mitigation of climate change and the protection of surface water and groundwater, objectives which should condition and already do condition these actions explicitly in some cases and implicitly in others. In spite of all this, following an in-depth analysis of the current situation and consensus, it will not be possible to move towards these common objectives without a strategy that provides coherence to all of the policies in progress, through respect for each and every one of them.

Although the need to address soil protection from a holistic perspective is still evident, it was not until relatively recently that the first international, national and regional political initiatives emerged in this respect. Soil has not enjoyed the same level of protection as other environmental compartments. There are many reasons why the roll-out of specific policies or the incorporation of soil preservation criteria in other areas has been delayed with respect to other compartments. The most relevant causes include the lack of data of sufficient quality to justify political intervention, the time scales in which most of the effects on soil arise or the difficulties involved in taking action on a natural resource that is generally privately owned and whose preservation transcends this ownership. Added to all of this is the duality of soil as an environmental compartment and, at the same time, as a support for human activities, which has caused a conflict of interests throughout history, forgetting the need to protect both sides of the same coin.

The declaration of 2015 as the "International Year of Soil" by the United Nations General Assembly was a key milestone in a process which had already been in progress but started to take shape from then on. In the same year, the United Nations Food and Agriculture Organisation (FAO) published a review of the 1982 "World Soil Charter". In the same way as the principles set out in this charter sustained the soil protection policies developed from then on, its review provides concepts that will steer strategies for the preservation of this resource in a new direction. Some of these new concepts, which describe a paradigm shift, have been used as a base for the formulation of this *Basque Soil Protection Strategy 2030*.

A. Soil is considered to be one of the main resources available to human beings, a key resource that is at serious risk due to the increasing pressure it sustains.

B. Although the role of soil as a source of food, fibre and fuels cannot be ignored, its protection cannot be limited to increasing productivity, as its preservation and the enhancement of the goods and services provided by ecosystems and their role in sustaining soil functions and, therefore, human survival and well-being, is of vital importance.

C. In parallel to the previous idea, approaches focusing on the design of pragmatic services to increase productivity and good use of land are evolving towards an approach based on the need to generate and share knowledge to support sustainability.

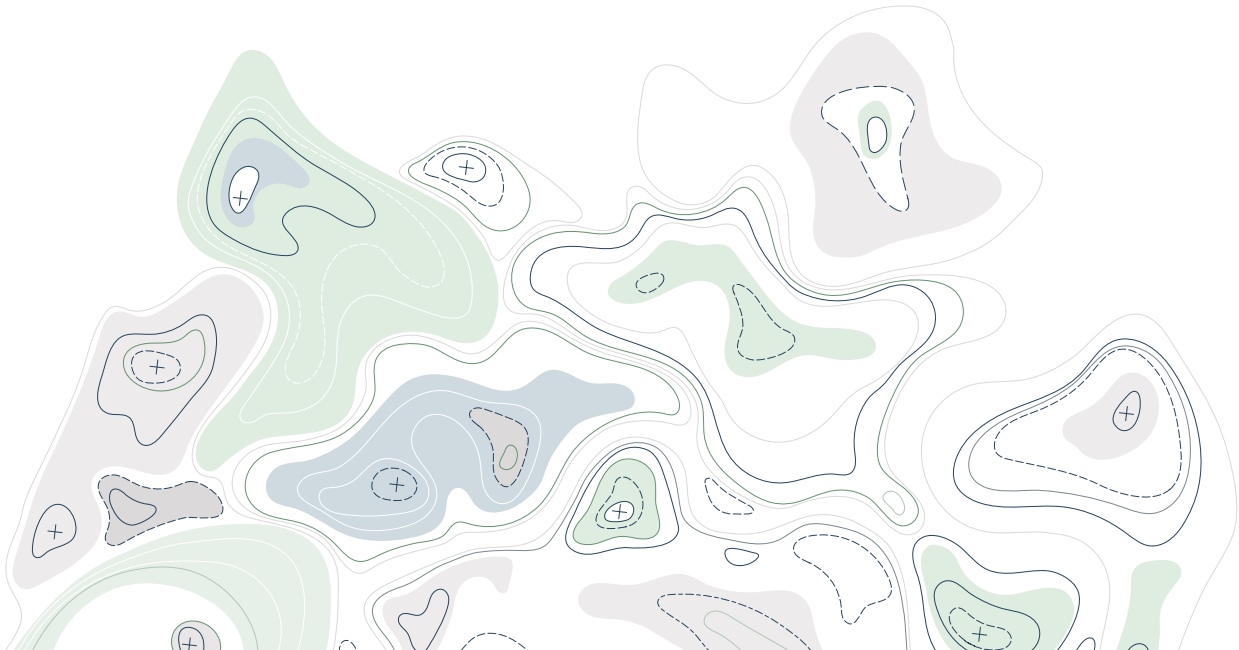
D. The concept of sustainable management should be central in all initiatives related to this resource in order to slow down its degradation, design flexible exploitation and organise its use with long-term objectives, incorporating preservation measures in the initial planning phases.

E. Regardless of the unanimous recognition of the need to protect soil against the threats that jeopardise it, a preservation strategy for this resource would not be successful if it did not consider a second perspective that identifies its role in key questions to sustain life, such as the preservation and improvement of biodiversity, climate regulation and water protection.

F. Soil protection moves from being considered as a policy that places requirements for more action on the national level, to recognising the importance of the local level and knowledge in a scenario that requires interdisciplinary initiatives in which a wide diversity of stakeholders are involved.

G. A scheme of this type, whose success lies in the integration of policies and the interaction of stakeholders, requires good governance which, far from being designed to oversee actions, places the focus on the assessment of their effectiveness towards the common goal.

Figure 3. Schematic view of the linkages between the Sustainable Development Goals, societal challenges, concepts in soil, land and water management, and indicators and processes in the biosphere (biological, chemical, and physical processes) (Soil, Keestra *et al.*, 2018)



2.2

The International Reaction
The Global Scenario

It was not until the *United Nations Rio de Janeiro Conference on Sustainable Development* held in 2012 when soil protection emerged as an area with its own identity associated with an ambitious target: achieving a world with net zero soil degradation in the context of sustainable development. Along with this target, the *Global Soil Partnership* was established in the same year with the ultimate purpose of placing soils in the Global Agenda through joint action. Promoting the sustainable management of soils and improving governance to guarantee healthy and productive soils, supporting the provision of essential ecosystem services for food safety and improving nutrition, the adaptation and mitigation of climate change and moving towards sustainable development are its ultimate goals.

The *Millennium Goals* resulting from the *Rio Conference* were replaced in January 2016 by the 2030 Agenda for Sustainable Development. Soil protection then gained unprecedented relevance worldwide, as shown by its direct consideration in five of the seventeen Sustainable Development Goals of the 2030 Agenda and indirect consideration in a further five. Of all of them, Goal 15 deserves special mention, whereby its target 3 incorporates the key objective of soil preservation, initially formulated by the Rio Conference, providing it with broader content and supported by the rest of the 2030 Agenda goals.

SUSTAINABLE DEVELOPMENT GOAL 15. TARGET 3

By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world.

However, almost all of the seventeen SDGs have significant implications in this area. It is not necessary to examine the contents of goals like the second goal, "Zero Hunger", the third goal, "Ensure healthy lives and promote well-being for all at all ages", the sixth goal, "Clean water and sanitation", the eleventh goal, "Sustainable cities and communities" or the thirteenth goal, "Climate action" in-depth to understand the transversal nature of soil and land, and the need to address their preservation from extremely diverse areas of competence and knowledge.

Table 2. Major international milestones in international soil protection policy

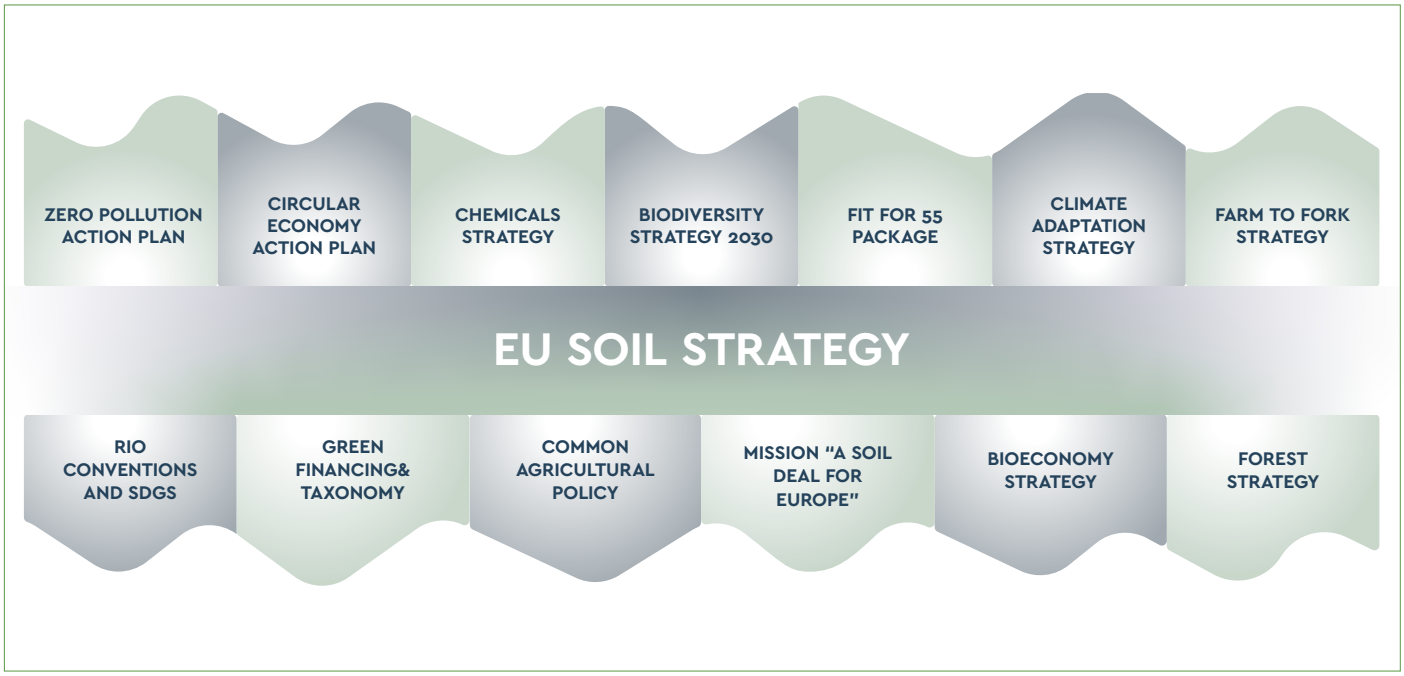
WORLD SOIL CHARTER (FAO,1982)
For the first time on the international stage, this document laid out the bases of what should become soil protection policies. Along with thirteen principles that highlight the relevance of soil from different points of view, it proposes a series of lines of action that governments and international organisations will be able to adopt in order to preserve this resource.
UNITED NATIONS GENERAL ASSEMBLY RESOLUTION 66/288. THE FUTURE WE WANT (2012)
This resolution, which endorses the final document of the *United Nations Conference on Sustainable Development*, incorporates express references to the need to protect soil as a resource for the first time ever, whilst formulating the goal that would later be incorporated in the SDGs and steer international, national and regional policies: achieve a world with soil degradation neutrality in the context of sustainable development.
REVISED WORLD SOIL CHARTER (FAO, 2015)
This document, which updates the contents of the first version of the *World Soil Charter* (1982) to the current context, strives to give greater priority to soil interventions and promote the translation of its principles into specific actions in favour of its sustainable management, conservation and restoration at an international, national and regional level. It reformulates the principles of soil protection around key concepts, such as the preservation of ecosystem services, sustainable soil management, interdisciplinarity of initiatives, good governance, involvement at a local level, knowledge development, safeguarding the biodiversity and incorporation of soil in the global climate and water regulation at different scales and includes guidelines for action and measures to be adopted by the different parties involved in soil management.
UNITED NATIONS GENERAL ASSEMBLY RESOLUTION 70/1. TRANSFORMING OUR WORLD: THE 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT (2015)
Soil forms part of this resolution of the general manifesto through which the signatory countries declare to be "determined to protect the planet from degradation, including through sustainable consumption and production, sustainably managing its natural resources and taking urgent action on climate change, so that it can support the needs of the present and future generations based on the description of our world today in which natural resource depletion and the adverse impacts of environmental degradation, including desertification, drought, land degradation, freshwater scarcity and loss of biodiversity, add to and exacerbate the list of challenges which humanity faces". The new goals and targets that arise from this resolution are almost all directly or indirectly related to soil preservation.
STATUS OF THE WORLD'S SOIL RESOURCES, (FAO, 2015)
This report compiles the first worldwide assessment of soil quality and is aimed at scientists, politicians and policy-makers in order to report on soil functions and overall soil health at global and regional levels, making a significant contribution to the Sustainable Development Goals.
VOLUNTARY GUIDELINES FOR SUSTAINABLE SOIL MANAGEMENT (FAO, 2017)
Based on the principles of the *World Soil Charter* and bearing in mind the data presented in the *Status of the World's Soil Resources*, this document, which is not binding, provides guidelines and steers stakeholders with the final objective of contributing towards increasing the area under sustainable soil management worldwide, establishing ten targets related to the threats faced by this resource in order to do so..

2.3

The European Union Response

In spite of the central position of soil in the environmental framework, there is no specific common legislation for the European Union that harmonises obligations in this field. Indeed, the preservation principles and requirements for this resource are dispersed in a wide range of policies, at times, lacking the necessary coherence and coordination. Addressing soil protection from a dual approach: as a resource, on one hand, and as territory, on the other hand, has contributed to this situation. All of this, together with an interpretation of soil protection from a regional perspective, which leaves this area to national action, has significantly slowed down the design of integrated policies.

Figure 4. Links between the EU Soil Strategy and EU initiatives

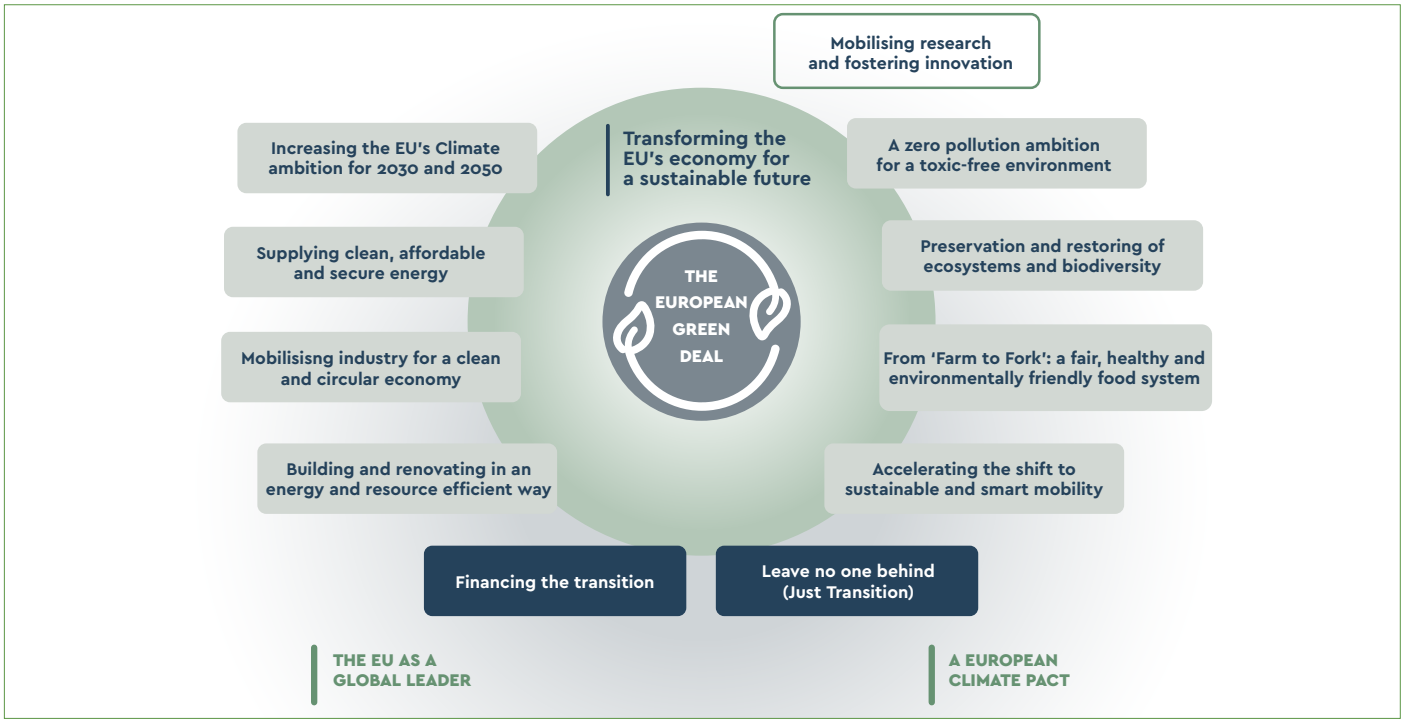


Source: EU Soil Strategy for 2030 Reaping the benefits of healthy soils for people, food, nature and climate, {SWD(2021) 323 final}

However, in recent months, the socio-economic context and the healthcare crisis in which Europe is immersed has accelerated the change towards a productive model that guarantees the environmental sustainability of growth, in such a way that essentially economic tools acquire a clear environmental orientation, as is the case of the European Green Deal.

Bestowing greater value on the protection and restoration of natural ecosystems, the sustainable use of resources and the protection of human health, the search for well-being beyond health, the value of alliances or the design and implementation of transforming policies that are effectively fulfilled are part of the Green Deal objectives, which, combined with the goals of the 2030 Agenda, make sense of this *Soil Protection Strategy 2030*.

Figure 5. European Green Deal Objectives



In this new scenario, soil has become a central element for the preservation of the planet and proof of this lies in the many documents that the Commission and other governing bodies of the European Union have published recently. Therefore, *European Parliament Resolution of 28 April 2021 on soil protection* was accompanied by the *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, of 12 May 2021, "Pathway to a Healthy Planet for All. EU Action Plan Towards zero pollution for air, water and soil"*.

However, the publication of the *Soil Strategy for 2030, "Reaping the benefits of healthy soils, for food, people, nature and the climate"* has been the most significant milestone on the European Union's path towards an integrated soil protection policy that considers the approval of a law to protect soil health as a core element.

Along with these three communications, the following table details the European strategies with the most direct repercussion on soil preservation.

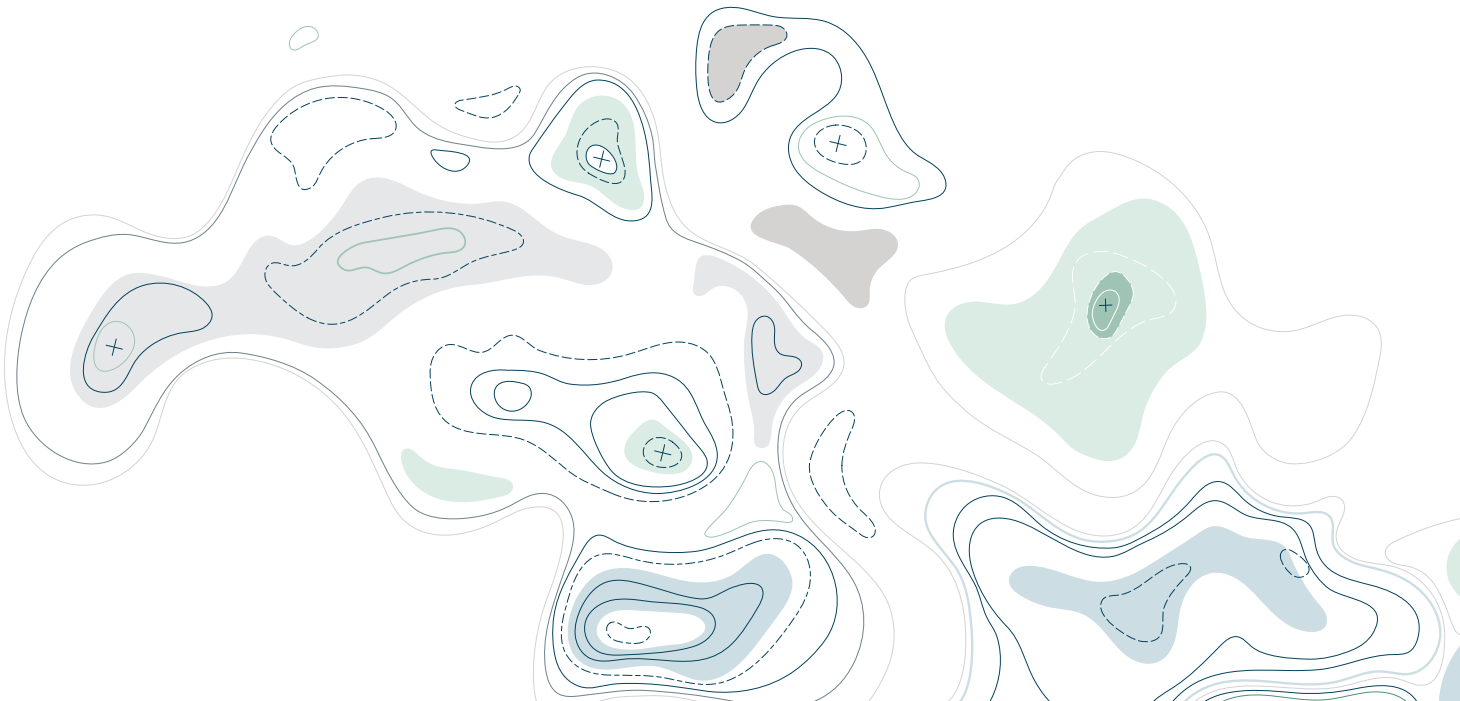


Table 3. Milestones of the soil protection policy in the European Union

SOIL PROTECTION STRATEGY 2030

This strategy has been presented with the general objective of guaranteeing healthy soils by 2050, in line with the "Soil Deal for Europe" Mission.

This target has been deployed in medium and long term objectives in order to design and implement actions and tools to fulfil them.

MEDIUM-TERM OBJECTIVES (2030)

- Combat desertification, restore degraded land and soil and strive to achieve a land degradation-neutral world.
- Restore significant areas of degraded and carbon-rich ecosystems, including soils.
- Achieve a net greenhouse gas removal of 310 million tonnes of CO_2 equivalent per year for the land use, land use change and forestry (LULUCF) sector.
- Reach good ecological and chemical status in surface waters and good chemical and quantitative status in groundwater by 2027.
- Reduce nutrient losses by at least 50%, the overall use and risk of chemical pesticides by 50% and the use of more hazardous pesticides by 50% by 2030.
- Make significant progress in the remediation of contaminated sites.

LONG-TERM OBJECTIVES (2050)

- Reach no net land take.
- Reduce soil pollution to levels no longer considered harmful to human health and natural ecosystems and respect the boundaries our planet can cope with, thus creating a toxic-free environment.
- Achieve a climate-neutral Europe and, as the first step, aim to achieve land-based climate neutrality by 2035.
- Achieve a climate-resilient society, fully adapted to the unavoidable impacts of climate change by 2050.

Initial actions proposed as a result of this strategy revolve around the role that soil plays as a solution to the major challenges faced by today's society:

- Mitigation and adaptation to climate change.
- Circular economy.
- Biodiversity for human, animal and plant health.
- Healthy water resources.

The strategy also considers the deployment of actions to prevent soil and land degradation and restoring healthy soils, in particular:

- Making sustainable soil management the new normal.
- Preventing desertification.
- Preventing soil pollution.
- Restoring degraded soils and remediating contaminated sites.

As is to be expected, the strategy identifies the need to increase knowledge, research and innovation, identify funding and investment opportunities, raise awareness and social commitment as essential elements to achieve healthy soils.

EUROPEAN PARLIAMENT RESOLUTION OF 28 APRIL 2021 ON SOIL PROTECTION

In view of the importance of soil as an "essential, complex, multifunctional and living ecosystem of crucial environmental and socio-economic importance which performs many key functions and delivers services vital to human existence and ecosystem survival, so that current and future generations can meet their own needs" and bearing in mind the threats it faces, the European Parliament calls on the Commission to design a common legal framework for the protection and sustainable use of soil, addressing all major soil threats.

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS – PATHWAY TO A HEALTHY PLANET FOR ALL - EU ACTION PLAN "TOWARDS ZERO POLLUTION FOR AIR, WATER AND SOIL" COM (2021) 400 FINAL

This document identifies environmental pollution among the persistent threats to the health of our planet which require an urgent response, along with climate change, biodiversity loss and an unsustainable use of natural resources. It also establishes a vision for 2050 (a healthy planet for all) which will provide coverage to other strategies arising from the deployment of this one; *pollution is reduced to levels no longer considered harmful to health and natural ecosystems and that respect the boundaries our planet can cope with, thus creating a toxic-free environment*.

Its main objective is to provide a compass for including pollution prevention in all relevant EU policies, maximising synergies, stepping up implementation and identifying possible gaps or trade-offs.

The targets for 2030 related more directly to soil protection include reducing:

- nutrient losses, the use and risk of chemical pesticides, the use of the more hazardous ones, and the sale of antimicrobials for farmed animals by 50%.
- micro-plastics released into the environment by 30%.

It also establishes a new zero-pollution hierarchy which aims to be more effective and European environmental policies should be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should, as a priority, be rectified at source and that the polluter should pay.

Of all the initiatives considered, many directly affect soil protection against contamination:

- Promote the recovery and renaturalisation of sites for the implementation of public green areas in favour of better mental and physical well-being and move towards reducing health inequalities.
- Move towards a structure to regulate the state of EU sites and take steps at all levels to address soil contamination and degradation.
- Generate the tools that make treated sludge ready for re-use, contributing to the reduction of agricultural soil pollution and addressing emerging pollutants, such as micro-plastics and micro-pollutants, including pharmaceuticals.
- Optimise actions towards integrated nutrient management.
- Revise the Directive on Sustainable Use of Pesticides, promote agroecological practices and avoid the use of pesticides in sensitive areas.

- Develop measures, through the new Soil Protection Strategy, to significantly increase efforts to identify, investigate, assess and remediate contaminated sites, whilst preventing pollution as much as possible.
- Have registers for (potentially) contaminated sites, step up efforts to remediate such sites and develop clear criteria to prioritise decontamination.
- Include restoration of degraded soil ecosystems objectives among the legally binding EU nature restoration targets.
- Draw up a priority watch list for soil contaminants which may also serve to guarantee the safe circular use of excavated soils.
- Move towards a better understanding of diffuse soil contamination.
- Continue actions to reduce landfill and guarantee the remediation of contamination through the review of the Industrial Emissions Directive.
- Design specific measures to prevent and address micro-plastics pollution, persistent organic pollutants (specifically mentioning per- and polyfluoroalkyl substances) through waste and products.
- Support research into emerging types of pollution (impact of "light" pollution on biodiversity or pollution with nanoparticles).
- Ensure that the contamination prevention laws are effectively complied with and deliver the intended environmental and health benefits.
- Promote the role of society towards a zero contamination future.
- Encourage cities to assume a key role to combat pollution.

PROPOSAL BY THE COMMISSION FOR A DECISION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON A GENERAL UNION ENVIRONMENT ACTION PROGRAMME TO 2030 (FOR AN ENVIRONMENT ACTION PROGRAMME, EAP)

Soil protection and restoration has been included in the thematic priority objectives, with a clear focus on two of them:

D. Pursuing a zero-pollution ambition for a toxic free-environment, including for air, water and soil, and protecting the health and well-being of citizens from environment-related risks and impacts;

E. Protecting, preserving and restoring biodiversity and enhancing natural capital, notably air, water, soil, and forest, freshwater, wetland and marine ecosystems;

EU BIODIVERSITY STRATEGY FOR 2030 - "BRINGING NATURE BACK INTO OUR LIVES"

This document identifies changes in land use as one of the five main direct drivers of biodiversity loss. The world is estimated to have lost €3.5-18.5 billion per year in ecosystem services from 1997 to 2011 owing to land-cover change, and an estimated €5.5-10.5 billion through land degradation.

The **actions** proposed include the limitation of soil sealing and urban sprawl and combating contamination.

EU BIODIVERSITY STRATEGY FOR 2030 - "BRINGING NATURE BACK INTO OUR LIVES"

For the first time ever in a European document on biodiversity protection, a chapter is devoted to the protection of soil ecosystems (2.2.3 "Addressing land take and restoring soil ecosystems") in which the following aspects are highlighted:

- The role of soil ecosystems in the control of key ecosystem services, such as soil fertility, nutrient cycling and climate regulation.
- Poor land management, deforestation, overgrazing, unsustainable farming and forestry practices, pollution construction activities and land sealing are among the main causes of degradation of soil in the EU.
- Compounded by erosion, the effects of the loss of organic carbon and desertification are becoming increasingly apparent.
- It is therefore essential to step up efforts to protect soil fertility, reduce soil erosion and increase soil organic matter without ignoring the need to progress in the identification of contaminated sites, restoration of degraded soils, definition of the conditions for their good ecological status, introduction of restoration objectives and improvement of the monitoring of soil quality.
- It is in this document that it was announced that the Commission will update the *EU Soil Protection Thematic Strategy in 2021*.
- Soil sealing and rehabilitation of contaminated brownfields will be addressed in the upcoming Strategy for a Sustainable Built Environment.
- As documents that will contribute towards the preservation of soil biodiversity, the Zero Pollution Action Plan for Air, Water and Soil is mentioned along with the mission in the area of soil health and food.

COMMUNICATION FROM THE COMMISSION, OF 20 MAY 2020, "A FARM TO FORK STRATEGY" FOR A FAIR, HEALTHY AND ENVIRONMENTALLY-FRIENDLY FOOD SYSTEM

This strategy addresses the challenges of sustainable food systems and recognises the inextricable links between healthy people, healthy societies and a healthy planet. To do so, it has set the objective of rewarding those farmers, fishers and other operators in the food chain who have already undergone the transition to sustainable practices, enabling the transition for the others, and creating additional opportunities for their businesses.

To fulfil this objective, the urgent need to reduce dependency on pesticides and antimicrobials, reduce excess fertilisation, increase organic farming and reverse biodiversity loss has been declared. In parallel, it sees the leadership towards competitive sustainability from farm to fork as an opportunity to ensure, on the one hand, that the activities that form part of the food chain have a neutral or positive environmental impact and, on the other hand, preserve resources, including land resources, whilst protecting land and soil.

COMMUNICATION FROM THE COMMISSION, OF 11 MARCH 2020, "A NEW CIRCULAR ECONOMY ACTION PLAN FOR A CLEANER AND MORE COMPETITIVE EUROPE"

To fulfil the aspiration of climate neutrality by 2050 and decouple economic growth from resource use, while ensuring the long-term competitiveness of the EU and leaving no one behind, the EU needs to advance towards keeping its resource consumption within planetary boundaries, reducing its consumption footprint and doubling its circular material use rate in the coming decade.

With regard to the previous circular economy plan, this new one has included "construction and buildings" among the key product value chains. This chapter indicates the actions that will be included in the future strategy for a sustainable built environment, which will promote circularity principles throughout the life-cycle of buildings. Among these actions, promoting initiatives to reduce soil sealing, rehabilitate abandoned or contaminated brownfields and increase the safe, sustainable and circular use of excavated soils are considered to be essential.

COMMUNICATION FROM THE COMMISSION, OF 14 OCTOBER 2020, "CHEMICALS STRATEGY FOR SUSTAINABILITY - TOWARDS A TOXIC-FREE ENVIRONMENT"

Although the EU already had a coherent and conservative strategy on chemical substances to develop and deploy the use of sustainable chemical compounds to protect the environment and human health, the European Union has considered it necessary to step up innovation in order to guarantee a greater degree of protection.

The actions included in this new strategy will lead to the prevention of the impact of chemical substances on the environment in line with Europe's zero pollution ambition.

However, beyond the preventive approach, the strategy recognises the impact of contaminated sites on the terrestrial and aquatic ecosystems, affecting the productivity of soils, and therefore puts forward actions, such as research and development of decontamination solutions in terrestrial and aquatic environments.

Special mention must be given to the attention that this strategy pays to a particular group of pollutants, per- and polyfluoroalkyl substances (PFAS) as the causes of the large number of cases of contamination of soil and water - including drinking water, with major consequences on health.

HORIZON EUROPE MISSION "SOIL DEAL FOR EUROPE" (2021-2027)

The development of a soil deal for Europe is one of the five EU commitments, along with fighting cancer, adapting to climate change, restoring oceans and waters and the consolidation of one hundred climate-neutral and smart cities by 2030, expressed in the form of a mission, which seeks to address some of the greatest challenges the world is facing today. As an integral part of the HORIZON EUROPE Framework Programme, which begins in 2021, these missions will contribute to the success of the European Green Deal and its objectives in the aforementioned areas.

It is intended that the soil health mission becomes a key tool to raise people's awareness of the vital importance of soils, engage citizens, create knowledge and develop solutions to preserve and restore soil health and its functions. It will also foster actions that help to take advantage of the ability of soil to mitigate the effects of climate change.

As a result of the preparatory work for each mission, "Caring for Soil is Caring for Life" (Report of the Mission Board, 2020) has been published, which has identified the following objectives for the European Deal:

1. Reduce desertification.
2. Conserve soil organic carbon stocks.
3. Stop soil sealing and increase re-use of urban soils.
4. Reduce soil pollution and enhance restoration.
5. Prevent erosion.
6. Improve soil structure to enhance soil biodiversity.
7. Reduce the EU global footprint on soils.
8. Improve soil literacy in society.

The quantifiable target for this mission by 2030 is: at least 75% of all soils in the EU are healthy for food, people, nature and climate.

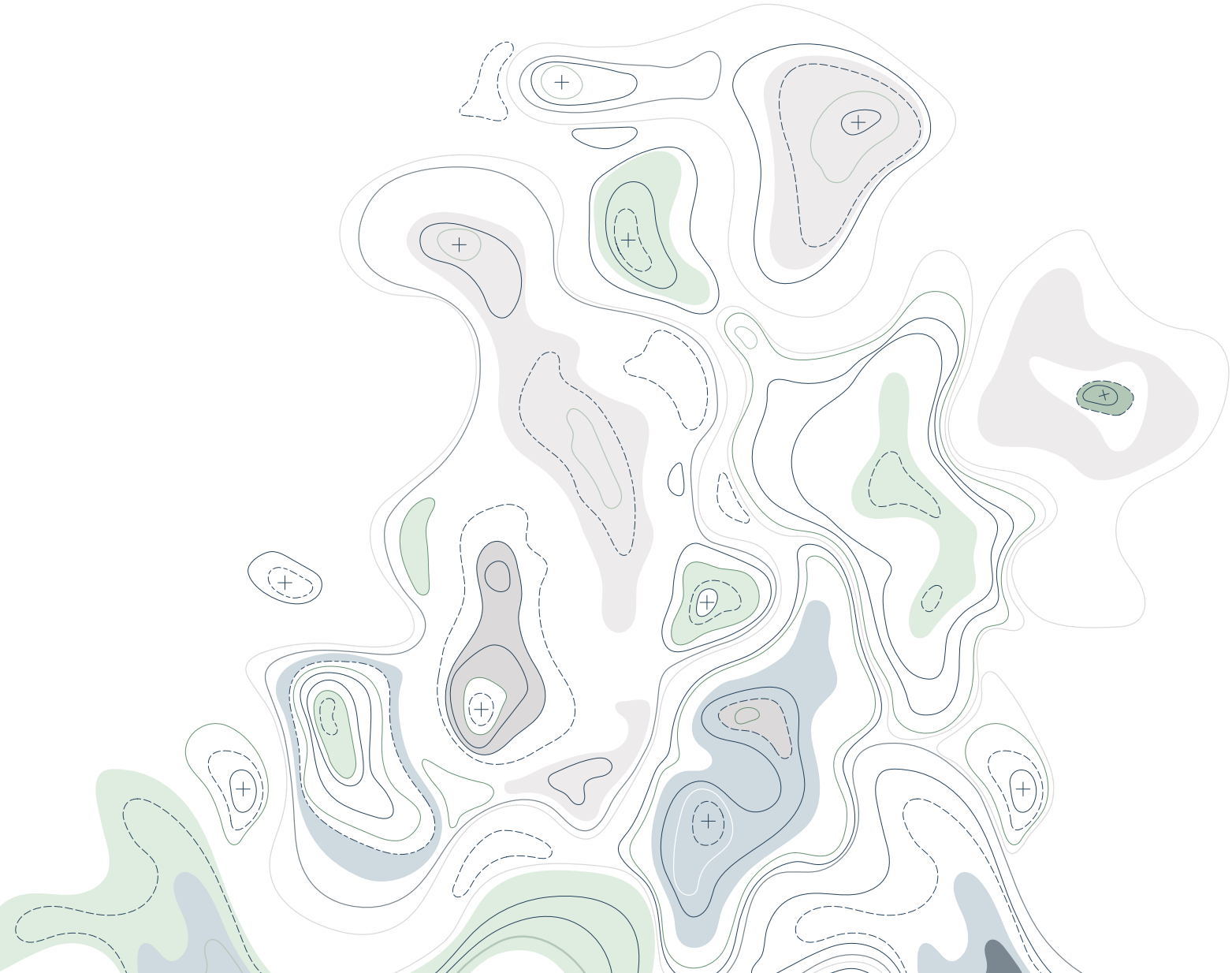
To meet this target, a series of actions have been proposed aimed at mobilising actors in the fields of research and innovation, education and training, investments and the demonstration of good practices. This latter proposal takes on a special importance through tools like "living labs" (experiments and innovation in a laboratory on the ground) and "lighthouses" - (places to showcase good practices).

COMMON AGRICULTURAL POLICY STRATEGIC PLAN 2023-2027

The new Common Agricultural Policy imposes the need to reach higher environmental and climate objectives, based on a financial framework that establishes that 40% of budgetary expenditure must have environmental and climate repercussions, with 20% of direct subsidies being allocated to fund eco-schemes and, at least 30% of rural development funds being allocated to environmental and climate objectives.

Aid will be subject to enhanced conditionality, or in other words, the fulfilment of a series of agricultural and environmental good practices, as well as the legal management requirements related to the environment and good soil management conditions (use of fertilisers and plant protection products minimum soil cover, anti-erosion practices, sustenance of organic matter, etc.)

Furthermore, there are also the aforementioned eco-schemes, key elements thanks to their capacity to provide an effective response to many of the needs that have been identified in the environmental field. In the case of soil management, the objectives of the eco-schemes focus on aspects such as the increase in the capacity of the carbon sink and fire prevention, agricultural practices for the preservation of soil and the environment (vegetation cover in woody crops), increased soil fertility (crop rotation with species enhancers), precision farming (nutrient management), etc.



2.4

Response of the Basque Administration

This Basque Soil Protection Strategy 2030 has emerged within the framework of *Law 4/2015, of 25 June on the prevention and correction of soil contamination*. However, this is not the first environmental policy devoted specifically to a field of soil protection. As in many other countries and regions, contamination of this resource was identified as a major problem in the Basque Country in the early 1990s, which led to the drafting of an initial plan in this field, the *Soil Protection Master Plan* (1994). The principles set out in this document have continued to the present day with the *Contaminated Site Plan for the Basque Country* (2007-2012), among other instruments.

Although contamination has been the threat on which attention has been focused from the environmental point of view, there are many regulatory and strategic instruments that directly or indirectly affect soil and its management. In all of the areas, there is growing concern for soil degradation and for the need to design and implement instruments that contribute towards its preservation.

Optimising the contribution of each of these areas to sustainable soil management will require a detailed study, based on the possibilities to act on soil or land of the available tools, proposing actions to be adopted in order to mitigate the threats faced by this resource whilst pursuing the objectives of a common strategy. Regional planning, the primary sector, water protection, natural heritage protection and conservation of the biodiversity or the adaptation and mitigation of climate change, among others, represent central nodes of soil protection that will be unable to advance without the determined action of the administrations and the key players in each of them.

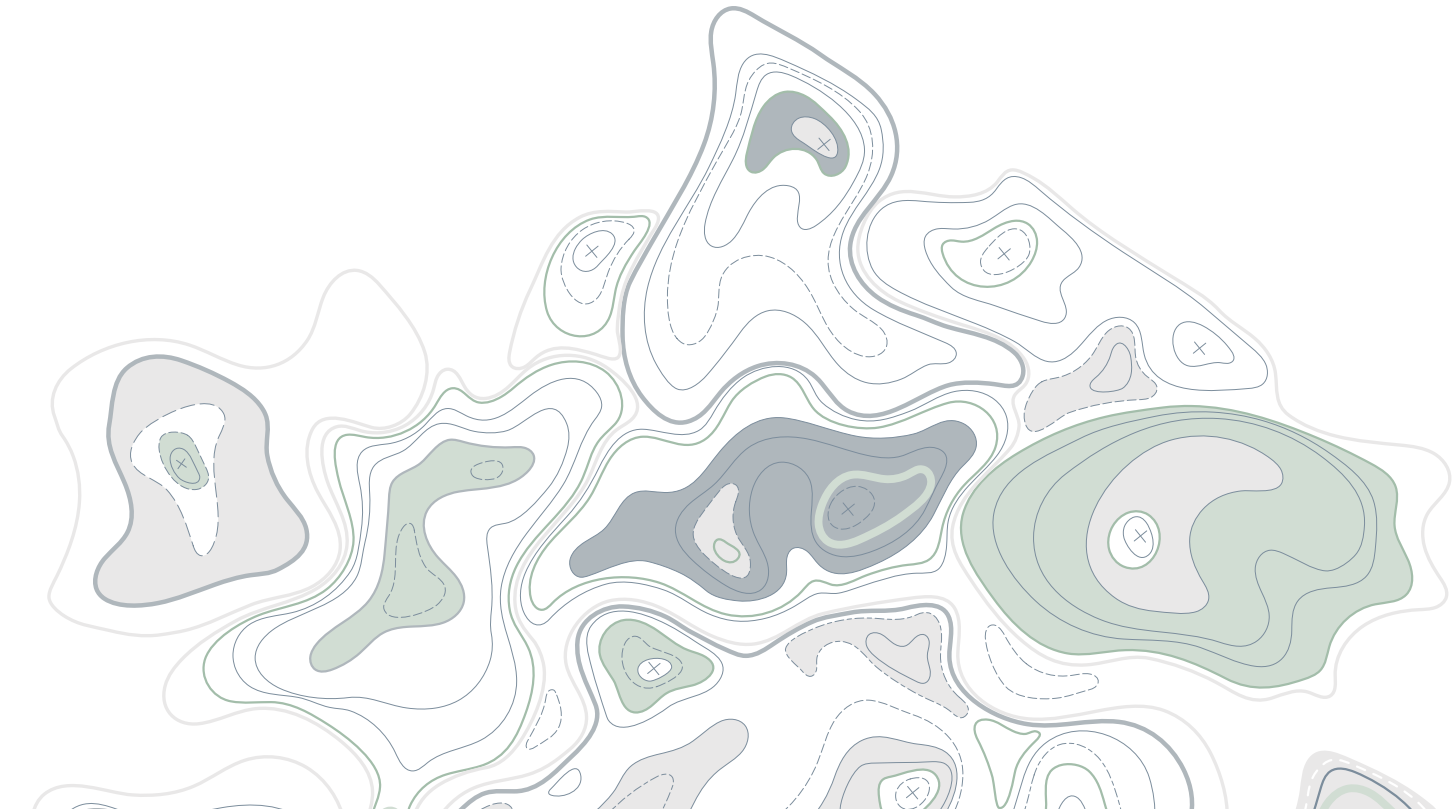


Table 4. Regulatory and planning documents related to soil protection

AREA	MAIN REGULATORY AND STRATEGIC INSTRUMENTS RELATED TO SOIL PROTECTION IN THE BASQUE AUTONOMOUS COMMUNITY
ENVIRONMENTAL	
Sustainable Development	• Basque Sustainable Development Environmental Strategy 2002-2020. • 4th Environmental Framework Programme. • New Environmental Framework Programme 2030 (in preparation).
Contaminated Sites	• Law 4/2015, of 25 June on the prevention and correction of soil contamination in the Basque Country. • Decree 209/2019, of 26 December, enacting Law 4/2015, of 25 June, on the prevention and correction of soil contamination.
Water	• Law 1/2006, of 23 June, on water. • Eastern Cantabrian River Basin Management Plan 2015-2021. • Western Cantabrian River Basin Management Plan 2015-2021. • Ebro River Basin Management Plan 2015-2021.
Biodiversity and Natural Heritage	• Legislative Decree 1/2014, of 15 April, approving the revised text of the Law on Nature Conservation in the Basque Country. • Biodiversity Strategy of the Basque Autonomous Community 2030. • Natural Resource Management Plans (NRMP). • Law 9/2021, of 25 November, on natural heritage conservation in the Basque Country.
Nature Protection Areas	• Decree 42/1996, of 27 February, on the organisation and operation of the Network of nature protection areas in the Basque Autonomous Community. • Decrees for the declaration of Protected Natural Spaces (SAC and SPAB) pursuant to the Birds and Habitats Directives. • Decrees for the declaration of natural parks, protected biotopes and singular trees in the Basque Autonomous Community.
Geodiversity	• Geodiversity Strategy of the Basque Autonomous Community 2020, including the Inventory of Sites of Geological Interest (SGI).
Climate Change	• Basque Climate Change Strategy 2050 Klima 2050. • Basque Energy Transition and Climate Change Plan 2021-2024.
Circular Economy	• Basque Circular Economy Strategy 2030. • Basque Circular Economy and Bioeconomy Strategic Plan 2024.
Waste	• Basque Waste Prevention and Management Plan 2030.
Education for Sustainability	• Education Strategy for Sustainability 2030.
Environmental Administration	• Law 10/2021, of 9 December, on Environmental Administration in the Basque Country .
NON-ENVIRONMENTAL	
Regional Planning	• Law 4/1990 of 31 May on Regional Planning in the Basque Country. • Decree 128/2019, of 30 July, finally approving the Regional Planning. • Guidelines for the Basque Autonomous Community. • Law 2/2006, of 30 June, on Land and Urban Planning.
Primary Sector	• Law 17/2008, of 23 December, on Agricultural and Food Policy. • Decree 177/2014 finally approving the Agro-forestry Partial Regional Plan. • Basque Rural Development Programme 2015-2020. • Basque Forest Plan 1994/2030. • Provincial Laws for Mountains.
Landscape	• Decree 90/2014, of 3 June, on protection, management and planning of landscape in regional planning in the Basque Country.

2.5

A Necessary Strategy

2.5.1 THE GLOBAL SITUATION

Today, it is practically impossible to make a diagnosis of the soil situation on a global scale with an acceptable level of precision for the design of policies at this level. The lack of data describing the situation caused by the different threats for many regions and the lack of homogeneity of the available information hamper this task. In spite of this, the FAO published the *Status of the World's Soil Resources* in 2015 (FAO, 2015) in order to provide an idea of the functions and general health of soil at a global and regional level, as an instrument to support the Sustainable Development Goals (SDGs).

"While there is cause for optimism in some regions, the majority of the world's soil resources are in only fair, poor or very poor condition. Today, 33 percent of land is moderately to highly degraded due to the erosion, salinisation, compaction, acidification and chemical pollution of soils. Further loss of productive soils would severely damage food production and food security, amplify food-price volatility, and potentially plunge millions of people into hunger and poverty. But the report also offers evidence that this loss of soil resources and functions can be avoided. Sustainable soil management (understood as the sustainable handling of soil), using scientific and local knowledge and evidence-based, proven approaches and technologies, can increase nutritious food supply, provide a valuable lever for climate regulation and safeguarding ecosystem services".

Status of the World's Soil Resources (FAO, 2015)

Table 5. Status of the World's Soil . Source: "Status of the World's Soil Resources" (FAO, 2015)

THREAT	GLOBAL ASSESSMENT
Erosion	• Average global loss of 0.3% of the annual crop yield due to erosion. • If there are no changes in the future, the reduction of total annual yield could reach 10% by 2050 (removal of 150 million hectares from crop production or 4.5 million hectares a year, approximately a football pitch every 5 seconds).
Loss of organic carbon	• Global organic carbon stocks will be an estimated 1,500 PgC in the first metre of soil. • No consensus has been reached on the magnitude of stocks below this depth. • Global soil organic content loss has been estimated at 66±12 PgC since 1850.
Land Occupation and Soil Sealing	• Considered to be the biggest threat for soil functions in Europe and Eurasia insofar as it represents almost the total loss of all its services and functions with the exception of its bearing capacity. • An analysis conducted in 2009 estimated the surface occupied by urban areas to be 657,000 km² (0.45 percent of the Earth's surface). • Between 1990 and 2000, urban soil increased by 58,000 km².

THREAT	GLOBAL ASSESSMENT
	• If the current urbanisation rates are maintained, soil loss due to sealing could double over the next 20 years and could even be tripled in developing countries by 2030. • In Europe, 70.8% of land take between 1990 and 2000 corresponded to agricultural land. Between 2000 and 2006, agricultural land take fell to 53.5%, which is equivalent to a loss of more than 6 million tonnes of wheat, 1% of the potential production capacity. .
Soil Acidification, Contamination and Salinisation	• Topsoil acidity (pH<5.5) affects around 30 % of the planet's total ice-free land area and subsoil acidity affects as much as 75 %. • The most acidic topsoils (pH<3.5) in the world are located in South America in areas where deforestation and intensive agriculture are practised, and also in river deltas populated by mangroves (e.g. the Amazon and Orinoco Deltas). • The regions with the highest presence of acid soils are located in the north and east of North America, South-East Asia, Central and South Africa and in the north of Europe and Eurasia. • Although soil salinisation is widespread and an increasingly severe problem, no recent data is available on its global extent. • In 1992, it was estimated that 412 million ha were affected by salinity and 618 million ha by sodicity. • Some sources cite that the extent of anthropogenic salinisation is about 75 million hectares of which 52.7 million hectares are located in Italy, Hungary, Greece, Portugal, France and Slovakia. • Currently, there is no reliable global data on contamination. • As for agricultural contamination in China, for example, it has been estimated that about 19.4 % of farmland is affected by high levels of cadmium, nickel and arsenic.
Compaction	• In the 1990s, it was estimated that approximately 68 million hectares (4% of the planet's total land area) suffered from different levels of compaction. • 33 million hectares were located in Europe (with the use of heavy machinery as the main cause), 18 million hectares in Africa (caused by cattle trampling and insufficient vegetation cover) and 10 million hectares in Asia. • The two main causes of human-induced compaction were improper agricultural practices (80 %) and overgrazing (16 %).
Biodiversity Decline	• In addition to being a threat in itself, biodiversity decline can be considered to the result of other soil alterations. • It has been estimated that 56% of soil within the European Union has some type of threat to biodiversity. • The main pressures on biodiversity, in order of importance, are intensive human exploitation, reduction of organic matter, habitat disturbance, sealing, pollution, land use change, compaction, erosion, habitat fragmentation, climate change, invasive species and invasion by genetically modified organisms. • Global data is still not available on this parameter, particularly on the biodiversity below the soil surface.

2.5.2 THE SITUATION IN EUROPE

Although knowledge of soil quality in some European countries is relatively good due, on one hand, to the long tradition of soil and environmental sciences and, on the other hand, the monitoring of many of them, it is practically impossible to provide a precise global view due to the lack of homogeneity of the available data on both a spatial and temporal scale.

In spite of this, a review at a European level is necessary in order to understand the overall status of this resource, along with the actions that have been adopted in accordance with the priorities identified. Understanding the global situation in Europe will contribute to steering what could be the priorities in the Basque Country, pending a detailed diagnosis at a local level.

In accordance with the *"Status of the World's Soil Resources"*, Europe is the world's region whose soil is least affected by the degradation phenomenon although the studies conducted show that several of these processes are being accelerated. This document considers that the four most relevant threats in Europe are: soil sealing, salinisation, contamination and loss of organic matter. Of these, sealing along with land take are the most concerning threat in western Europe, whilst the management of contaminated sites is of interest to the whole region.

Through "The State of Soil in Europe" (European Commission, 2012) and "Status of local soil contamination in Europe" (JRC, 2018) European institutions recognise that although the situation is variable, several degradation processes are being accelerated in many regions of Europe, exacerbated by unsustainable human activities. Therefore, not only is the soil status variable, but also the measures adopted to address the different threats.

Table 6. State of soil in Europe

EROSION

STATE

- In 1990, it was estimated that 105 million ha (16% of the total land area) would be affected by water erosion in Europe (excluding Russia).
- A more recent study estimated the surface area affected by this type of erosion to be 1.3 million km^2. Almost 20% of this surface area would be subjected to soil loss of around 10 t/ha/yr (moderate erosion).
- The greatest impact is in the Mediterranean area, where many places have exceeded the irreversibility limits.
- 7% of cultivated land is estimated to suffer from moderate to severe erosion (>11t/ha/year[1]). This equates to 115,410 km^2 (approximately the entire surface area of Bulgaria). However, this phenomenon only appears in 2% of permanent grasslands.
- Wind erosion is estimated to affect between 10 and 42 million hectares, one million of which is categorised as being severely affected (Germany, Eastern Netherlands, Eastern United Kingdom and the Iberian Peninsula).

TREND

It is difficult to assess the evolution of erosion rates due to a lack of systematic approaches and data. However, it is expected that changes in land use and the alteration of the rain patterns will lead to increased erosion risks.

COMPACTION

STATE

- Estimates of areas at risk of soil compaction vary considerably.
- Some authors estimate that 36% of European subsoils have a high or very high susceptibility to compaction whilst other sources report that 32% of soils are highly susceptible and 18% moderately affected. Other sources estimate 33 million hectares being affected in total, corresponding to 4% of the European land surface.

TREND

This threat, which has been exacerbated since the 1960s with the mechanisation of agriculture, remains nowadays in spite of some improvement due to certain agricultural techniques.

ORGANIC MATTER DECLINE

STATE

- Around 45% of soils in Europe have a low or very low organic matter content (0–2%).
- This phenomenon is particularly evident in southern European countries, but is also evident in countries like France, the United Kingdom, Germany, Norway or Belgium.
- One of the key factors in the loss of organic matter is nitrogen surplus due to the increase in carbon mineralisation as a result of intensive fertilisation. In 15% of land in the EU-27, this parameter exhibits a surplus of around 40 kg N/ha.[1]
- Soil organic carbon stocks in the EU27- are estimated to be between 73 to 79 billion tonnes, half of which are found in the peatlands and forest soils of Sweden, Finland and the United Kingdom. Between 1850 and ,1998 12±78 Gt of the carbon stocks in soil have been lost mainly due to accelerated mineralisation (two thirds) and soil degradation (one third).
- Peatlands are under serious threat. More than %20 of all peatlands have been drained for agriculture, %28 for forestry and %0.7 for peat extraction.

TREND

Changes in soil organic carbon levels are slow. However, data suggests that SOC is decreasing in European agricultural land in proportion with the initial concentration. This decline is particularly significant in the Mediterranean region where high temperatures and droughts accelerate the decomposition of the organic matter.

In contrast, despite the complexity in the interpretation of the available data, there appears to be a slight increase in organic carbon stocks in forests.

1 To understand this parameter, the IRENA Mineral Fertilizer Consumption indicator estimates that, depending on the specific crop, the average rates of nitrogen fertiliser applications ranged from 8–179 kg N/ha in 2000.

SEALING / DEVELOPMENT

STATE

- Since the mid 1950s, the total surface area occupied by cities has increased by 78%, while the population has only increased by 33% (proliferation of housing in peri-urban areas).
- Soil occupation between 1990 and 2000 was estimated to be around 1,000 km²/year (a surface area greater than that of the city of Berlin) or 275 hectares a day.
- Between 2000 and 2006, the rate of occupation fell slightly to 920 Km² a year (252 hectares a day). This is equivalent to an increase of almost 9% between 1990 and 2006.
- The total surface area of soil sealing amounted to 100,000 km² (2.3 % of the EU region) in 2006, an average of 200 m² per citizen.
- Member States with the highest sealing percentages (in excess of 5% of the national territory) are Malta, the Netherlands, Belgium, Germany and Luxembourg. High percentages were also observed in the main urban agglomerations and on most of the Mediterranean coast, where this phenomenon increased by 10 % in the 1990s alone.

TREND

Productive soil continues to be lost to urban sprawl and the construction of transport infrastructures. In the period 1990-2006, Member States lost a potential agricultural production capability equivalent to a total of 6.1 million tonnes of wheat due to this phenomenon, with large regional variations. For example, in the Italian region of Emilia Romaña, approximately 95% of land take between 2003 and 2008 corresponded to fertile plains.

Although a rate of land take of 250 hectares a day may appear to be low in comparison with the total surface area, the impact produced by existing urban centres must also be added. If this linear trend remains constant, a surface area equivalent to the territory of Hungary will be transformed within a century. In addition to the soil sealing surface area, the space distribution and the value and availability of the occupied land also play a key role.

ACIDIFICATION

STATE

- Availability of information on acidification is scarce for non-forest uses as most of the studies have been developed for this purpose.
- Although the objective established by the EU for 2010 has not been met, a significant improvement has been observed in this parameter.
- However, a subsequent study on samples from 160 forests showed that critical limits for soil acidification were substantially exceeded in a quarter of the samples.

TREND

Emissions of acidifying pollutants, particularly SO_2, have fallen in recent years as a result of the implementation of regulation and improved practices in industry. Numerous local studies ratify the reduction in acidity levels in many parts of the United Kingdom, Germany and Scandinavia. However, a recent study shows that there was only a slight variation between 2000 and 2006. In many areas, NO_x and NH_3 are now identified as the main acidifying agents.

CONTAMINATION

STATE

- In accordance with the report on "Status of Local Soil Contamination in Europe" (JRC, 2018), the extrapolation to the entire surface area of the 39 Member States using the data compiled, estimates that the number of sites on which potentially polluting activities have taken place stands at 2.8 million.
- The real number of sites currently registered is in excess of 650,000, of which 76,000 have been included in the registers since the last progress report ("Progress in the Management of Contaminated Sites in Europe 2014").
- Approximately 20% of the sites require or may require risk reduction measures.
- The number of sites that have already been remediated is estimated to be 65,500.

TREND

Although heterogeneity between the data from the different countries does not recommend its integration, significant progress has been observed in recent years, particularly in the final action phases, with a considerable increase in the number of sites investigated, recovered or in which monitoring or control measures have been introduced since the 2011 progress report.

SALINISATION

STATE

- Salinisation affects around 3.8 million hectares in Europe, mainly due to inappropriate irrigation practices (Valle del Ebro in Spain and parts of Italy, Hungary, Greece, Portugal, France, Slovakia and Romania).

TREND

There is no systematic data available to carry out an appropriate assessment across the whole of Europe, but some studies do show that salinisation is a growing trend in Spain, Greece and Hungary.

LANDSLIDES

STATE

- There is no reliable or homogeneous data that enables the total area affected by this phenomenon in Europe to be estimated.
- Some countries have created landslide databases. 630,000 events had been registered up to 2012 although the total number could be much higher.
- There have been more than 485,000 landslides in Italy, more than 25,000 in Austria, more than 21,000 in Slovakia, more than 19,500 in Norway, more than 15,000 in the United Kingdom, more than 14,000 in the Czech Republic, more than 12,000 in Poland, more than 10,000 in France, more than 6,600 in Slovenia, more than 5,000 in Iceland, more than 2,000 in Greece and more than 1,500 in Bosnia and Herzegovina..

TREND

There is no data at a European level but changes in land use, vegetation cover and climate, particularly in the rainfall pattern, will undoubtedly cause major effects on the susceptibility of landslides with serious consequences for people, property and infrastructures.

BIODIVERSITY DECLINE

STATE Y TRENDS

- Information on the impact of human activity on soil biodiversity is scarce, although there is evidence that soil organisms are affected by alterations in the organic matter content or modifications of the chemical and physical properties of soils.
- The main problem lies in the fact that a majority of soil organisms are still unknown. For instance, it has been estimated that the fauna of nematoda, acari and protozoa described to date represent less than 5% of the total number of species.
- Information on the dynamics of soil biodiversity is insufficient and generally refers to a few groups of soil organisms. Mushrooms are the group of soil organisms for which a relatively long history of records exists, which has enabled the decline in mushroom species to be shown in European countries (for example, a 65% decrease in mushroom species over a 20-year period has been reported in the Netherlands, and Switzerland has published the first ever 'Red List' of mushrooms, detailing 973 species in danger of extinction)..

TREND

The scarcity of data on this parameter makes it impossible to establish trends with any degree of rigour.

DESERTIFICATION

STATE

- Overall, sensitivity to desertification is lower in Europe than in other regions.
- Its effects are concerning in some areas, such as southern Portugal, much of Spain, Sicily, southern and eastern Greece and the areas of Bulgaria and Romania bordering the Black Sea.
- High or very high sensitivity to desertification has been assigned to 8% of the area in southern, central and eastern Europe (approximately 14 million hectares). This area would amount to 40 million hectares if areas with moderate sensitivity were taken into consideration.

TREND

Identifying trends related to this threat for the whole of the European region is no easy feat as certain characteristics of soil (low soil organic carbon content, proneness to erosion, low fertility) and the climate already exhibit many aspects of desertification, particularly in the Mediterranean area. In general, although there appears to be a tendency towards desertification throughout the region, recent data appears to indicate that although the north of the Mediterranean region is showing signs a slight warming and of drier conditions, the eastern part is experiencing cooler and wetter conditions. However, there are also studies that report opposing trends, which is why a future prediction cannot be made.

Source: "The State of Soil in Europe" (European Commission, 2012) y "Status in Local Soil Contamination in Europe" (JRC, 2018)

2.5.3 THE SITUATION IN THE BASQUE AUTONOMOUS COMMUNITY

In the preparation of this strategy, a preliminary assessment of the state of soil in the Basque Country was carried out, which has led to a document whose summary is presented below. To understand its scope, it is necessary to bear in mind that there is no systematic data that encompasses the entire area of the Basque Autonomous Community for any of the threats that soil faces, with the exception of development, industrial point-source contamination and, up to a certain point, erosion. For this reason, the conclusions of this assessment should be supplemented with more detailed studies so that data is available to facilitate the design of instruments adjusted to the magnitude and nature of the different impacts.

Erosion

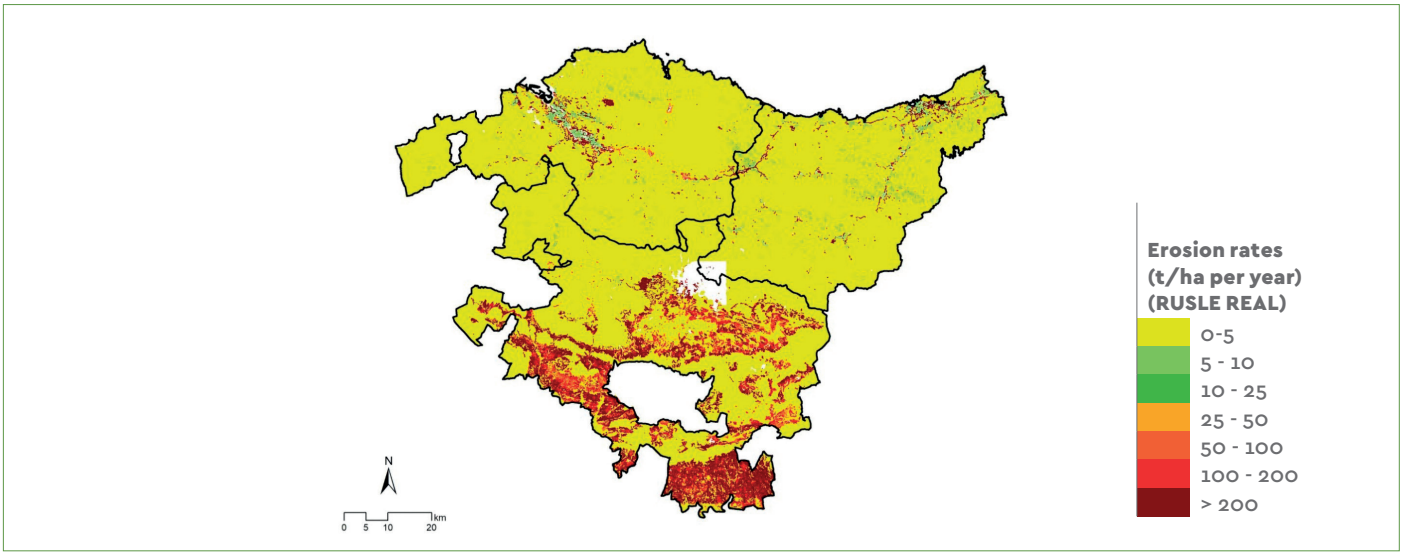
Existing information in relation to this threat for the entire surface area of the Basque Autonomous Community derives essentially from three sources: Map of soil erosion in the Basque Autonomous Community (2005), National Soil Erosion Inventory (INES, 2018) and Map of susceptibility to erosion (NEIKER, 2018).

The work carried out for the preparation of the first of these documents aimed to draw up a map (1:25.000) of the degree of sheet and rill water erosion using a simple but scientifically robust method in order to, first of all, identify the potential areas of action to combat erosion and, secondly, compare the situation at that time with that of previous years for which information was available.[2]

The result of this work was mapped, showing soil loss in tonnes by hectare and year (**Figure 6**).

This study concludes that practically 80 % of the Basque territory presents a potential risk[3] of suffering extreme erosive processes with rates in excess of 200 t/year. However, looking at this real erosion[4] map, most of the soil in the Basque Country (approximately 90%) has a real erosion rate of less than 10 t ha^{-1} $year^{-1}$ (areas with low or very low erosion levels or areas not susceptible to the erosive process with tolerable soil losses). Only a small percentage of the surface area (3.9%) presents extreme real erosion rates (> 200 t ha^{-1} $year^{-1}$). The highest rates are calculated in the south of Alava (Rioja Alavesa and south of Cuadrilla de Añana.

Figure 6. Map of real soil erosion in the Basque Autonomous Community (t ha^{-1} $year^{-1}$)



Source: GeoEuskadi

2 The USLE method was used to compare data from previous years as this has been used traditionally, and the RUSLE method was used for prediction purposes as its predictive capacity is greater although it is more complex.

3 **Potential Erosion.** Erosion that will occur if vegetation is removed. This value is extremely important for regional management as it allows for an analysis of how the removal of vegetation cover affects erosion.

4 **Real Erosion.** Erosion value resulting from the combination of all the factors involved in the USLE and RUSLE models with estimated values for each situation in the region.

In 2018, as part of the *National Soil Erosion Inventory* (INES), the Ministry for Agriculture, Fisheries and the Environment published the digital map of the three historical territories of the Basque Country for five types of erosion: sheet and rill erosion, gully erosion, mass movements (typology and potential), riverbed erosion and wind erosion.

According to this study, the surface area susceptible to suffer sheet and rill erosive processes reached 19.27% in Alava, 63.50% in Bizkaia and 83.79% in Gipuzkoa.

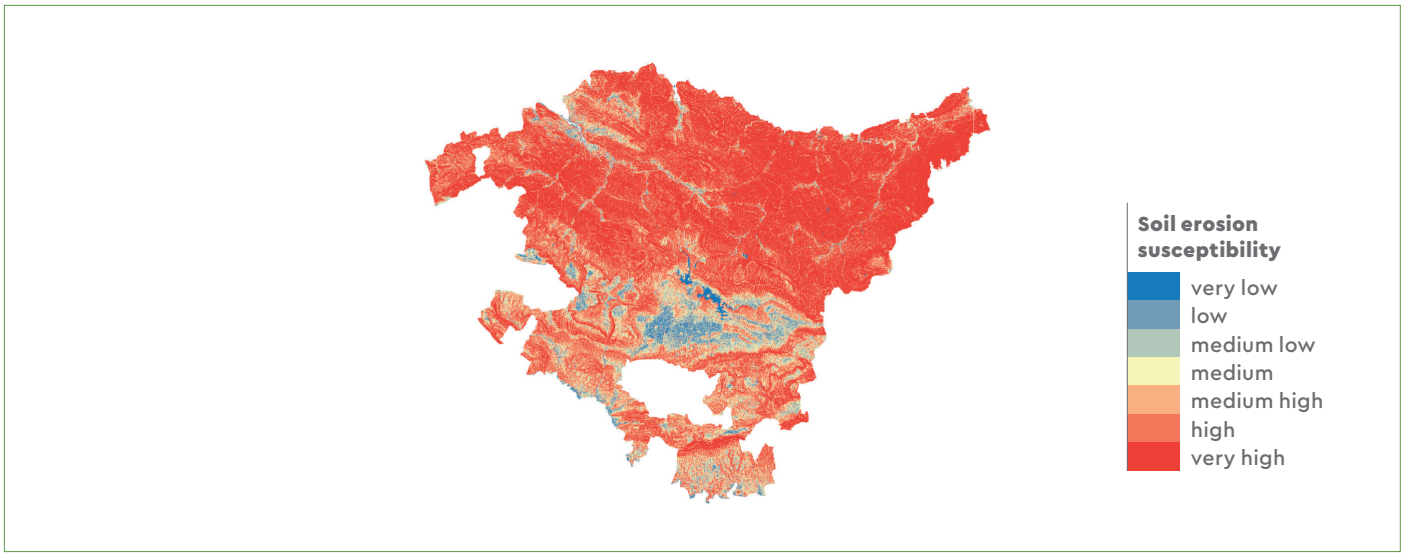
Considering all of the erosive phenomenon, most of the surface area (78%) of the historical territory of Araba/Alava had the lowest levels of erosive risk (< 10 t ha^{-1} $year^{-1}$). In the case of Bizkaia, the surface area with the lowest risk levels was 66%. Finally, in Gipuzkoa, this surface area was 40%.

Considering the total surface area of the Basque Country, it is estimated that 68% of the erodible surface will suffer soil losses of less than 10 t ha^{-1} $year^{-1}$, slightly less than the estimate obtained with the aforementioned erosion map. The surface area associated with extreme erosion rates was 0.37 %.

Although the ranges of soil loss estimated using USLE are tolerable for most of the Basque Country, a new susceptibility to erosion map was drawn up in 2018 in order to serve as a base for decision-making related to soil management. [5]Although they both address the same concept, the map drawn up in 2005 and the one drawn up in 2018 present significant differences in methodology, mainly related to the factors that are considered in the equation calculation model.

The USLE universal soil loss equation considers climate factors (R factor), soil factors (K factor), topographic factors (LS factor) and cover management factors (CP factor). To calculate the susceptibility to erosion, only climate, soil and topographic factors are considered. A new map of the R factor, rainfall run-off erosivity, for the Basque Country was developed based on 81 weather stations in the Basque Autonomous community with more than 10 years of detailed data. Soil texture and organic matter maps developed in LURCARBONTEXT were used to improve the soil erodibility map, K factor and the LS topographic factor map was generated following the methodology established by the European Commission.

Figure 7. Susceptibility to water erosion of soil in the Basque Country



Source: NEIKER

As can be seen in **Figure 7**, most of the land in the Basque Country presents a high and very high susceptibility to erosion, except the Llanada Alavesa, where the susceptibility is estimated to be low and very low. This is mainly due to its high rainfall, heavy soils and rugged terrain. In this context, the sustainable management of this resource is cornerstone to combat the risk of soil degradation. From this map and previous results, it is shown that soil uses that ensure permanent vegetation cover effectively reduce soil loss.

In order to estimate the influence of climate change on susceptibility to erosion, caused by the alteration of rain patterns, possibly more torrential rain, new maps of the R factor, which

5 The terms "potential erosion" and "susceptibility to erosion" correspond to the same concept: The USLE universal soil loss equation considers climate factors (R factor), soil factors (K factor), topographic factors (LS factor) and cover management factors (CP factor). To calculate the susceptibility to erosion, only climate, soil and topographic factors are considered.

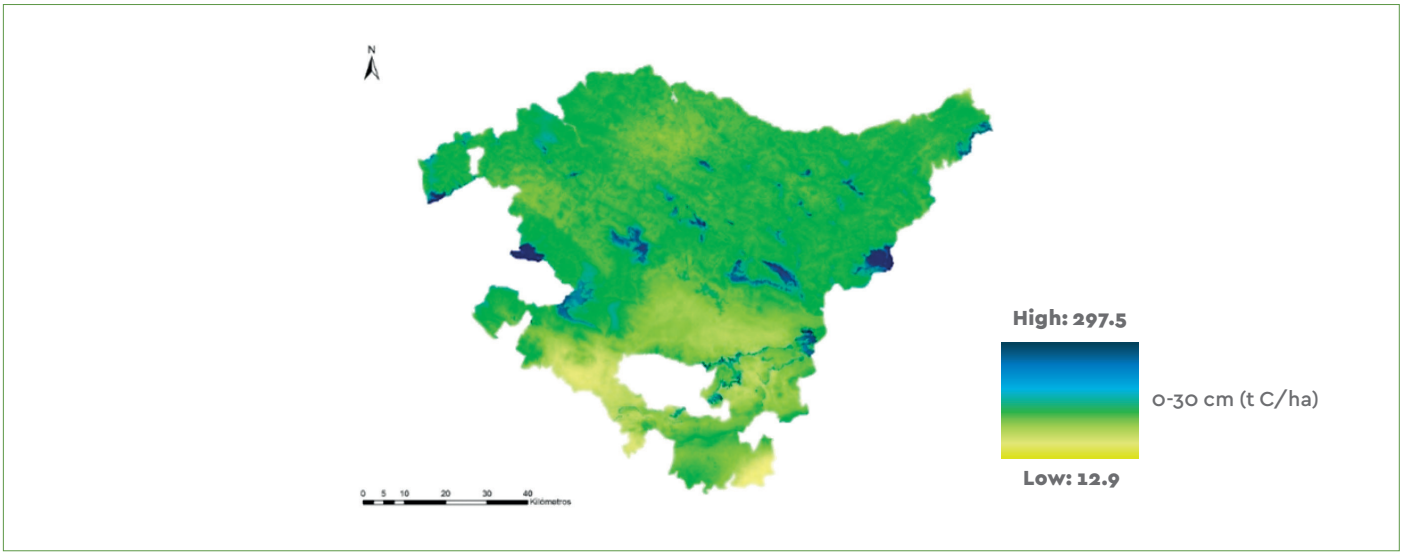
is most related to this phenomenon, have recently been drawn up for three time horizons: near future (2011-2040), intermediate future (2041-2070) and distant future (2071-2100).

The data available shows, on one hand, the threat posed by erosion for soil in the Basque Country and, on the other hand, the need to incorporate erosion factors in any regional action or management policy.

Reduction of organic carbon content /soil organic matter

There are carbon stock estimates in soils in the Basque Country for 1995, 2006 and 2018. Between 1995 and 2006, a tendency towards carbon loss was observed. In 2018, a new map of organic carbon stocks was drawn up, for which variables, such as lithology, soil use, regolith thickness, X-Y interaction, accumulated annual rainfall, slope, elevation, average annual temperature, maximum annual temperature and minimum annual temperature were taken into account, all of which are important for the prediction of soil organic carbon. **Figure 8** shows the organic carbon stocks in our territory.

Figure 8. Map of the carbon stock per surface unit (Mg C ha^{-1}) in the Basque Country in the first 30 cm of soil depth



Source: IHOBE, 2018

This study also enabled the possible effect of the change in soil management on the potential of carbon storage in agrarian soil in the Basque Country to be simulated in the long term and compared against the current scenario, in such a way that it enables the capacity of agri-forestry soil to remove carbon from the atmosphere and sequestrate it in soil to be estimated. It was estimated that a set of proposals to change soil management could sequestrate approximately 670,000 t CO_2 eq. ha^{-1} $year^{-1}$, which would affect almost 222,000 hectares of the Basque Country, 30 % of its surface area. It must be highlighted that these proposals would also play a major role in adaptation to climate change due to their contribution to the better use, storage and efficiency of water.

Stocks of soil organic matter in the Basque Country must be stabilised or increased as a strategic element, not only to improve soil health and its resilience to climate change, but also to contribute towards the reduction of greenhouse gas emissions.

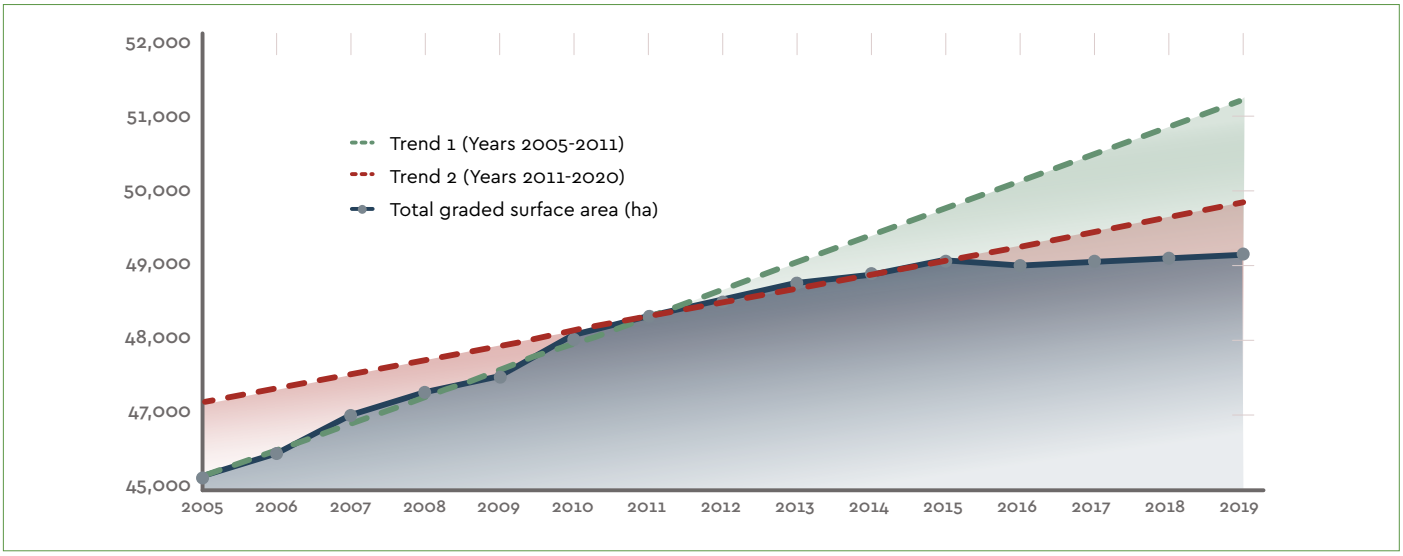
Even so, in the current context of climate change, there is a high degree of uncertainty regarding the soil carbon response. Some simulation models predict large releases of additional carbon from soil and vegetation, whilst other suggest only slight modifications.

Soil Sealing / Development

The indicator related to urban development-classification, managed by the Basque Government's Department for Regional Planning and Urban Agenda, describes the evolution of the urban stain in recent years, specifically the evolution of urban development/categorisation of land (for residential use, economic activity and general systems (infrastructures, facilities and open spaces)).

Like in the rest of Europe, land development in the Basque Country is a highly significant parameter as it is a densely populated, industrialised and developed region with a settlement model concentrated in valleys, with an intense and located level of land consumption for the construction of first and second homes, production facilities and transport infrastructures. From 2006 to 2011, the urbanisation rate increased and the area of soil sealing in the Basque Country reached 6.68%. However, this percentage has only increased slightly in subsequent years. If this figure is compared with the percentage of soil sealing in the rest of the European countries, the Basque Country is above average, which stands at 1.81%, resembling the percentages presented in the Netherlands (7.33%) and Belgium (7.37%) which also have high population densities.

Figure 9. Developed land (ha).



Source: Basque Government's Dept. for Regional Planning, Housing and Transport, 2021

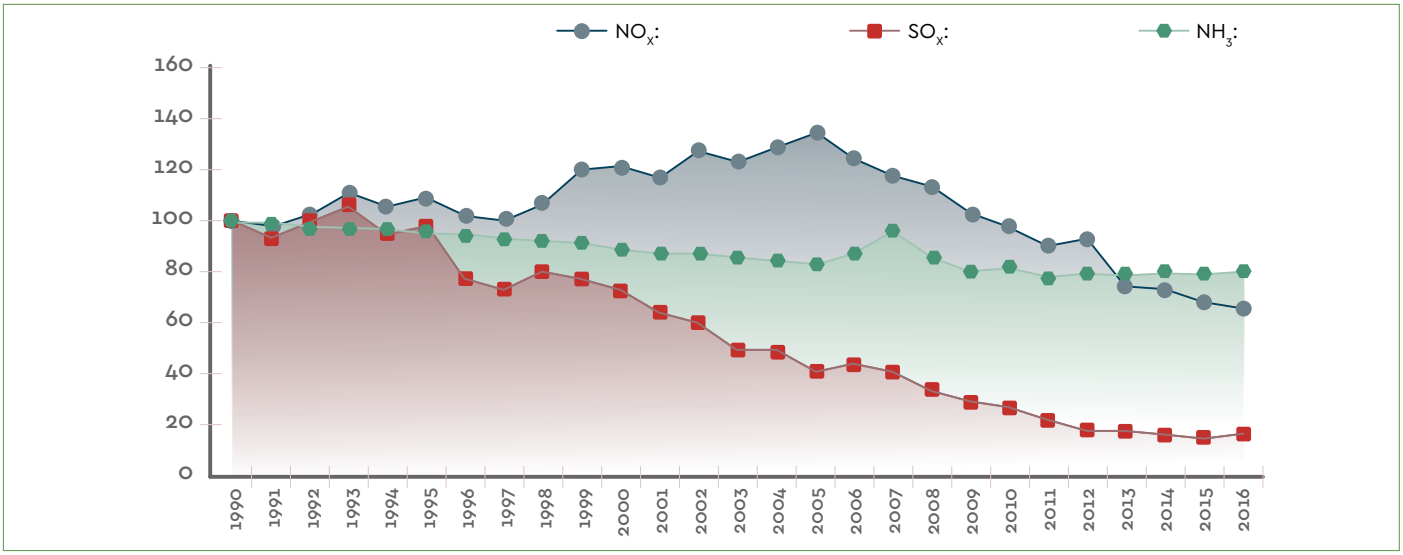
Over the past five years, the percentage of developed land in the Basque Country has remained stable.

As for the quality of land take by urban expansion, according to the *"National Forest Inventories of soil degradation of planted forests"*, the Basque Country will have lost around 3,000 hectares of forest land and 4,000 hectares production land in the past five years.

Acidification

In the Basque Country, there has been a reduction in the exposure of ecosystems to acidifying substances of almost 50% in 2016 with respect to 2007, due largely to the reduction in SO_2 emissions, one of the main acidifying compounds. The limitations imposed on sulphur content in fuels and the promotion of the use of fuels that release less sulphur to the atmosphere, such as natural gas, have contributed to this reduction.

Figure 10. Evolution of emissions of acidifying substances (NO_x, SO_x, NH_3).



Source: Own preparation based on data from EUSTAT (2018)

As for European soils, those in the Basque Country show a tendency towards the reduction of acidification if the effect of rain full of acidifying ions is considered to be the cause, as it is foreseen that air contamination by these compounds will continue to fall over the coming years, although the progress is estimated to be slower from 2030 onwards.

In spite of the positive tendency observed, the acidifying effect of the washing away of soil by rain in the Cantabrian area and the loss of the traditional habit of liming to increase the pH of the soil must not be forgotten, which are two factors that also play a key role in relation to this threat.

Contamination

Industrial point-source contamination

According to the data provided in the *Basque Environmental Profile 2020* devoted to contaminated sites, a total of 12,448 sites have been registered in the Basque Country in the *Inventory of sites that withstand or have withstood potentially soil contaminating activities or facilities*.[6] These sites occupy 9,642 hectares, which represents 1.3% of the total surface area of the Basque Country and 19.7% of the sum of the surface areas classified as urbanised and for development. Even though landfill accounts for 25% of the total potentially contaminated surface area, the remaining 75% is occupied by a very heterogeneous group of industrial activities, which represent 88% of the total number of inventoried sites.

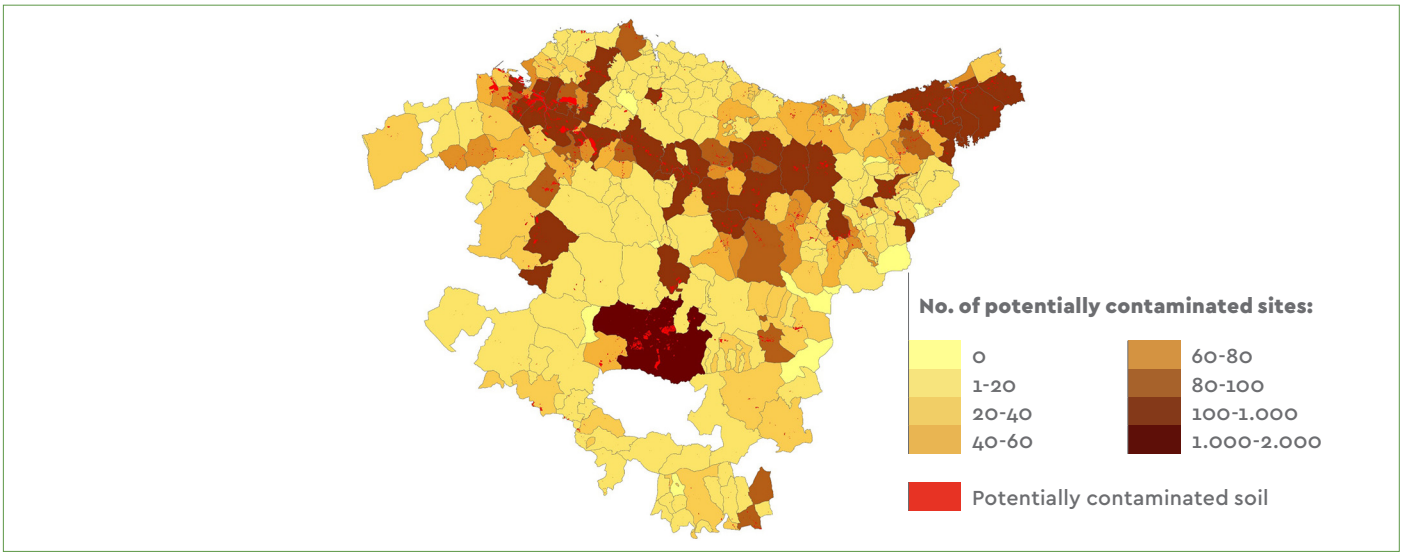
When the spotlight is placed exclusively on industrial/commercial activities, a clear predominance of activities related to the metallurgy industry is discovered.

In relation to sites in which landfill is the reason for their inclusion in the inventory, almost half of them (47%) have small

6 Figure updated to 2018.

(1,000-10,000 m³) or very small (<1,000 m³) volumes of waste. The average value of this parameter is 125,000 m³ even though the landfill areas with above average volumes barely exceed 17%.

Figure 11. Distribution of potentially contaminated sites



Source: Basque Government's Department for Economic Development, Sustainability and the Environment, Basque Environmental Profile 2020 - contaminated sites

One hundred and fifty-nine hectares of those classified as potentially contaminated are located in Natura 2000 network spaces and 1,700 hectares are at least 50 metres from surface water courses, whereby 588 of them are at least 50 metres surface courses with a chemical status of "good". On the other hand, 1,568 hectares of potentially contaminated soil is located in areas of hydrogeological interest. In flood-prone areas with a return period of 10 and 100 years, there are 237 ha and 877 ha respectively.

Areas affected by soil contamination in spaces of special interest (Natura 2000 network areas, water courses in a good state, areas of hydrogeological interest) should be managed as areas for priority action to combat this threat.

In 36% of the 972 soil quality declarations processed since the approval of Law 1/2005, of 4 February, for the prevention and correction of soil contamination, the alteration of the quality of the groundwater was found to be associated with the soil. 1.5% of the soil quality declarations processed have ended up with the soil being classified as 'contaminated', 82% as 'altered' and the remaining 17% as 'unaltered'. In 65% of the soil quality declarations, measures to control and monitor the groundwater associated to the soil have been imposed.

68% of the potentially contaminated soil is on sites classified as subject to urban transformation. 70% of the area of sites on which soil quality appraisal and restoration actions have been carried out correspond to sites classified as intended or economic activities. 77% of the potentially contaminated sites have been converted into urban use (collective housing and facilities) in which the reason for the intervention was the change of use.

20% of all of the potentially contaminated sites inventoried have been returned to the market once the actions that guarantee their quality to safely develop the intended use have been carried out.

Diffuse Contamination

Diffuse contamination is a process of soil degradation for which there is insufficient information to enable the magnitude of the problem to be evaluated. It must also be taken into account that there may be numerous origins of this type of contamination. Atmospheric deposition from industry or traffic, mining or agricultural and farming activities are some of its causes.

In spite of the fact that there are specific studies devoted to the contamination associated with each of these areas, the results are not transferable to all of the zones that may have been affected in the Basque Country, except in the case of nitrate contamination from agrarian activity in zones that have been declared as vulnerable, which are systematically monitored.

In the Basque Country, five zones have been declared vulnerable to contamination from nitrates from agrarian activity; three sectors of the Vitoria-Gasteiz Hydrogeological Unit (East Sector, Dulantzi Sector and West Sector-Foronda I and II6) and the Northern and Intermediate sectors of the body of alluvial groundwater in Miranda de Ebro. According to the report on *Monitoring of vulnerable zones affected by nitrate contamination from agrarian activity in the Basque Autonomous Community* (URA, 2019), the favourable tendency of decreasing nitrate concentrations in recent years has continued in the East and Dulantzi sectors, with average concentrations that do not exceed 50 mg/l. Such a clear and defined tendency cannot be observed in the East Sector, although average values below this concentration have been obtained in the past two years and in all points of the sector. The Western sector of the Vitoria aquifer requires the delimitation to be modified. The situation in the vulnerable zone of the Miranda de Ebro Alluvial is far less favourable than that of the Vitoria Alluvial, with average nitrate concentrations reaching 60-100 mg/l.

Historic data and the incorporation of new control points have provided increased knowledge of nitrate concentrations in the groundwater of different zones subjected to agricultural pressure and have enabled new vulnerable zones to be determined: the Zambrana sector of the Miranda body of alluvial groundwater and the Leziñana sector of the Treviño synclinal body of groundwater, in accordance with the criteria for the identification of vulnerable zones published recently by the European Commission.

> In most cases, information on the scope of diffuse contamination is insufficient to make a precise diagnosis.

Salinisation

In the Basque Country, soils with natural primary salinisation processes can be found in the area around Laguardia (Araba/Alava), where severe climate aridity is combined with the presence of geological materials rich in salts.

Secondary or induced salinisation has only occurred in cases of glasshouse crops, which, according to the available data, does not pose a major problem for the Basque Country as a whole.

> Salinisation has a low incidence in the Basque Country having only been identified in isolated cases.

Compaction

To obtain relevant information on the state of soil compaction in the Basque Country, diverse studies conducted in different areas and with varying soil uses have been analysed. However, these studies are ad-hoc and do not enable an overall vision of the state of Basque soil compaction to be obtained.

> There is no soil susceptibility to compaction map or any systematic information in the Basque Country.

The European Commission drew up a map of soil susceptibility to compaction in Europe, which shows that Basque soils mostly have low or moderate susceptibility. There is no specific map for the Basque Country, but studies developed to evaluate natural risks in Atlantic forests reflected that the natural susceptibility to compaction was high or very high, which is associated with the heavy soil texture.

Biodiversity Decline

A reflection of the high pressure to which biodiversity is subjected is the size of the protected areas. In the Basque Country, 53% of the Natura 2000 Network sites are less than 1,000 ha, and 29% are between 1,000 and 5,000 ha. This partly shows the high pressure to which the region is subjected as a result of human-induced uses of soil, which undoubtedly have an adverse effect on biodiversity in general and soil, in particular.

In the Basque Country, ad-hoc studies have been carried out on the impact of contamination or agricultural practices on the diversity of soil organisms, determining their beneficial and adverse effects. With the exception of some taxonomic groups (e.g. fungi, beetles, arachnids, hymenopterans, oribatid mites), there is no data on the state of soil biodiversity for the region.

There is no data on the state of the soil biodiversity in the Basque Country at a regional level, which is essential to evaluate the wealth, diversity, composition and interactions of the soil species, and to assess soil health.

An indispensable starting point to meet the necessary objective of preserving soil biodiversity is achieving a reasonable sufficient and adequate level of knowledge of the wealth, diversity and composition of the soil species, as well as their spatial-temporal distribution. Establishing a network to monitor biodiversity and, in general, soil quality in the Basque Country, would enable the temporary trends derived from the impact of the different sources of environmental stress on the functionality of the soil resource to be monitored and studied. In this way, highly valuable data and knowledge will be available to draw up and implement policies based on the sustainable soil management.

Desertification

Information available on desertification in the Basque Country is limited to the contents of the *Desertification Risk Map* for Spain. In accordance with the severity of desertification risk classification criteria defined in this map, there is no area in the Basque Country considered to be at very high risk. However, a surface area of 10,952 ha with high risk has been identified in Araba/Alava. This site is located in the southern part of Araba/Alava, where vineyards and cereal crops prevail.

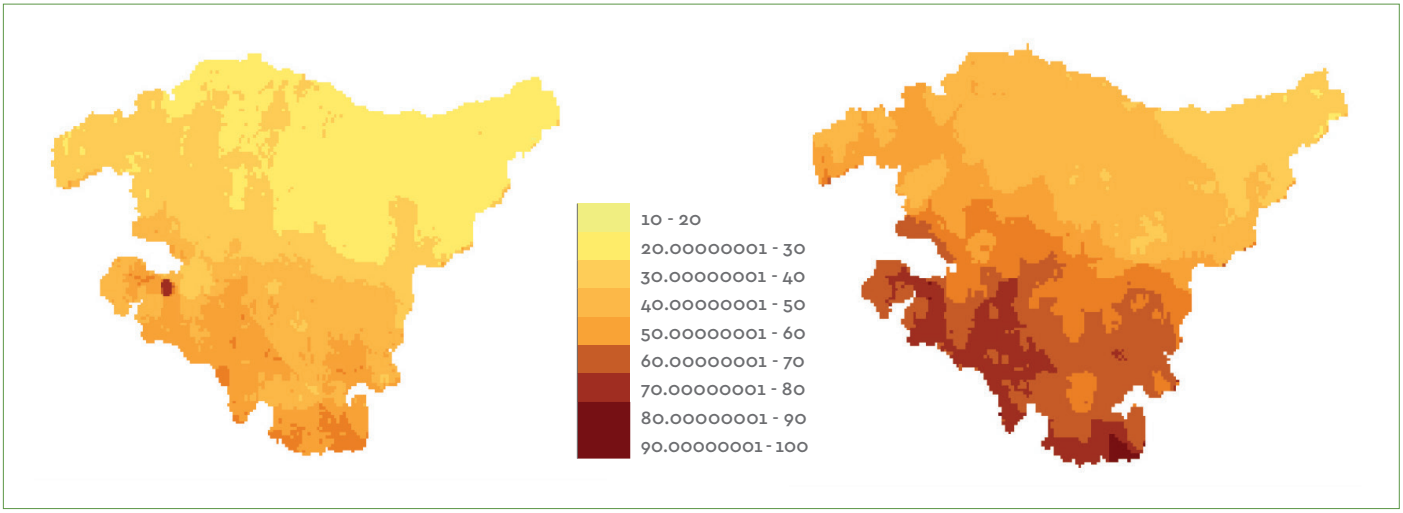
The areas at highest risk of suffering desertification processes are located in the south of Alava/Araba.

The potential effect of climate change, which is associated with prolonged droughts and more irregular rainfall, combined with the unsustainable use of water and agricultural practices may lead to the expansion of the desertification phenomenon.

In accordance with the high resolution regional climate change scenarios for the Basque Country (Ihobe, 2017), an increase in drought periods is predicted, based on the maximum number of consecutive dry days a year. The assessment of vulnerability and municipal risk of impact of increased periods of drought on economic activities (Ihobe, 2019) has determined that 100% of the municipalities in the Basque Country are at a greater or lesser degree of risk due to the increase in droughts for scenario RCP 8.5 and for the periods 2011-2040 and 2071-2100 (**Figure 12**). Therefore, the desertification risk may be increased due to the projected climate conditions.

The increase in drought periods predicted in accordance with the high resolution regional climate change scenarios for the Basque Country may increase the risk of desertification in the whole of the Basque Autonomous Community to differing extents.

Figure 12. Indicator that evaluates the increase in droughts (CDD Index: number of consecutive dry days / year). The indicator calculated for the current situation is shown on the left and the estimate for the RCP 8.5 scenario and the period 2071-2100 is shown on the right



Source: Preparation of high resolution regional climate change scenarios for the Basque Country (IHOBE, Basque Government, 2016)

Landslides

As is the case in most countries and regions of Europe, the Basque Country does not have systematic data on the total area affected or susceptible to be affected by landslides.

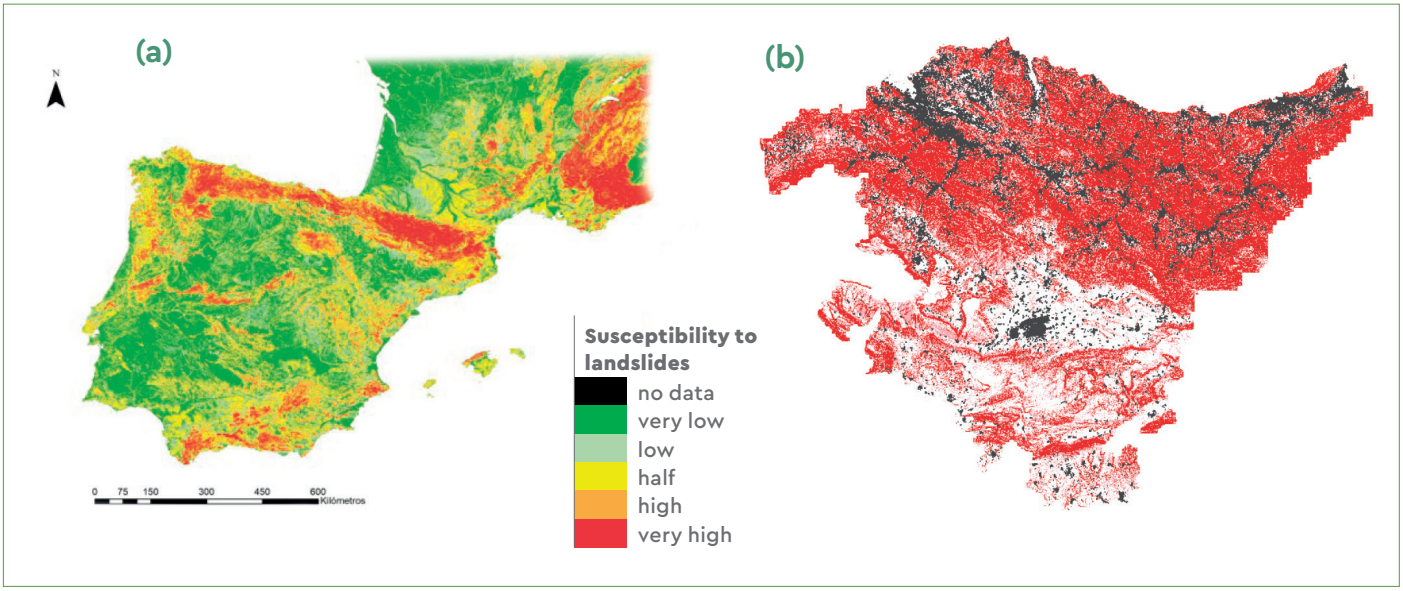
> The Basque Country is a region with a very high susceptibility to landslides due to its steep slopes and rainfall patterns.

Figure 13 shows the landslide susceptibility map developed by the European Commission for the whole continent, focusing on the Iberian Peninsula. The map shows a very high susceptibility to this phenomenon in the Basque Country and in general, across the entire Cantabrian mountain range. This is not surprising in a region like the Basque Country with steep slopes (more than 90% of the historical territory of Gipuzkoa, 75% of Bizkaia and 50% of Araba/Alava present slopes in excess of 15%) and rainfall, two factors that favour the falling of loose material (in most cases) or stones.

This information, based exclusively on slope data, is coherent with that provided by the *National Soil Erosion Inventory* (INES, 2018) which it calls "mass movements". According to this inventory, the potential of this type of landslides occurring will be classified as high or very high in 16.15 % of the erodible surface of Alava, 67.63 % of that of Bizkaia and 76.77 % of that of Gipuzkoa. In the case of Alava, most of the territory (60.73 %) will be subject to medium potential.

Landslide phenomena are constant in the relief of the Basque Country, generally on a small scale.

Figure 13. (a) Map of landslide susceptibility in Spain (Source: Wilde et al. (2018)); (b) Map of slopes in the Basque Country with the areas potentially most prone to the landslide genesis marked in red (slope in excess of 15 %) (Source: Landslide Risk. What you should know, Official Association of Geologists, 2014)



Furthermore, human activity (construction of roads and motorways, urbanisation in areas with a steep slope or deforestation of hillsides and embankments) has a direct influence on the stability of the terrain. This human intervention, along with expected changes in rainfall patterns due to climate change, foresee a greater incidence of this threat in soil.

A theoretical increase in landslides is expected as a result of the increase in extreme rainfall due to global warming and increased human influence.

Nutrient Imbalance

According to the Ministry for Agriculture, Fisheries and the Environment, the N balance (2017) in the Basque Country is positive, 11.9 kg N ha^{-1} $year^{-1}$ The surplus is 44.8 kg N ha^{-1} $year^{-1}$ for arable crops, 22 kg N ha^{-1} $year^{-1}$ for woody crops and -0.9 kg N ha^{-1} $year^{-1}$ for grazing areas. In the case of P, and according to the same source (2017), the surplus of P is 5.6 kg P ha^{-1} $year^{-1}$, which can be broken down to 25.6, 9.4 and -2.0 kg P ha^{-1} $year^{-1}$ for arable crops, woody crops and grazing areas, respectively.

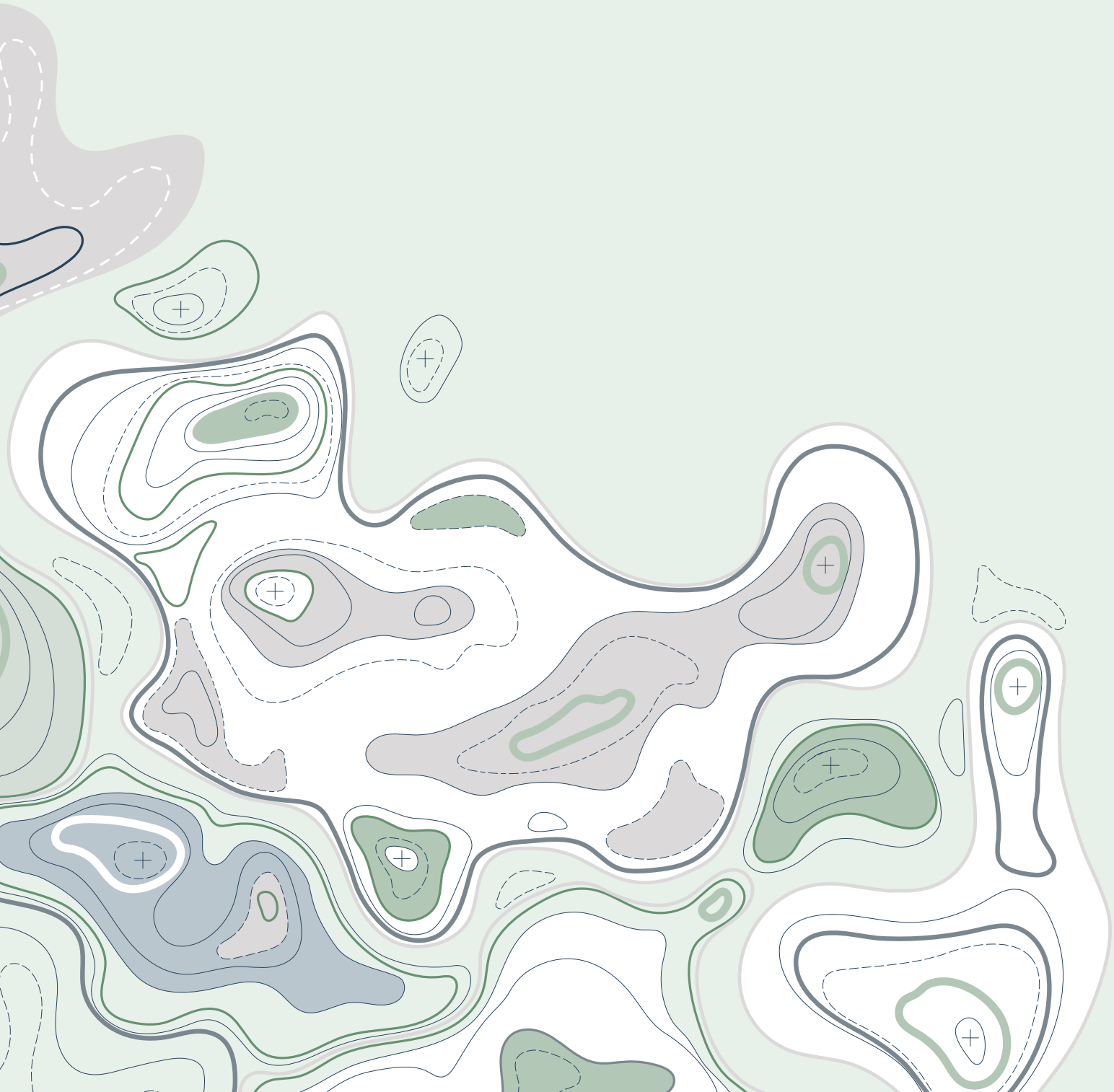
However, these figures contrast with those obtained in more detailed studies conducted at a municipal level, in which it is concluded that the excess of N in the Basque Country is 22,000 t of N, which corresponds to an average excess of N of 101 kg N ha^{-1} of agricultural area, with a variation from 23 to 245 kg N ha^{-1}. The areas with the highest excess of N are those with a larger livestock population, whilst those areas with extensive crops are characterised by lower excesses. In those areas of Araba/Alava with most of its area devoted to extensive crops, the excess was between 51 and 75 kg N ha^{-1} (del Hierro *et al.*, 2006).

The N balance of agricultural soil in the Basque Country in 2015 was positive (11.9 kg N ha^{-1} $year^{-1}$). In the case of P, there was an excess of around 5.6 kg P ha^{-1} $year^{-1}$.

In livestock production systems, intensive livestock activity is based on a high consumption of fertilisers and food in the form of forage and concentrates in order to maintain high milk production. This mass intake of nutrients into the system involves an excess of nutrients that leads to their accumulation

in soil with the risk of export towards water resources and the atmosphere. In Gipuzkoa, a study was conducted in which different risks of N losses towards water from pastures were estimated using a theoretical model. On applying the indexes adapted to the pastures of this historical territory, it was estimated that 32% of the pastures could be accompanied by a high potential risk of contamination of waterways.

03.
STRATEGIC APPROACH



3.1

Vision and Strategic Goals

In line with the principles and goals of global and European strategies, the *Basque Soil Protection Strategy 2030* pursues the ambitious goal of not producing net degradation of this resource whilst guaranteeing its health through sustainable soil management.

Assuming that human activities affect soil quality and that social and economic development inevitably involves its use, the aim is, on one hand, to minimise land take through the recovery of soil that has already been anthropised, and, on the other hand, offset the effects of the use of virgin soil, without forgetting the need to restore soils subjected to degradation processes.

VISION FOR 2050

All soil in the Basque Country is sustainably managed and threats are successfully addressed, guaranteeing its health and hence the long term soil functions for its use by future generations.

Based on this vision for 2050, the definition of strategic goals is conditioned internationally and locally by specificities within the context of the regulation and management of this resource:

a). As a result of the *European Green Deal and the European Soil Protection Strategy 2030*, progress has been made in recent months in terms of the goals set on a European level beyond the general definition on which they are based. Even so, there are still no clear and homogeneous guidelines for their systematic waterfall deployment through national or regional policies.

b). In soil protection policy, many variables come together, interacting from extremely diverse areas of competence and action. This hinders the definition of goals, but also highlights the need for a common direction that gives coherence and direction to this strategy.

c). The convergence of two interdependent concepts, soil and land, presents an added difficulty but also an opportunity to address the goals through coordinated management between the administrations and actors with a role to play in soil protection from each of these sides.

d). The identification of the indicators that enable progress towards the goals to be assessed is pending at a European level, due to the difficulty of their fulfilment and, above all, the interpretation of data subject to variables of a diverse nature.

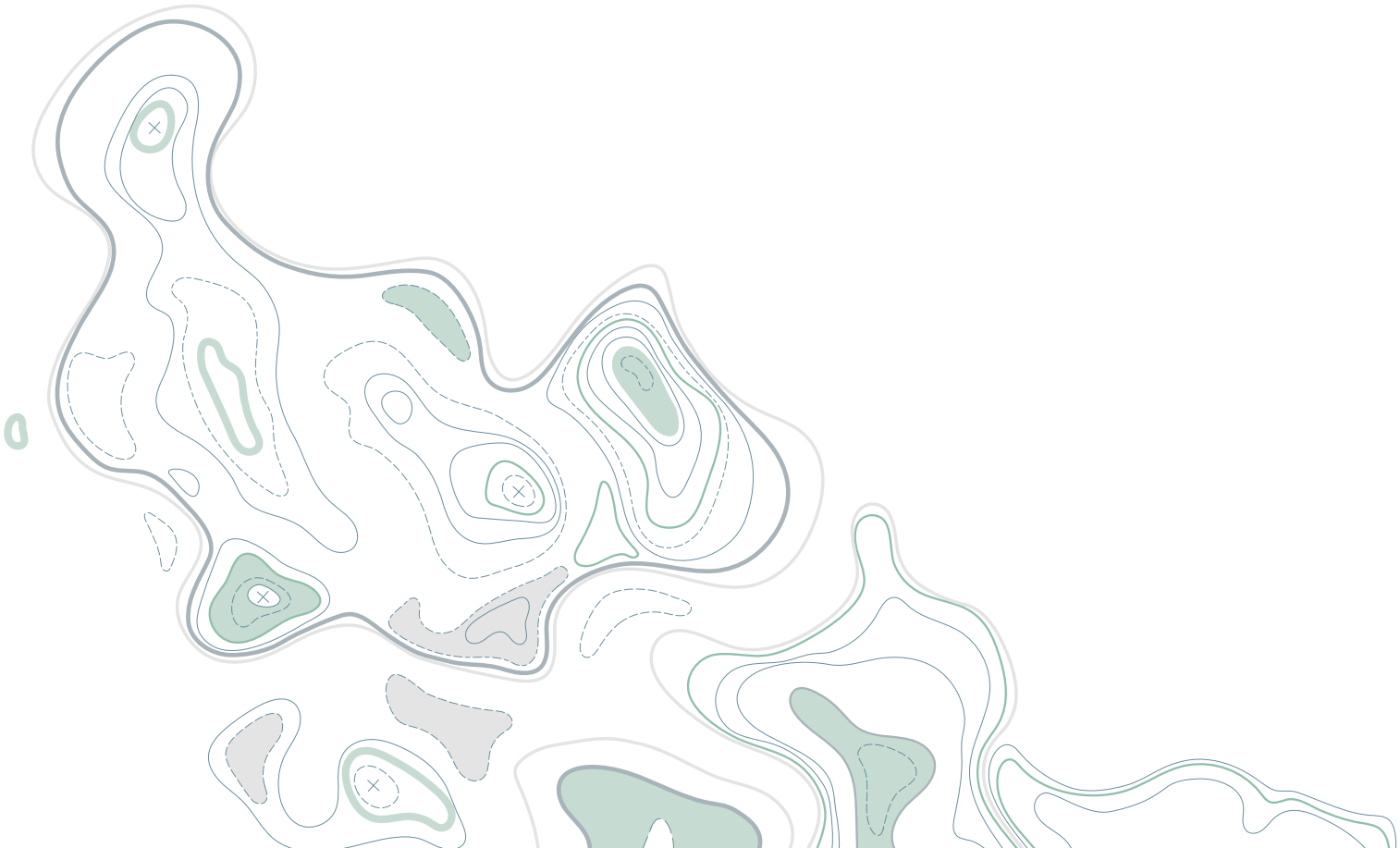
Moving towards the vision for 2050, incorporating these conditions will require the roll out of some strategic goals that help to focus efforts on common directions within the European strategies and the Sustainable Development Goals.

OVERALL GOAL

Make sustainable use of soil leading to "ZERO NET DEGRADATION" and achieve HEALTHY SOILS by 2050, contributing towards the fulfilment of the Sustainable Development Goals with an impact on soil.

OBJETIVOS ESTRATÉGICOS

1. **REDUCE** soil consumption. Zero net degradation by 2050 is accompanied by neutrality in land take thanks to the re-use of anthropised soil in disuse, among other actions.
2. **MANAGE** soil occupation from a global perspective. Occupation of virgin or agricultural soil is avoided, anthropised soil is re-used through the assignation of new uses or its restoration and its effects are offset or mitigated when soil occupation is inevitable.
3. **PROTECT** soil from harmful impact. Soil characteristics and vulnerability along with the services provided by soil ecosystems are taken into consideration for the implementation of new uses and for its protection against threats.
4. **RESTORE** degraded soil. Whenever feasible, degraded soil is always restored in order to recover its normal functions bearing in mind its location.
5. **INCREASE** awareness and knowledge. Soil is perceived as a valuable and finite resource that requires protection through the sustainable management and use by trained professionals and environmentally aware citizens.



3.2

Principles and Key Success Factors

Following the principles on which general environmental protection policy in the Basque Country is based, some principles have been adopted, incorporating the specificities in the field, which aim to inspire all of the actions proposed in this strategy or which are incorporated at a later date within its validity period.

	GENERAL PRINCIPLES
Preservation of soil functions	The first two principles of *Law 4/2015, of 25 June*, conservation of the natural functions and maximum maintenance of the functions that soil can develop are also the basis of this strategy.
Polluter Pays	To guarantee a socially fair and equitable policy aligned with the principles set out by the European Union, the soil protection policy will apply the principle of "polluter pays" whenever possible for those threats to related to chemical quality. In other words, the polluter will initially bear the recovery costs. This means internalising prevention costs and, where appropriate, soil restoration costs in the general costs of potentially soil-contaminating economic activities.
Integrated solutions	In coherence with the new vision, sustainable soil management can only be addressed through the search and implementation of solutions that enable the conservation or restoration of the widest possible range of ecosystem services in integrated and coherent units of action.
Circular economy and sustainable and efficient management of soil as a resource	The circular economy concept takes on new meaning from the perspective of soil protection set out in the document initially approving the "Review of the Regional Planning Guidelines of the Basque Autonomous Community" (February, 2018): *Therefore, it is proposed to move forward towards the goal of zero net land degradation through the re-use and recycling of the land and the promotion of the circular economy for the re-use of excavated soils as a result of the needs of the construction projects.*
Proportionality	Restoration *in natura*, understood as returning soil to its original state prior to the damage, is practically impossible. For this reason, the search for integrated solutions must be complemented with an element of rationality and sustainability laid out in the principle of proportionality, which limits the scope of the measures to be adopted after the weighting of the different factors involved. Therefore, the restoration plans implemented must analyse the economic, social and environmental impact deriving from their implementation.

	GENERAL PRINCIPLES
Minimum soil movement	This principle, initially used in the field of contamination, prioritises on site treatment over other possible clean-up solutions. However, efforts to maintain soil in its original location should prevail in all activities affecting land, in order to preserve the value and integrity of a resource whose formation has required thousands of years.
Transparency	The application of all of these principles must be accompanied by information that is reliable, easily available and prepared ad hoc for all of the stakeholders involved or with a stake in soil management and protection.

The success of the implementation of a soil protection policy based on these principles will depend to a great extent on the fulfilment of a series of **necessary conditions that generate the appropriate and coherent framework** through the roll out of key success factors which are set out in **Table 7**.

Table 7. Key success factors and necessary conditions for their implementation

KEY SUCCESS FACTORS	NECESSARY CONDITIONS
Knowledge of the state and functioning of soil to establish well-founded priorities and design the most effective measures.	Soil protection must be built on knowledge that enables a better definition of priorities and efforts to focus on areas in which it is necessary and possible to progress. Understanding the effects of the pressures and threats on soil and the state of natural soils will enable active measures to be implemented for the prevention, restoration and monitoring of its functions, including natural functions. Similarly, information on chemical, physical and biological soil processes will allow for a better understanding of the mechanisms that determine their functioning.
Integrated planning for holistic soil and land management.	Sustainable soil and land management requires sustainable and inclusive planning with an integrated vision of soil and its functions, focusing on prevention and protection against impacts and the regeneration of affected areas, with the goal of reaching zero net soil degradation. Furthermore, integrated approaches that consider the relationship between soil and other environmental compartments and the pressing need to incorporate soil into cross-cutting environmental challenges, such as action to combat climate change or the protection of biodiversity must also be considered.
Transversality and integration of the need for soil protection in other policies.	The new paradigm advocated in this strategy results in the integration of the broadest concept of soil into sectorial policies so that it is systematically considered to be a resource that provides services that go far beyond merely sustaining human activity. Therefore, a significant part of the efforts must be focused on policies of a diverse nature, not necessarily environmental.

KEY SUCCESS FACTORS	NECESSARY CONDITIONS
Coherence between policies and **coordination and collaboration** between administrations.	In recent years, different perspectives of soil and land have become key elements of different sectorial policies and plans. The lack of a common vision has led to the dispersion of objectives and actions. Only an exercise of coherence in its design and implementation can successfully drive the success of this strategy. Coherence must be accompanied by effective coordination and collaboration between the different actors involved, which enables knowledge to be shared, targets to be aligned and resources optimised in order to reach the common goal.
Co-responsibility of all.	All people and organisations involved in soil management accept their share of responsibility. Only in this way can society fairly and equitably share the benefits deriving from the preservation and restoration of soil quality and its functions. Public-private collaboration plays a major role when addressing a privately owned resource whose functions must be preserved for the benefit of society as a whole. For this same reason, the commitment and participation of owners are seen as factors in the success of soil conservation activities.
Raising awareness and understanding of stakeholders and citizens.	Nowadays, society has a high degree of awareness of the importance of the protection of resources, such as water or air. However, this is not the case for soil. Dependence on overcoming the challenges of today's society and soil quality is a relationship that stakeholders and citizens do not establish directly. Therefore, raising awareness and understanding becomes a necessary condition for the new approach that guides the fulfilment of this strategy.
Promotion of **participatory processes**.	Raising awareness and understanding should be accompanied by the incorporation of all stakeholders and those with the capacity to act into the design and implementation of the strategic approaches and processes.
Exemplary attitude from the **administration**.	All of this will be possible with an administration that strives to be the driver of a better environment and upholds collaboration, coordinating resources in search of integrated solutions.

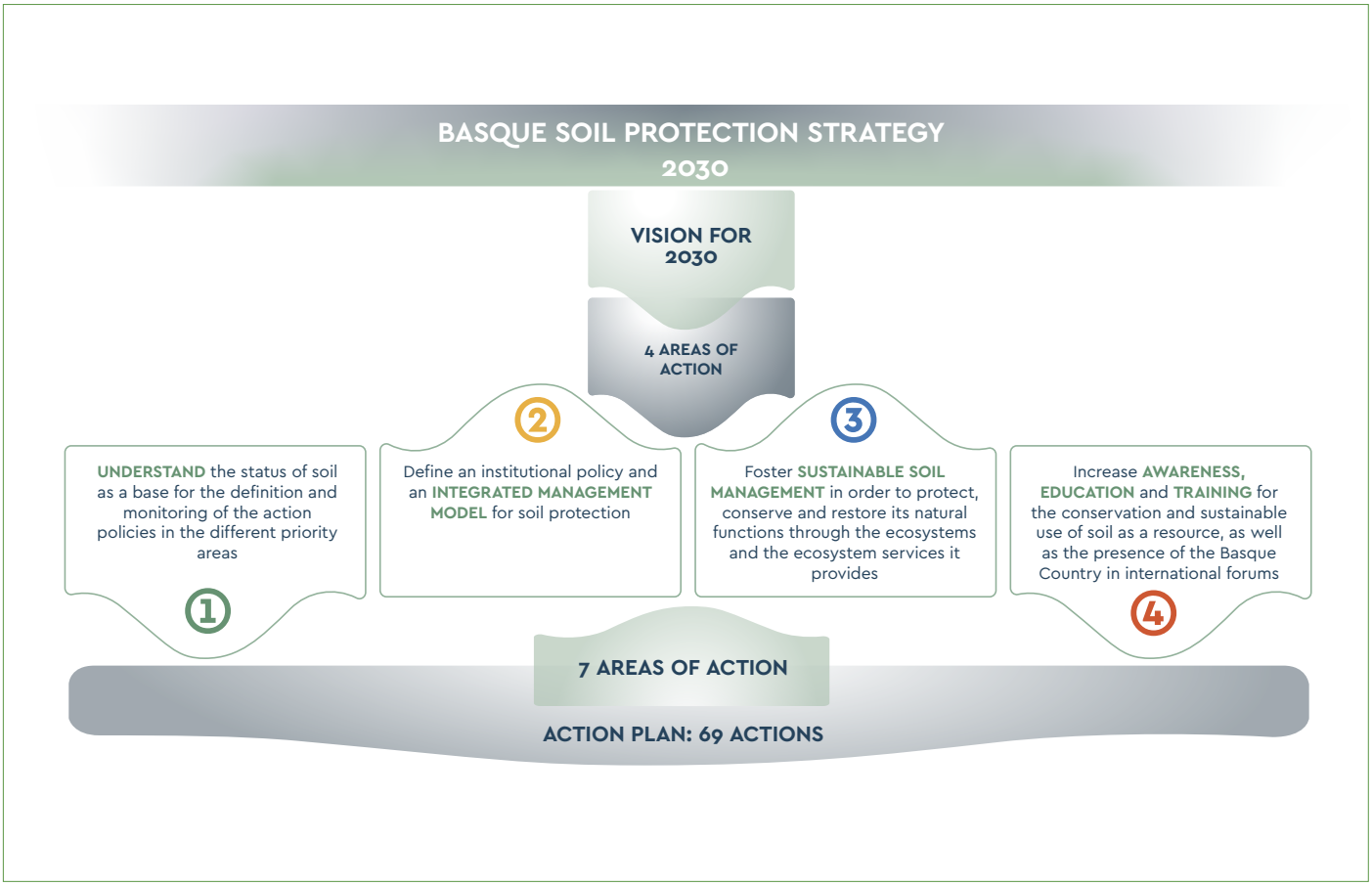
04.
LINES OF ACTION 2030

Based on the vision for 2050, this strategy is structured around four areas of action. The first two areas lay the bases on which the soil protection policy will be founded: knowledge and incorporation of soil protection in different areas of competence from an integrated and coordinated perspective. Actions of a more administrative nature will be encompassed in the third area, whilst the fourth area will drive such a key aspect for the success of this plan as engaging society as a whole through awareness, education and training.

The different dimensions of soil management represent an added difficulty when it comes to designing how to organise the lines of action from which specific actions for the coming years will derive. For this reason, a scheme that facilitates the implementation of this first *Soil Protection Strategy 2030* has been chosen. Bearing in mind the areas of action above and the need for transversality in soil protection and management, seven areas of action have been defined, the first of which will include those transversal actions that are key to the success of the strategy.

1. Transversal Actions
2. Regional Planning
3. Agriculture, Livestock and Forestry
4. Natural Environment: Natural Soils
5. Industrial point-source contamination
6. Excavated Soils and Circular Economy
7. Mitigation and adaptation to climate change

The assessment of the current situation, along with the consensus of those administrations and institutions with competences and the contributions of the actors involved in the participation process, have led to the definition of **69** actions which have been incorporated in an initial plan, which will be the starting point for the deployment of the strategy.



To structure the actions within each area of action, lines of action have been defined that facilitate the grouping of the actions in accordance with secondary criteria that go beyond the scope and the areas. These lines have been designed as "boxes" that allow for any type of action. Therefore, some may include a number of limited actions or may even be empty in the initial action plan. This is the case of line of action *3.5 Act on soil and land management to increase the protection of human health, natural habitats and wild fauna and flora*. The protection of human health, natural habitats and wild fauna and flora is a transversal goal of the strategy. Therefore, all of the planned actions have an impact on this objective in some way. Even so, it has been considered opportune to maintain the line of action, in view of the fact that there may be a specific action in the future that is difficult to fit into the other lines.

1 UNDERSTAND ACQUIRE AND DEVELOP KNOWLEDGE

The preliminary assessment performed to support this strategy has revealed the existence of significant information gaps, as was to be expected. It is obvious that any policy that sets out to reach the objectives, making optimum use of the available resources, needs to be built on thorough knowledge of the matter it aims to protect.

However, the need to supplement the available information cannot become an obstacle in order to move towards such a critical objective on the path towards the fulfilment of the challenges faced by today's society, such as net zero land degradation. On one hand, many of the actions are already underway through different areas of competence and, on the other hand, there are areas that are still being assessed, for which the need for intervention is unquestionable.

Therefore, as is to be expected, understanding the status of the Basque Country's soil is the first goal of this strategy. Knowledge is required to design the most appropriate actions, but prior to this, knowledge is required to dedicate the available resources to the priority problems, not only from an environmental point of view, but also from a social and economic perspective in an attempt to impregnate soil management in sustainability.

Assessing the initial soil status will be a key piece in the puzzle, but maintaining a monitoring system that serves as a base to evaluate the soil status, at the same time as the effectiveness of the designed actions, will be even more significant.

None of this will be possible without the active participation of experts and researchers working in different fields within this sphere in the Basque Autonomous Community. The purpose of this strategy will be to foster and guarantee collaboration and alignment with the principles and goals of this group, providing a suitable stage for research and knowledge generation and transfer.

Lines of action

1.1 Increase the accessibility of available information.

1.2 Increase knowledge of the state of conservation and evolution of soil health and identify vulnerable zones and map them.

1.3 Foster research and knowledge generation and transfer.

2 INTEGRATED MANAGEMENT MODEL

IMPLEMENT A REGULATORY AND GOVERNANCE FRAMEWORK FOR SUSTAINABLE SOIL MANAGEMENT

The more than transversal nature of soil and the role it plays in human activity, in addition to the inherent need to protect ecosystems and the services that sustain the functions on which this activity is developed, require additional effort in the coordination of institutions and actors.

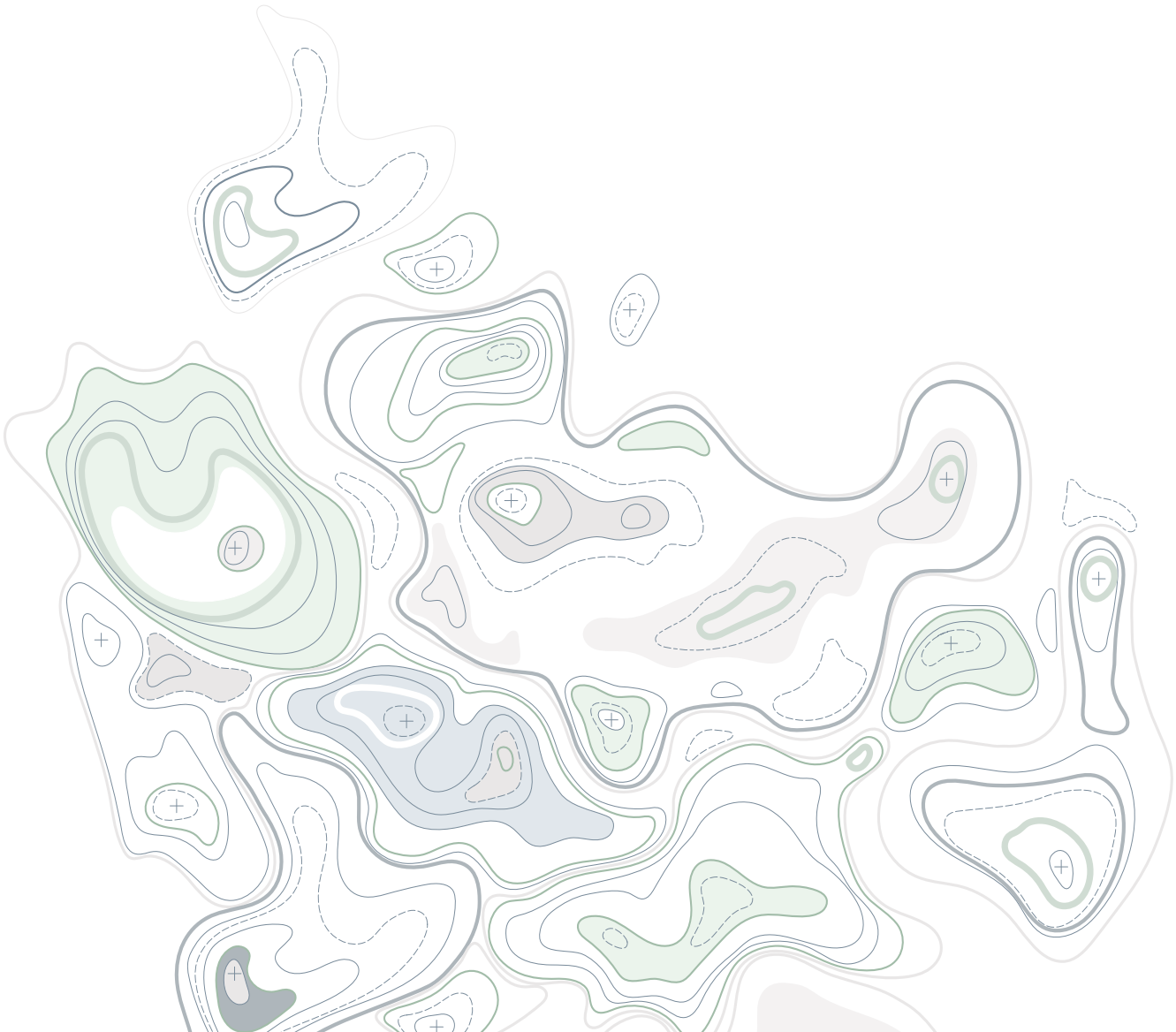
The success of this *Soil Protection Strategy 2030* will depend to a large extent on the proper integration of a framework that has started to be built, which requires common guidelines to steer the actions towards a common goal. Along with this common goal, the design of action plans accompanying the actions of different players enables synergies to be identified, instruments of collective value to be developed and knowledge and experiences to be shared.

Lines of action

2.1 Guarantee the coherence and transversality of the policy for sustainable soil management through the consolidation of inter-institutional coordination mechanisms and the representation of key players.

2.2 Assess and tap the potential of the current regulatory legal framework for soil protection and develop new regulatory tools, where appropriate.

2.3 Develop technical and methodological instruments for sustainable soil and land management.



3 SUSTAINABLE MANAGEMENT

FOSTER SUSTAINABLE SOIL MANAGEMENT IN ORDER TO PROTECT, CONSERVE AND RESTORE ITS NATURAL FUNCTIONS THROUGH THE ECOSYSTEMS AND THE ECOSYSTEM SERVICES IT PROVIDES

All of those actions aimed directly at the fulfilment of results that enhance the protection, conservation and restoration of soil functions form part of this goal. It is therefore the focal point of the intervention on soil that covers a significant and growing number of actions, around which the rest of the targets will revolve.

Based on the obvious multitude of stakeholders participating in soil management, ten lines of action have been established with differentiated and complementary approaches. These lines arise from the need to respect the work spheres of each actor whilst stimulating collaboration between them in order to optimise resources.

Review of policies implemented in the process of drawing up this strategy has highlighted the existence of numerous instruments and actions that represent direct or indirect intervention on soil. Respect for the initiative and autonomy of the developers form part of the spirit of this strategy, but the need for a coordinated push towards the objective is also recognised. Therefore, the role of the strategy is to place the focus on the preservation of this resource beyond the current soil intervention, which often occurs without any explicit intent, from different sectorial policies through the design of actions and action plans.

However, the promotion of sectorial policies will not be enough. Working on the interfaces through the development of joint tools is highlighted as a task that deserves its own line of action, as it will require a huge effort over time and will also provide the perfect forum to cultivate the spirit of collaboration that this strategy seeks.

Lines of action

3.1 Consolidate sustainable soil and land management in regional and urban planning processes.

3.2 Consolidate the sustainable management of agro-forestry land.

3.3 Work on the interrelationship between water and soil and strengthen the protection of water resources.

3.4 Pursue the protection, conservation and restoration of the natural soil functions.

3.5 Act on soil and land management to increase the protection of human health, natural habitats and wild fauna and flora.

3.6 Move forward in the prevention and restoration of point-source contamination of industrial sites.

3.7 Move towards an integrated restoration and re-use policy for degraded vacant land with swift procedures.

3.8 Create the necessary conditions to encourage the prevention, restoration, re-use and management of excavation materials in a circular economy environment.

3.9 Guarantee that the re-use of materials in applications in contact with soil is carried out safely for this resource.

3.10 Define an action framework to optimise the role of soil in the mitigation and adaptation to climate change.

4
AWARENESS EDUCATION, TRAINING

AWARENESS AND TRAINING FOR SUSTAINABLE SOIL MANAGEMENT

The *"Status of the World's Soil Resources"* (FAO, 2015) recognises that perhaps even more significant for policy makers (than other reasons that have led to the design of integrated soil protection policies), is the disconnection between our increasingly urbanised human societies and the soil. *The proportion of human labour devoted to working the soil has steadily decreased through the past century, and hence the experience of direct contact with the soil has lessened in most regions. Soil is very different in this regard from food, energy, water and air, to which each of us requires constant and secure access. Yet human society as a whole depends more than ever before on products from the soil, as well as on the more intangible services it provides for the maintenance of the biosphere.*

However, in spite of such evident dependence a priori, the reality shows that the degree of society's awareness, as a key driver for any action, is still far from enough when it comes to soil preservation. Therefore, it will be necessary to activate all of the existing channels to reach out to society as a whole and to those groups with the potential to intervene in soil or its management.

Increasing the level of awareness of formal and informal education and training, under the auspices of the *Basque Education Strategy for Sustainability 2030*, will be based on an evaluation that enables the most effective actions and the actors with a higher intervention capacity to be identified, via an assessment of the situation.

Although non-formal education is profiled as the work area from which the potential for action is more immediate, intervention from the different levels of formal education, as the most systematic channel to reach all citizens in our near future, should not be renounced. On the other hand, those who are directly involved in soil management will require specialised training to ensure that their actions are carried out in line with sustainability criteria.

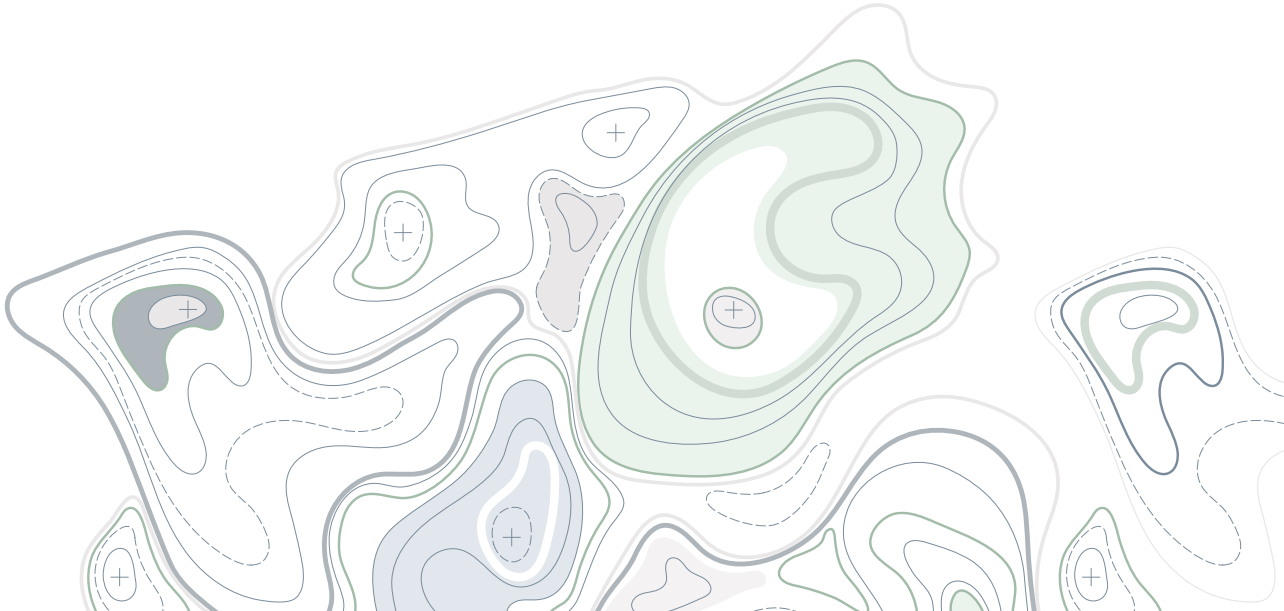
Finally, as the last line of action within this goal, fostering the participation of representatives of the Basque Country in international forums of interest has been included, with the dual purpose of keeping watch of the most avant-garde policies and actions, whilst sharing the Basque experience and contributing to the image of a sustainable region.

Lines of action

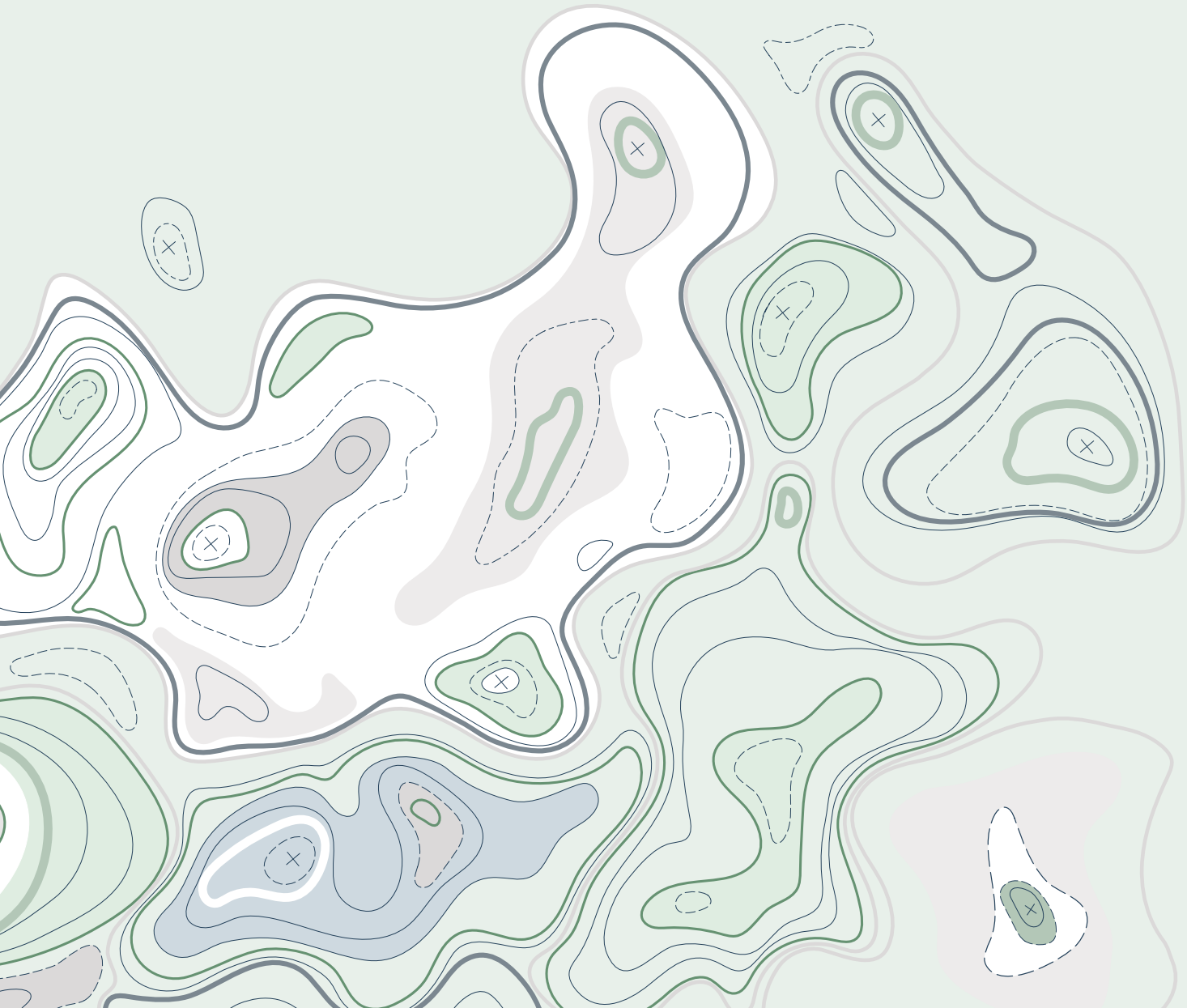
4.1 Incorporate soil conservation concepts in education and training.

4.2 Raise awareness and involve society as a whole in sustainable soil management.

4.3 Increase the presence of the Basque Country in inter-regional and international initiatives.



05.
INITIAL ACTION PLAN



5.1

Transversal actions

The priority actions that will be implemented as part of the action plan have been organised into areas in order to facilitate their implementation. Most of them fall under what can be called sectorial activities. However, there is a series of transversal actions whose development may be of interest for all or most of the actors involved in the sectorial actions.

1 ACQUIRE AND DEVELOP KNOWLEDGE

1.2 Increase knowledge of the state of conservation and evolution of soil health and identify vulnerable zones and map them.

Implementation of a soil health monitoring network based on the mapping of soils in the Basque Country.

Foster studies that delve into the knowledge of soil ecosystem services to place value on and highlight the ecosystem services as a sustainable management tool for the region.

Identification and prioritisation of the zones vulnerable to the most significant threats.

1.3 Foster research and knowledge generation and transfer.

Draw up a map of knowledge and instruments

Promote projects related to soil protection in existing research and subsidy programmes.

2 REGULATORY AND GOVERNANCE FRAMEWORK

2.1 Guarantee the coherence and transversality of the policy for sustainable soil management through the consolidation of inter-institutional coordination mechanisms and the representation of key players.

Move forward in inter-institutional coordination mechanisms.

Define, provide content, design and implement a system of indicators to monitor the objective of the strategy; zero net land degradation.

Incorporate variables related to soil protection in aid programmes.

Integrate or reinforce the presence of criteria for sustainable soil management in plans that are being prepared or are under review.

Present an integrated LIFE project or any similar instrument for the promotion of transversal actions of the soil protection policy.

4 AWARENESS AND TRAINING

4.1 4.1 Incorporate soil conservation concepts into education and training.

Identify and foster training actions aimed at the administration, professionals and other stakeholders.

Foster the integration of soil protection in formal and informal education.

4.2 1.1 Raise awareness and involve society as a whole in sustainable soil management.

Draw up a roadmap for citizen awareness and action.

Organise an annual social forum (citizen participation and stakeholders).

4.3 Increase the presence of the Basque Country in inter-regional and international initiatives.

5.2

Regional planning

Introduction

Region is the physical space where all of a society's activities are developed and these directly or indirectly produce an impact. Regional planning in which these activities are organised in accordance with environmental aptitudes and social needs guarantee the rational use of soil, a scarce and non-renewable natural resource that needs protection. Therefore, the development of regional and urban planning models must be fostered, in which actions for the renewal, recycling, restoration and re-use of urban spaces and existing infrastructures actions are prioritised. The regional model that arises from this plan must become the best ally to guarantee its sustainability.

In the Basque Country, a region characterised by its mountainous terrain, its dense population settlement, especially on the Cantabrian side, its tertiarisation of industry and the climate challenge, which will heighten the impact, even more importance will be placed on regional planning. Through all of the development instruments, a sustainable and resilient region is sought in which responsible management of the natural resources and the limitation of land development are some of the commitments that guarantee future generations an environment that does not limit its capacity to satisfy its own needs.

Main Threats

Land occupation and soil sealing are currently considered to be one of the greatest threats to soil conservation. Furthermore, urbanisation of land or its covering by "grey" infrastructures, affects organic contributions, which triggers a reduction in soil organic carbon, hindering CO2 capture, and hence the development of life in these areas. Developed land is extensively monitored in the Basque Country and the development of regional and urban planning models is promoted, prioritising renewal, recycling, recovery and re-use actions for urban spaces and existing infrastructures as well as the permeability of this land. Consequently, the annual land development rate appears to have stabilised since 2010, whereby growth has been almost null since 2015.

Geological processes, such as erosion, landslides or flooding, aquifer vulnerability or other risks associated with climate change, often related to human activities, such as hillside deforestation, alteration of river courses or the urbanisation of certain land, may also represent threats and contribute towards soil loss. Therefore, these situations are set out as overlapping conditions in regional plans and municipal planning in order to limit or condition the usage system established for each planning category for the physical environment.

Finally, another threat is the contamination of both soil and other media (water or air) through migration phenomena. Therefore, the Regional Planning Guidelines for the Basque Autonomous Community promote the planning of land use bearing the "land quality" factor in mind to guarantee prevention of risks that are unacceptable to human health and the function of ecosystems, and to avoid spreading pollutants to other environmental compartments and optimise use of resources.

Assessment

Once a space organised around central cities that are heavily hierarchical and closely related to its industry, the Basque Country has evolved towards a regional model with the following objectives: integrate the Basque city system into Europe, inter-connect the three Basque capitals, weave the network of medium-sized cities, achieve greater internal regional structuring for Functional Areas and foster greater regional balance and complementarity.

With a population of 2,193,199 inhabitants (1,129,158 women and 1,064,041 men) in 2021, the Basque Country spans 7,229.34 km^2, with a density of 303.13 inhab/km^2, which makes it one of the densest non-metropolitan regions in the European Union. In terms of historic regions, Alava has a density of 108.5 inhab/km^2, Bizkaia 516.6 inhab/km^2 and Gipuzkoa 363.4 inhab/km^2. However, the current demographic dynamic is regressive and one of an ageing population.

On the other hand, confirmation that the soil resource is limited has generated a new vision that considers it as a central element of regional sustainability. According to data from Udalplan for 2019, current occupation in the Basque Country stands at 491.34 km², only considering the surface area designated for development purposes, or in other words, residential, land for economic activities and general systems, with the exception of open spaces, which is equivalent to 6.8 % of the total Basque surface area and represents an urban population density of 4,435.81 inhab/km², which characterises the Basque Country as a region with a density similar to urban zones that are more central.

Industrial activity of past decades and its subsequent decline has left us with a legacy of unused land included in the urban perimeter. Regional Planning is currently committed to urban regeneration, the "Urban Growth Perimeter" tool in order to limit urban expansion, and residential quantification tending to favour the better use of urban land as opposed to new occupation in the region Therefore, placing value on existing industrial land, its restoration and re-use is understood to be priority.

Legal and Planning Context

In the *Basque Country, the Regional Planning Guidelines* (RPG) lay the foundations of the regional model. The latest review, finally approved in 2019, complements the pre-established bases on social well-being, economic competitiveness and sustainable development through a series of guiding principles, among which the regeneration of land that has already been developed takes on special importance.

The RPG were finally approved under *Law 4/1990 of 31 May on Regional Planning in the Basque Country, and via Decree 128/2019 of 30 July. Article 10 - Guidelines on urban regeneration* establishes that the Partial Regional Plans (PRP) shall define spaces to undergo regeneration in order to prevent their degradation or recuperate them for totally or partially different uses, as well as programmes to be implemented to this end and supporting measures designed

to provide incentive for them. In any event, Town Halls are responsible for delimiting these areas, through their plans. It also points out that with regard to urban regeneration, regional and urban planning shall develop the following determinations:

- Prioritise urban regeneration, densification of urbanised spaces and recycling obsolete, degraded or under-used spaces as an alternative to new land occupation, in order to meet demands for housing, economic activity and services or to resolve existing imbalances.
- Promote transitory uses as a strategy for regeneration of the urban setting, placing the focus on the re-use and collective use of spaces in transition through collaborative models between citizens and the administration.
- Promote actions to make the consolidated city permeable by generating green spaces in block and street patios.
- Reduce negative impacts in relation to the environmental quality of the urban setting: atmospheric, acoustic, water and land pollution.

Article 12 - *Guidelines on land for economic activities and commercial facilities* proposes:

- Driving development of regional and urban planning models that prioritise renewal, recycling, recovery and re-use actions for urban spaces, as well as for already-existing infrastructures, such as old sealed landfills, which must be categorised as environmental infrastructures or facilities.
- Planning land use bearing the "land quality" factor in mind to guarantee prevention of risks that are unacceptable to human health and the function of ecosystems, and to avoid spreading pollutants to other environmental compartments and optimise use of resources.
- Fostering research that enables soil clean-up requirements to be established in accordance with the intended use when the potentially contaminating activities cease and prior to any urban development action so as to avoid impact on human health or ecosystems.
- Including research and recovery of contaminated sites in urban regeneration processes.

Finally, Section 8.3. Circular economy of the RPG, based on the principle of soil as a resource, calls for:

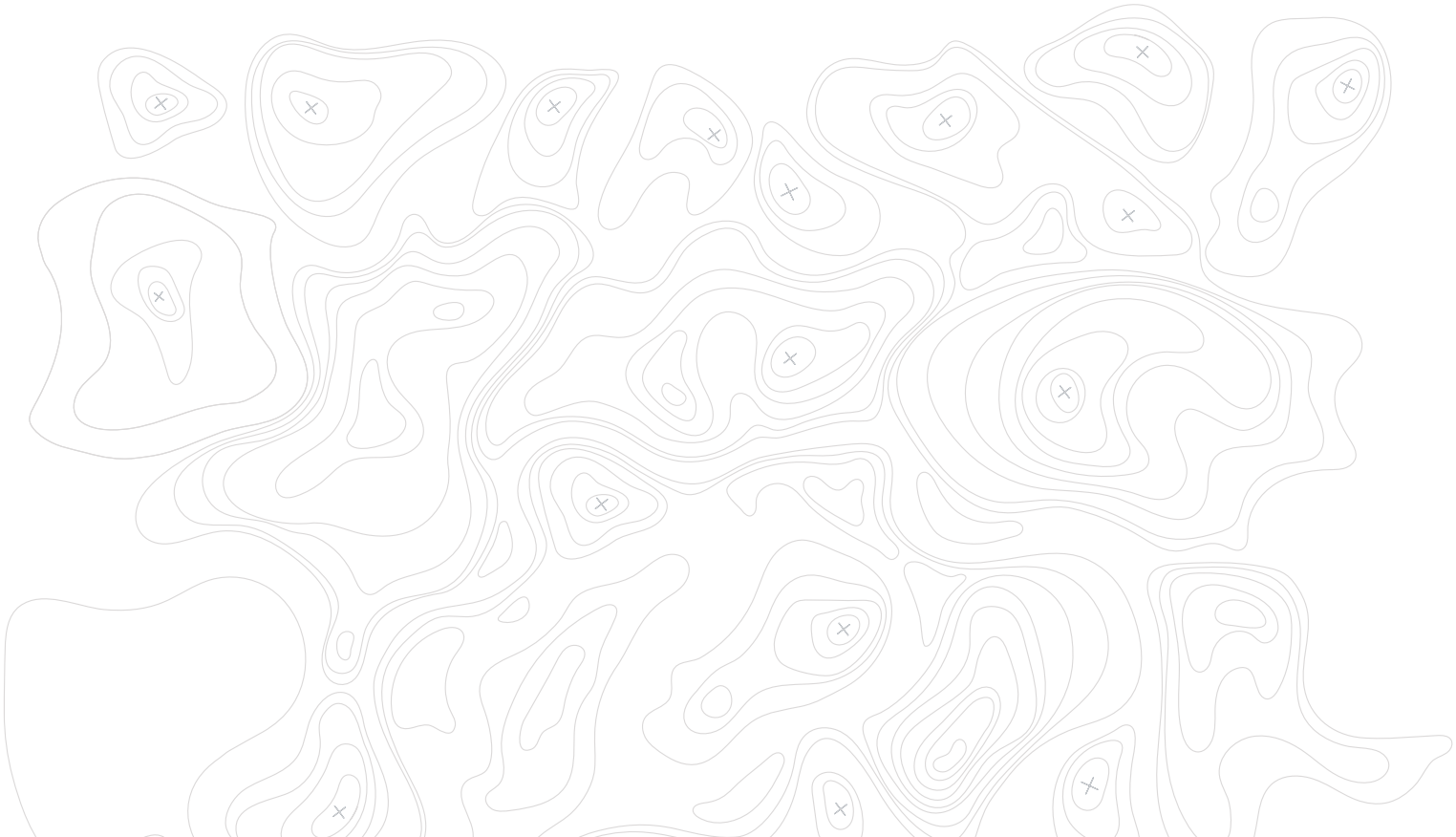
- Integrating circular economy strategy into regional and urban planning, administering use of available soil based on its valuation as a scarce asset, whose use and development must be optimised.

- Promoting the fulfilment of the "zero net land degradation" objective.
- Encouraging the re-use of soil that has already been impacted by humans instead of virgin soil, applying circular economy principles.
- Ensuring soil quality as an essential resource to meet global needs in food, water and energy safety.
- Maintaining or improving support, supply, regulation and crop services provided by soil, without significantly affecting the functions of land that make these services possible, or its biodiversity. Seeking balance between support and supply services for plant production and regulating services that soil provides for water quality and availability and for the composition of greenhouse gases.
- Maintaining the soil's biodiversity in order to safeguard ecosystem goods and services related to soil.
- Promoting the re-establishment of basic functions and contribution to the ecosystem services of soil that has undergone degradation, applying suitable rehabilitation techniques.

Future Challenges

Worldwide, the United Nations 2030 Agenda for Sustainable Development identified some challenges, known as the Sustainable Development Goals (SDG), in 2015, to which regional planning should aspire and which clearly have a bearing on the RPG. Among them, *SDG 11 Make cities and human settlements inclusive, safe, resilient and sustainable; SDG 15 Protect, establish and promote sustainable use of land ecosystems, manage forests in a sustainable way, combat desertification, stop and invert land degradation and halt the loss of biological diversity; and SDG 9 Build resilient infrastructures, promote inclusive and sustainable industrialisation and foster innovation stand out: As a development of this agenda, the worldwide New Urban Agenda and the EU Urban Agenda* promote sustainable and balanced regional development, where questions related to the sustainable use of soil and solutions based on nature occupy a key role in regional planning. This focus is essential for sustainability, given that it identifies avoiding the destruction of soil, which sustains natural processes, as one of the main challenges.

In line with the above, regional planning participates transversally in much of the **Government Programme 2020-2024**, for example in Area of Action 21. *Preservation of the Natural Environment and Biodiversity*, boosting integration of the "environmental variable" into regional planning and conducting periodical monitoring reports on regional planning to analyse evolution of environmental indicators, as well as in Action 36. Roll out and implement the Basque Urban Agenda "Bultzatu 2050" and Action 39. Promote renovation, urban regeneration and innovation in housing..



1 ACQUIRE AND DEVELOP KNOWLEDGE

1.1 Increase accessibility to available data.

Provide data on soil status, such as its development or the location of potentially contaminated sites (through Udalplan, and the regional indicators and Geoeuskadi).

1.3 Foster research and knowledge generation and transfer.

Include appraisal and restoration of contaminated sites in urban regeneration processes.

Increase support for demonstration projects that contribute to soil protection from the local perspective, as a way of fostering good practices.

2 REGULATORY AND GOVERNANCE FRAMEWORK

2.1 Guarantee the coherence and transversality of the policy for sustainable soil management through the consolidation of inter-institutional coordination mechanisms and the representation of key players.

Increase the presence of soil protection in the new Udalsarea Strategic Plan in order to increase the contribution to the 2030 Agenda.

Setting up of a stable group in Udalsarea in order to move forward in soil protection at a municipal level.

2.2 Assess and tap the potential of the current regulatory legal framework for soil protection and develop new regulatory tools, where appropriate.

In Partial Regional Plans, propose an urban growth perimeter that can be adjusted by municipal plans and that considers residential and economic-activity demands for all municipalities.

2.3 Develop technical tools and methodological guidelines for sustainable soil management.

Propose methodologies and good practice guides:

1. For the reconversion of disused industrial sites.
2. For the reduction of soil sealing, incorporating solutions to municipal urban planning by-laws.

3 SUSTAINABLE MANAGEMENT

3.1 Consolidate sustainable soil and land management in regional and urban planning processes.

Drive development of regional and urban planning models that prioritise renewal, recycling, recovery and re-use actions for urban spaces, as well as for existing infrastructures, as an alternative to new land take.

Plan land use bearing the "land quality" factor in mind and its impact on human health and the ecosystems, as well as avoiding the spread of pollutants.

4 AWARENESS AND TRAINING

4.1 Incorporate soil conservation concepts into education and training.

Train technical staff from local entities in soil protection, as well as its recovery and re-use to avoid the occupation of rural areas and soil sealing in new urbanisations.

5.3

Agriculture, livestock and forestry

5.3.1 AGRICULTURE AND LIVESTOCK

Introduction

In the Basque Country, agricultural activity has been strongly influenced by bioclimatic conditions and by economic development over the past century. Beyond the singularities that both the Atlantic and Mediterranean climate confer on Basque livestock farming, the period of economic expansion since the middle of the 20th century has outlined the sector's composition today.

Beyond its economic and food supplier role, the elements that characterise the agrarian activity developed in the Basque rural space turn it into a strategic factor insofar as it plays a key role in the management of the region and its natural, landscape and environmental resources, feasible only through the active management of agrarian spaces.

Agrarian soil presents characteristics that go far beyond a mere support function. Its unrepeatable and limited nature, along with its importance for primary activities, call for its protection, due to the shortage of quality soil and its special vulnerability to the pressure of urban, industrial and infrastructural uses, which destroy it and intensely affect the valley floors with greater agrological aptitude.

The intensification of Basque industrial activity and the resulting migration from the country to urban areas led to the economic weight of the Basque agricultural sector being significantly reduced. However, this smaller magnitude has not prevented the sector from becoming professionalised today, becoming an activity whose use of soil must be managed sustainably.

With regard to the identification of threats associated with this sector, such as erosive processes, reduction of soil organic matter content, nutrient imbalance, compaction, salinisation and acidification, along with the diffuse contamination of soil and surface and groundwater, as a result of the accumulation of fertilisers and pesticides, it must be pointed out, as indicated herein, that the exercising of agrarian activity is strictly regulated by different regulatory frameworks aimed at its sustainability.

On the other hand, among the most significant threats for agrarian soil are sealing and development, one of the most important forms of degradation in the Basque Country, whereby the space classified for urban use in 2020 represented 6.8% of the area, a figure that is higher than the EU average (4.2%), having lost almost 3,000 ha of forest land and 4,000 ha of productive land between 2015 and 2020.

Assessment

According to data for 2020, the area of the Basque Country devoted to the agricultural sector, made up of crops and hay meadows, occupies 180,073 ha (25% of the total area of the Autonomous Community). Looking exclusively at the agricultural area, Alava is the historical territory with the largest cultivated area (55%) and cereal (wheat, barley, oats and maize) is the most extended crop, followed by vines, which is particularly important in Rioja Alavesa. Potato, sugar beet, horticultural crops, and finally, fruit plantations (apple and pear) round off the predominant crops in the Basque Country.

As for the Basque farming sector, whose activity is divided more fairly between the three territories, beef cattle and sheep predominate in the three territories, although it is Gipuzkoa where there is a significantly higher number of sheep. Goat and pig farming stand out in Bizkaia and in Alava, respectively.

Unlike the general tendency in the sector, with an active agricultural population in decline and with a final production value that remains stable, despite some highs and lows, the agricultural and organic farming area is gradually increasing. These sustainable production schemes, which contribute to the health of soils, groundwater and surface waters and the conservation of soil fertility, registered an area of 6,789 hectares for organic farming in 2020, which is up 383 percentage points with respect to 2010. Crops like pastures, meadows, fodder and protein crops, along with grapes, cereal grains, fruit and vegetables are predominant, and there is already a total of

140 organic farms, among which 48 beef, 25 sheep meat, 18 egg-producing poultry and 15 equine farms stand out.

Legal and Planning Context

Although it is the European Union, through the *Common Agricultural Policy (CAP)*, that determines the guidelines to follow when it comes to guaranteeing food production whilst imposing the need to achieve ever increasing environmental goals, particularly in the new period 2023-2027 (CAP), it is the Basque Country that assumes its effective implementation and the setting up of legal instruments and specific policies for proper land management and preservation of the agrarian environment.

Therefore, *Law 17/2008, on the Basque Agricultural and Food Policy* establishes the objective of protecting agrarian land through the regulation of production practices and methods in accordance with its sustainability and by regulating mechanisms to preserve it from urban, infrastructural and industrial influences and actions that harm its role as the main means of agrarian activity production and

structuring element for the Basque rural space. It also enacts the protection of agrarian land, not only for its agronomic value, but also to support and guarantee biodiversity and landscape, as well as its ability to halt or avoid desertification and erosion processes, rolling out a system for special protection of land with a high agrological value, granting this land a strategic status and recognising it as assets of social interest.

In coherence with *Law 17/2008, Chapter 5 of the Regional Planning Guidelines*, devoted to the rural habitat, identifies the need to:

- Protect agrarian land, especially of High Strategic Value, as an instrument to manage the physical environment by regulating mechanisms to preserve it from urban, infrastructural and industrial influences and actions.
- Preserve existing agrarian land and activate surfaces that may be under-used, establishing necessary measures to foster ongoing and adequate use of said land in relation to agrarian activity that guarantees balanced regional management.
- Restore, preserve and improve ecosystems related to agriculture and forestry, guaranteeing diversity and permanence of forested mountains and planning the forestry region.
- Guarantee food sufficiency and safety.

Similarly, in Chapter 8. B. (Soil as a resource) considers it essential to Ensure land quality as an essential resource to meet global needs in food, water and energy safety.

The objectives of the *Agro-Forestry Sectorial Regional Plan (Decree 177/2014, definitively approving the Agro-Forestry SRP)*, include consolidating the insertion of sectorial activities within the essential factors that ensure environmental conservation and making agrarian protection compatible with environmental protection. To do so, it develops and details the criteria of the RPGs in relation to the categorisation of land protected from development and regulation of uses and activities in these categories, graphically delimiting the planning categories, including land with high strategic value and requires the application of an evaluation protocol for sectorial effects.

In its commitment to soil protection, the Basque Rural Development Programme 2015-2020 incorporates a broad range of measures set out in EU Rural Development Priority 4 (Restoring, preserving and enhancing ecosystems related to agriculture and forestry) in order to restore, enhance and preserve biodiversity and high nature-value agriculture systems (FA 4A), prevent soil erosion and improve soil management (FA 4C). These measures derive from the identification of aspects directly related to agrarian land management, such as heavy development, risk of erosion caused by improper practices, abandonment of agrarian activity, the need to recover the agrarian vocation of certain soil, social demand for well-preserved spaces, the key role of the agrarian sector in maintaining the region's physical environment and the consideration that 85% of the Basque region is managed from the agrarian field.

In the short term, the CAP *Strategic Plan 2023-2027* will become an essential element to consolidate the protection of agricultural soil quality. The new CAP imposes the need to display higher environmental and climate ambition, based on a financial framework establishing that 40% of budgetary expenditure should be environment and climate relevant, with 20% of the budget for direct payments being allocated to eco-schemes and, at least 30% of expenditure on rural development allocated to measures with environment and climate goals.

Aid will be subject to enhanced conditionality (fulfilment of a series of agricultural and environmental good practices), as well as the legal management requirements related to the environment and good soil management conditions (use of

fertilisers and plant protection products, minimum soil cover, anti-erosion practices, sustenance of organic matter, SMR zones vulnerable to aquifer pollution).

It also boasts the aforementioned eco-schemes, key elements clave due to their capacity to provide an effective response to many of the needs that have been identified in the environmental context, which, in terms of soil management, focuses on aspects like increasing the carbon sink capacity in soil and fire prevention, agrarian practices for the preservation of land and the environment (vegetable cover in woody crops), increased soil fertility (crop rotation with enhanced species), precision farming (nutrient management), etc.

Future Challenges

Application of the prevailing regulations, together with the sector's awareness in terms of environmental protection, has led Basque agricultural and farming activity to gradually move towards more sustainable and environmentally friendly production models, including soil. This transition, however, still presents areas for improvement, which will mark the challenges to be addressed in the short-medium term.

The *European Union's 8th Environmental Action Programme (EAP)* identifies the need to pursue a toxic-free environment; protect, preserve and restore biodiversity, enhancing natural capital; and foster environmental sustainability and reduce the main environmental and climate pressures related to production and consumption of the food system, among its six priority objectives.

Along the same line, the *EU Soil Protection Strategy* roadmap recognises the priority need to intensify efforts to protect soil fertility and reduce erosion; increase soil organic matter content and restore carbon-rich ecosystems; and protect and increase soil biodiversity. With the aim of bringing nature back to agricultural land, the EU Biodiversity Strategy for 2030 also considers reducing the global use of chemical pesticides by 50%; ensuring that at least 10% of agricultural area is utilised by high diversity landscapes; and that at least 25% of agricultural land is devoted to organic farming.

By focusing the analysis on the value chain of the agri-food sector, the Farm to Fork Strategy, a cornerstone of the *European Green Deal*, recognises the commencement of the aforementioned transition towards more sustainable production and consumption systems, but also insists on the fact that food production continues to pollute air, water and soil, hence contributing to biodiversity decline, climate change and an excessive consumption of natural resources. All of this, together with the increasing awareness and demand by citizens for sustainable food, represents the lever for change so that the strategy, which assigns a key role to the Common Agricultural Policy, fosters the use of sustainable practices, such as precision farming, organic farming, agroecology, agro-forestry and stricter rules in terms of animal well-being. It seeks to increase the sector's environmental and climate performance through better management of the soil carbon stock, reduced impact of the use of fertilisers, pesticides and antibiotics, and the promotion of the area devoted to agriculture and organic farming.

In this context, the Government Programme 2020-2024 calls for *Rural and Coastal Development and Food* through its *Area of Action 4*, whereby maintaining the natural environment and the fight against climate change cannot occur without a Basque primary sector that is solid and innovative in which it is committed to a more sustainable agricultural and livestock model. For this reason, several of the initiatives that make up the programme's *Commitment 27. Promote ecological, local, sustainable and healthier food* call for, on one hand, approving the new *Rural Development Plan*, aligning it with the new *CAP 2023-2027* in order to move toward innovative, sustainable 21st-century agriculture that is respectful of people's health and the environment; and, on the other hand, drive production, transformation, and sale of ecological products, increasing production of ecological agriculture by up to 7,500 hectares. They also advocate the incorporation of environmental criteria in new public procurement so as to reward those alternatives with less impact.

5.3.2 FORESTRY

Introduction

Today's forestry composition of the Basque Country, a region with a high nature value and forest vocation, is the result of numerous transformations undergone by the forest landscape to adapt to the industrial and rural needs of Basque society.

The forestry and timber sector have remained at the epicentre of progress in the Basque region for centuries. It was the exploitation of forests that provided the fuel that enabled the Basque iron industry to take off in medieval times, or that facilitated the establishment of the first shipyards in the Basque Country in the 16th century. At the beginning of the 20th century, the abandonment of farming activities from the least suitable soil and of the activity of many farmhouses altered the Basque forestry landscape with the exploitation of new species of conifers.

The soil generation and protective role that forest cover plays over its maintenance is the greatest of all possible activities that can be carried out on soil. However, the performance of some forest exploitation activities, unless performed correctly or at the right time, may lead to problems in soil degradation, which needs to be minimised.

In general, the Basque institutions and the timber forest sector have pledged to make a strategic commitment to sustainable forest management and to its certification.

This sustainable management includes from the definition of harvest shifts in the longest-living species and which increases tree cover over time, the regulation of the use of machinery, the performance of tasks depending upon the weather conditions.

This commitment to sustainable forest management over other types of management should not let us lose sight of the need to improve and optimise this management so that it is compatible with the maintenance and improvement of the quality of forest soils, among others, and the rest of the ecosystem services that forests offer.

Today, the forestry sector faces the challenge of addressing the demand for wood-based products without forgetting the sustainability criteria that contribute to preserving the natural heritage and minimising the impact of the sector on soil. Aware of this, the Basque Government has been working for years on a strategic policy in favour of the forestry sector, environmental protection and landscape quality.

Assessment

In the Basque Country, according to data for 2017, the forest area, made up of wooded and non-wooded land (grassland, scrubland, crags), spans 490,027 hectares or 68 % of the total area of the Autonomous Community. Although this area is evenly distributed among the three historical territories, Gipuzkoa is the territory with the highest percentage of forest (72.3% of its total area).

As for the wooded forest area, it represents 54.9% of the total area of the Autonomous Community, fluctuating between 46.5% of Alava, 59.7% of Bizkaia and 62.6% of Gipuzkoa. By type of tree species, the 212,634 hectares occupied by broad-leafed trees exceed the 184,589 hectares of conifers; and, by type of formation, forest plantations, spanning 207,131 hectares, continue to exceed the area of natural forests by a slight margin.

On analysing the evolution of the forest area subscribed to sustainable management, 91,153 hectares had PEFC certification (Programme for the Endorsement of Forest Certification) in 2007, which represents an increase of 374 percentage points with respect to 2004. In 2019 the area had increased to 96,563 hectares.

The Natura 2000 Network, the common framework for the conservation of wild fauna and flora, and the habitats of community interest, is made up of 55 spaces and occupies an area of 168,000 ha, representing approximately 23% of the Basque region. A significant part is located in mountainous areas, with its forests representing around 25.5% of the Basque forest stands. The predominant use is forestry and in recent years, the area occupied by broad-leafed trees (particularly beech and oak) has been increased to the detriment of conifers (radiata pine).

In many cases, the mountain areas that form part of Natura 2000 are covered by another protection body, Public Utility Mountains (PUM). These spaces, publicly owned forest land supervised by the forestry services of the Provincial Councils, make up 72.7% of the Network. As a result of all this, in most of the forest areas that are part of Natura 2000, there are various protection bodies that guarantee the proper environmental management and conservation.

Legal and Planning Context

Similar to what happens with the agricultural sector, the European Union determines the guidelines to be followed to guarantee sustainable agro-forestry activity committed to the conservation of the environment through the Common Agricultural Policy (CAP).

In this case, other strategies like the forthcoming *European Forest Strategy*, which will be based on the *EU Biodiversity Strategy for 2030* and aligned with the growth model of the *European Green Deal*, will also mark the path to be followed by the Basque Country in the effective implementation of specific legal and political instruments for proper forest soil management.

Law 17/2008, on the Basque Agricultural and Food Policy, which fosters the multifunctional use of forestry systems, in line with the premises of the *Basque Rural Development Programme 2015-2020*, is committed to quality wood production, preventing environmental impacts, such as soil erosion through sustainable forestry production and management methods.

The Agro-Forestry Sectorial Regional Plan (Agro-Forestry SRP) develops and details the criteria of the *Regional Planning Guidelines (RPGs)* in relation to rural land, seeks to ensure the compatibility of the sectorial activities corresponding to environmental conservation.

Finally, both the *Basque Forest Plan 1994-2030 and the Provincial Laws for Mountains*, highlight the importance of guaranteeing the diversity and continuity of wooded hills, as well as maintaining and restoring vegetation cover, increasing the quality of soil and water and avoiding erosion and desertification. All of these policies and plans, along with the self-imposition of rules, standards and good practice guidelines by the Basque forest sector lay the bases for the preservation and enhancement of forest soil. in order to protect forest systems.

Future Challenges

The overall progress made in the fulfilment of environmental and sectorial regulations has contributed to Basque forests moving forward on their path towards models in which soil protection is of paramount importance. In spite of this, the sector still faces the need to overcome a series of essential challenges to guarantee quality forest production under strict sustainability criteria.

In addition to attempting to satisfy the growing demand for forest raw materials, the forthcoming *European Forest Strategy* emerges with the aim of guaranteeing that the multi-functional potential of EU forests is managed in a sustainable and balanced way. One of the priority areas established to do so, that of protecting forests and boosting ecosystem services, in line with the proposal of planting 3 billion trees set out in the *EU Biodiversity Strategy for 2030* proposes maintaining and increasing forest cover to guarantee soil protection and regulation of water quality and quantity. Sustainable forest practices are integrated in the programme of measures for the management plans of the river basins in accordance with the *Water Framework Directive* and in the rural development programmes.

Beyond recognising the importance of forests for the sequestration and storage of carbon and soil stabilisation, among others, in its quest to recover soil ecosystems the aforementioned *EU Biodiversity Strategy for 2030* considers stepping up efforts to protect soil fertility, reduce its erosion and increase its organic matter, and proposes increasing forest cover to do so.

In line with these trends, the Government Programme 2020-2024 promotes eco-innovation and reforesting projects, increasing the forested surface area by 10,000 hectares, making it possible to absorb 25,000 tonnes of CO_2 per year through its Area of Action 20. *Action for the Climate and Circular Economy*. Area of Action 4. *Rural and Coastal Development and Food*, calls to promote measures that foster the conservation of Natural Heritage and the development of socio-economic activities in the rural environment through, for example, boosting entrepreneurship and the creation of new business activities in the agro-forestry sector. It also calls for the approval and implementation of the new Rural Development Law in order to move towards an innovative, sustainable and environmentally friendly forestry sector.

Main Threats

In the case of forests, erosion is also considered to be one of the most pressing environmental problems as it causes the loss of forest soil fertility, accelerates the degradation of vegetation cover and reduces the natural regulation of waters. In a context such as that of the Basque Autonomous Community, heavily conditioned by factors, such as steep slopes, heavy soil texture or a rainy climate, means that great care needs to be taken over avoiding bad forest practices whereby it needs to be under study and forest exploitation methods need to be improved in order to minimise the risk of soil erosion.

Loss of soil organic matter is another threat faced by forest soil. In spite of action for the generation of soil and organic matter, which is generated over the period of permanence of the forests, the times when some forest exploitation activities are carried out are critical for soil organic matter losses.

As in the previous case related to erosion, the control and improvement of current regulations on forest use must be a clear objective.

Finally, deforestation or the performance of practices that are unsuited to the specific characteristics of each terrain may lead to specific situations of hill slides, increases in run-off or other extreme erosive processes, which may be minimised with proper forestry management.

1 ACQUIRE AND DEVELOP KNOWLEDGE

1.2 Increase knowledge of the state of conservation and evolution of soil health and identify vulnerable zones and map them.

Initiative for the design of an agriculture and forestry soil quality monitoring network in the Basque Country.

New "Zones vulnerable to nitrate pollution of agricultural origin" have been declared and extended, which are added to existing zones. The Action Plan for Vulnerable Zones in the Basque Country has been approved.

Preparation of compaction and nutrient deficiency maps.

1.3 Foster research and knowledge generation and transfer.

Foster research lines seeking to substitute conventional plant protection products with others that are compatible with community soil protection and environmental requirements, including the development of studies to analyse the evolution of soil health, in close relationship with the actions that are foreseen for the previously mentioned new *CAP Strategic Plan* (e.g. design of agri-environmental interventions with payments for the fulfilment of environmental objectives).

2 REGULATORY AND GOVERNANCE FRAMEWORK

2.1 Guarantee the coherence and transversality of the policy for sustainable soil management through the consolidation of inter-institutional coordination mechanisms and the representation of key players.

Setting up of a work group between the Basque Government, Provincial Councils and foresters, in order to evaluate the effectiveness of the current regulations and suggest improvements to them. Adapt the potential new regulation to the demands of the new *CAP Strategic Plan* and the *"European Green Deal"* Strategy.

3 SUSTAINABLE MANAGEMENT

3.1 Consolidate sustainable soil and land management in regional and urban planning processes.

In conjunction with Regional Planning, develop the content of the RPG on rural habitat and agrarian land protection (preservation of agrarian spaces, consideration of the agrological value of soil in the location of infrastructures, urban growth perimeters, activation of action programmes aimed at the maintenance of agrarian activities, etc.) through the review of the Agro-Forestry SRP.

3.2 Consolidate the sustainable management of agro-forestry land.

Identify and evaluate agricultural and livestock practices to foster the change of those that involve an environmentally unsustainable use of soil for others with soil health benefits through the *CAP Strategic Plan (2023-2027)* articulating actions within the framework of the *European Green Deal (Biodiversity Strategy 2030, Farm to Fork Strategy, European Climate Law ,etc.)*. Aid will be subject to an enhanced conditionality system, which includes soil management requirements (use of fertilisers and plant protection products, minimum soil cover, anti-erosion practices, sustenance of organic matter, SMR zones vulnerable to aquifer pollution) and a structure of eco-schemes that also incorporate practices aimed at soil protection, increased soil fertility, nutrient management, etc. Forestry, agri-environmental, climate and organic production measures related to proper soil management and protection will also be implemented.

3.3 Work on the interrelationship between water and soil and strengthen the protection of water resources.

Protection and recovery of waters affected by nitrates from agricultural sources.

In addition to the actions of the general strategies of the sectorial administrations for the environmental sustainability of the agrarian practices set out in the *Rural Development Plans 2014-2020*, this line includes efforts that are already underway and are being developed jointly between the Basque Water Agency and the Basque Government's Department for Agriculture and Livestock, related to the fulfilment and implementation of *Directive 91/676/EEC*, concerning the protection of waters against pollution caused by nitrates from agricultural sources:

- Monitoring of surface waters and groundwater, in line with programmes to monitor nitrates and other compounds in surface waters and groundwater.
- Regular review of the zones declared to be vulnerable to pollution by nitrates.
- Regular review of the corresponding Action Plans.
- Regular review of the Code of Good Practices.
- Other studies and related papers.

Protection and recovery of waters affected by farming and forestry activities.

Like in the previous action, in addition to the actions of the general strategies of the sectorial administrations for the environmental sustainability of agrarian practices, a line of additional actions is included, which seeks to control and mitigate pressure in certain areas where impact is detected due to the nature of the practices or the sensitivity of the environment (for example, water collection points to supply the population).

- Monitoring of surface waters and ground water in affected areas.
- Risk assessment at the collection points to supply the population, in line with the *Directive 2020/2184* of the *European Parliament and of the Council of 16 December 2020* on the quality of water intended for human consumption.
- Increased protection in affected areas and water collection points to supply the population.

5.4

Natural environment: natural soil

Introduction

The strategic biogeographical position, the climate gradient from the Cantabrian coast to the south of Alava and the altitude differences of more than 1,000 metres are just some of the conditions that give rise to the Basque Country's huge natural diversity. For several decades, however, human-induced factors, such as contamination, over-exploitation, development or climate change have led to the conservation and slowing down the loss of biodiversity and ecosystem services in general, and soil in particular, becoming one of the major challenges faced by the Basque Country as a society.

Soil represents an extremely complex and heterogeneous habitat that supports communities of organisms which play a key role in sustaining the functioning of soil and the ecosystem in general, contributing to the production of food and fibres, the regulation of nutrient cycles, the reduction of greenhouse gas emissions or water purification. Soil biodiversity reserves also represent a major biological and genetic pool.

Assessment

The *"State of knowledge of soil biodiversity – Status, challenges and potentialities"* Report (FAO, 2020) focuses attention on the lack of data, policies and measures on soil biodiversity at all levels (local, national, regional and global). It also highlights the need to foster changes that lead to the introduction of biological indicators of soil health in soil protection policies, along with others of a physical and chemical nature.

However, very few countries have specifically addressed the monitoring of soil biodiversity, although some do carry out evaluations based on indirect parameters related to soil biota. Very few countries have national soil information systems that include biodiversity. The European Union has a monitoring system in which soil biodiversity is a key component. Even so, the lack of data on soil biodiversity for many taxa, and for many geographical areas, has led to soil biodiversity assessments merely being tentative.

On the other hand, although there is increasingly more knowledge on soil and its biodiversity, little is known about how soil life reacts to the pressures of human activities. However, there is indisputable evidence that soil organisms are affected by the alteration of the organic carbon content, the chemical characteristics of soil (for example, pH, quantity of soil contaminants or salts) and physical properties, such as the porosity and bulk density altered by compaction or sealing. Indeed, new analysis methods are revealing the high sensitivity of soil biota to changes derived from poor management.

It is estimated that 33% of European soil is in a state of degradation, but the risks to soil biodiversity are difficult to quantify. They include erosion risks, contamination risks or changes in soil moisture/temperature associated with climate change. The resistance of soil biodiversity to these threats is still unclear and the role of soil organisms in the carbon storage potential continues to be debated.

Today, the total area of land occupied by natural and semi-natural habitats in the Basque Country stands at 478,417 hectares (66% of the total surface area of the Basque Country). Around 45% of this area is occupied by forests, 36% by pastures and grasslands, and 12 % by heathlands and scrublands, with the rest corresponding to less extended habitats, such as sclerophyllous shrubs, crags and caves, freshwater environments, coastal and halophytic habitats, dunes and hydrophytic and tophaceous environments (Source: *The State of Nature in the Basque Country 2013-2018*).

Of this extension, the protected area of the Basque Country consists of a total of 175,330 hectares or 23% of the Basque region. 168,000 hectares correspond to sites in the Natura 2000 Network, although in many cases these areas are also protected by some of the categories of natural areas protected by the *Basque Country's Nature Conservation Law, by the Sectoral Regional Plan for Wetlands* or by other categories of international protection, such as the *Ramsar Convention or the UNESCO Biosphere Reserve*. The most visible strength with respect to soil is that it is preserved in these areas, at

least partially, through the protection categories, limiting the performance of environmentally harmful activities.

The fact that soil management is not addressed specifically but rather as part of ecosystems, leads to a significant lack of information on the state of conservation of soil ecosystems not only in the Basque Country, but also in the rest of the world.

Legal and Planning Context

In spite of the global vision of the policy related to the biodiversity, determined by the Habitats Directive, the recently published EU Biodiversity Strategy for 2030 or, even, the Common Agricultural Policy (CAP), this is a policy for regional implementation. In this respect, although community texts set out the objectives to be fulfilled and the actions to be carried out to combat the pressures to which the biological diversity is exposed in the international sphere, it is the Basque Country that has the powers for their transposition and effective implementation in the regional context.

Legislative Decree 1/2014, of 15 April, approving the revised text of the Law on Nature Conservation in the Basque Country calls for the proper and sustainable use of natural resources; preservation of the variety and uniqueness of natural ecosystems; maintenance of essential habitats and ecological processes; and preservation of the productive capacity of natural heritage. To do so in the specific area of soil, it establishes that Basque public administrations should use this resource, while conserving and protecting it in such a way that its fertility is not diminished or affected.

Along the same line, *Law 9/2021, of 25 November, on natural heritage conservation in the Basque Country*, which recognises soil as an element of natural heritage, will seek, among other objectives, to ensure the protection and restoration of the biological and geological diversity of soil, as well as its productive capacity, whilst guaranteeing the recovery of forests, soils and wetlands as the cornerstone in mitigating climate change.

Future Challenges

The significant progress in recent decades in the Basque Country in terms of policies for the protection of habitats and species, along with the preservation and restoration of ecosystems, has not affected the fact that there is still a long way to go.

The *EU Biodiversity Strategy for 2030* recognises soil as one of the most complex ecosystems. It identifies it as a habitat in its own right, home to an incredible diversity of organisms that together regulate and control key ecosystem services, such as soil fertility, nutrient cycling and climate regulation. It also indicates that it is a hugely important non-renewable resource, vital for human health, the economy and the production of food and new medications. Consequently, in order to preserve and recover soil ecosystems, it highlights that it is essential to step up efforts to protect soil fertility, reduce soil erosion and increase soil organic matter. This must be achieved through the adoption of sustainable soil management practices, particularly through the CAP. Progress must also be made on the restoration of degraded soils, defining the conditions for their good ecological status, introducing restoration objectives and improving the monitoring of soil quality.

The *Biodiversity Strategy of the Basque Autonomous Community 2030* does not directly address such relevant aspects as natural soil management (which is treated as just another part of the ecosystems), soil biodiversity, the capacity of soil for carbon sequestration or the ecosystem services associated with the soil resource. Consequently, there is a large gap in the knowledge of the soil ecosystems, their level of degradation or the conditions determining their good ecological state, whereby clarification should be one of the specific challenges to be faced over the coming years.

Even so, the Government Programme 2020-2024 has included the need for an advanced environmental policy through which the natural environment and ecosystems will be improved, promoting the defence of biodiversity and the main land and maritime habitats in Area of Action 21. *Preservation of the Natural Environment and Biodiversity*.

In line with these objectives, the study of the best conserved soils in forests, scrublands and grasslands is considered as a contribution to this *Soil Protection Strategy*. Despite being aware that they are not paradigmatic, the characteristics of these soils may provide an idea of the goal to be pursued to obtain soils with appropriate edaphic characteristics, becoming a reference on which the situation of other soils can be measured in relative terms.

The data obtained regarding these soils will be applicable not only to natural soils, which are understood to be those that are not subjected to any intensive manipulation, but will also enable estimates to be made of how much the developed soils (those that are subjected to any human use) "deviate" from the ideal situation and, in this way, decide and design the restoration, recovery, conservation and protection actions that must be carried out to achieve soils that add appropriate ecosystem services in the entire area of the Basque Autonomous Community and not only in protected spaces and habitats.

The first actions will be aimed at the most natural or naturalised soils, but not only protected soils as there are areas that have a sufficient degree of naturalness without being under the protection of any body to be taken into account in these initial works.

1 ACQUIRE AND DEVELOP KNOWLEDGE

1.2 Increase knowledge of the state of conservation and evolution of soil health and identify vulnerable zones and map them.

Identify the forest habitats, scrublands and grasslands of the Basque Autonomous Community in the best state of conservation and establish the necessary parameters to carry out soil characterisation.

Characterise the structure, functions and state of conversation of the biodiversity of this land to establish a reference.

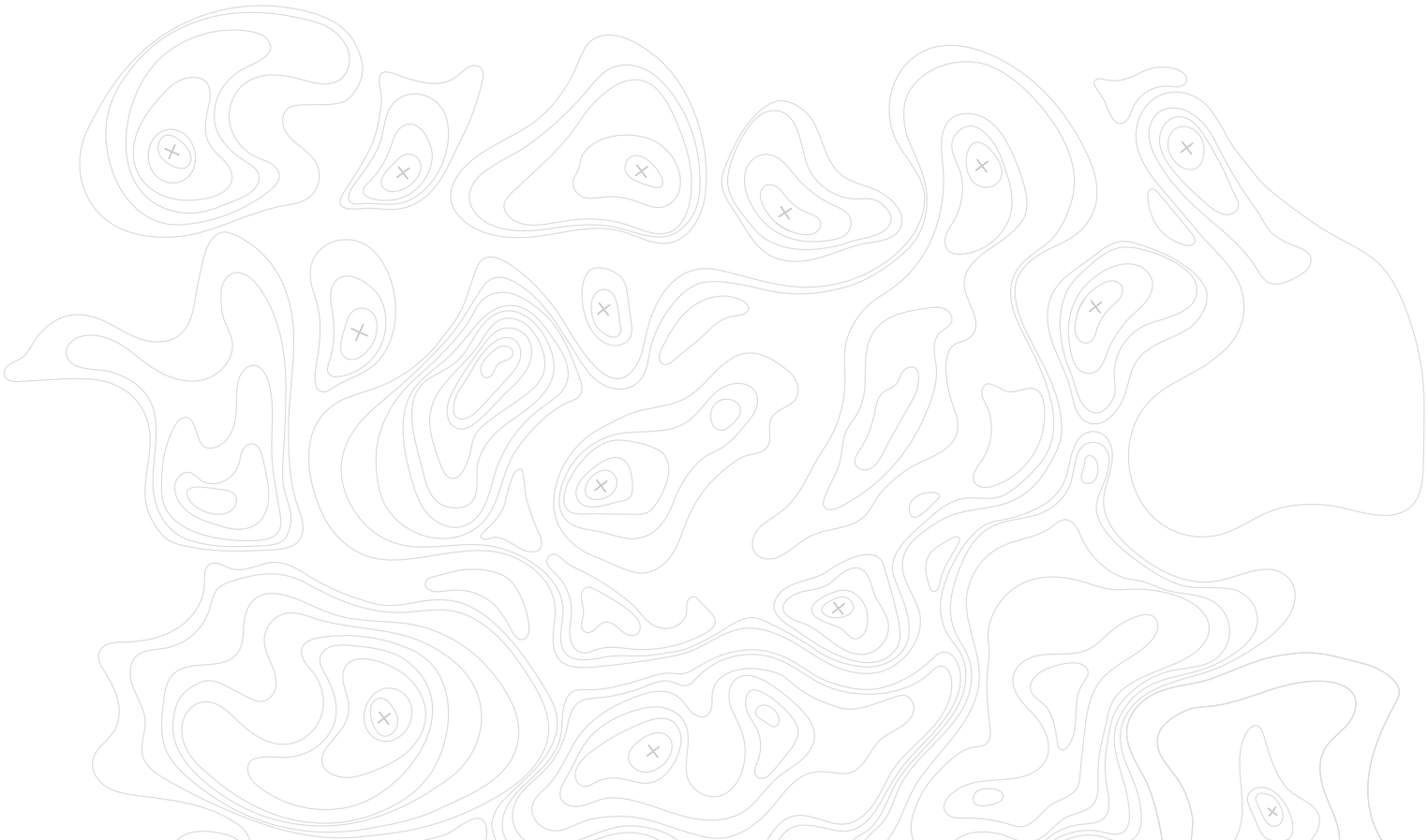
Assess the state of soil conservation of the rest of forests, scrublands and grasslands in comparison with references.

Identify soil pressures and threats in forest habitats, scrublands and grasslands.

2 REGULATORY AND GOVERNANCE FRAMEWORK

2.2 Assess and tap the potential of the current regulatory legal framework for soil protection and develop new regulatory tools.

Use *Law 9/2021, of 25 November, on natural heritage conservation in the Basque Country* to increase the protection of natural and semi-natural soils in the Basque Country.



5.5
Contaminated soils

Introduction

Intense industrial activity in the Basque Country since the 19th century has had an environmental impact on soil, which continues to the present. The first cases of contaminated soil identified as a result of the uncontrolled dumping of waste, mainly generated by the chemical and metal industries, were detected in the early 1990s at sites earmarked for development projects that were considered to be iconic at that time.

At that time, the Basque Government became aware that point-source pollution of industrial sites would require a well-planned response to protect human health and the environment. It was then that the Basque Government began to drive a specific policy to address this new challenge.

Assessment

In 2018, there were 12,448 plots on which potentially soil contaminating activities had taken place, occupying a total surface area of 9,642 ha. 88 % of them corresponded to industrial activities whilst the remaining 12 % originated from uncontrolled landfill. Translated to the surface, these figures represent 75% of the total area for industrial activities and 25% for landfill.

The metallurgy industry, which has traditionally had a significant presence in the Basque Country, is the most representative activity of those developed on sites susceptible to contamination. Others appear far behind, such as those developed within the chemical industry section or service stations. Consequently, the most commonly detected pollutants in soil and groundwater are heavy metals, petroleum hydrocarbons, polycyclic aromatic hydrocarbons and volatile organic compounds.

Approximately 70% of potentially contaminated sites are found on soil that is classified as subject to urban transformation. Indeed, industrial plots are mainly located in urban or peri-urban areas, many of which in areas of development opportunity. This situation turns them into a focal point for priority action to move towards a scenario of minimum land occupation.

To date, 70% of the sites on which investigation and remediation actions have been developed correspond to land intended for economic activities and the remaining 30% to other uses (residential, communications, facilities or basic infrastructures). This data is coherent with the fact that 64% of actions are initiated due to the installation, expansion or winding up of industrial activities. Only 16% of interventions arise from a change of land use.

Special mention must be given to the 1,720 registered sites where the activity causing soil contamination has been landfill. In contrast to industrial plots, these sites are located in less anthropised, peri-urban or rural areas, which are less attractive to develop private projects and, hence, require a greater public boost. For this and for other reasons, such as the existence of specific legislation, that this type of potentially contaminating sites require different approaches and instruments, taking into account their specific circumstances.

Beyond the effects of contamination on human health, the need for the preservation of other natural resources has led to the impact on surface and groundwater being given special consideration, as well as the protected areas included in the Natura 2000 Network.

In the Basque Country, 17.6% of the potentially contaminated area is located at less than 50 metres from a river, 6.1% of which are less than 50 metres from surface water courses with a 'good' chemical status. As for groundwater, it has been observed that 17.3% of the inventoried area is located in what was initially designated sites of hydrogeological interest. The fact that 36% of the investigations into soil quality have shown an impact on water, generally groundwater, shows the need to move forward with the coordination and protection of these two environments.

1.6% of the total potentially contaminated sites are located within the limits of the Natura 2000 Network, which accounts for 0.1% of the total surface area occupied by this network. Although it is true that a significant part of the sites correspond to active industrial activities located in protected riverside areas, 62% of

the total area is associated with uncontrolled landfills, mainly inert (44%) but also with other origins (30% urban and 10% industrial).

Legal and Planning Context

Although it is the state that establishes general obligations related to the environment through basic regulations, in the field of contaminated soil management, the Autonomous Communities assume a major part of the development and implementation of specific legal and political instruments. Assuming the criteria set out in *Royal Decree 9/2005, of 14 January, establishing the list of potentially soil contaminating activities and the criteria and standards for the declaration of contaminated sites and Law 7/2022, of 8 April, on waste and contaminated soils*, in the Basque Country, actions in this field are fundamentally sustained by *Law 4/2015, of 25 June on the prevention and correction of soil contamination, its development decree, Decree 209/2019, of 26 December*, and the instruments of the contaminated soil policy established by law: the inventory of sites with potentially soil contaminating activities or facilities, the soil plan (hereinafter included in this *Soil Protection Strategy 2030*), the soil quality administrative registry, soil research and restoration accredited entities and financial support for contaminated soil investigation and remediation.

Future Challenges

To date, the contaminated soil policy has led to action being taken to guarantee human health and the environment in 20% of the potentially contaminated sites in the inventory. These interventions have been carried out all over the Basque territory, more specifically, in 189 out of the 210 municipalities in which potentially contaminating soils have been identified, whereby these municipalities concentrate 98% of the population.

This data, along with the increasingly systematic application of the legislation are a reflection of an effective policy that is continuously improving but requires more integrated and coordinated actions to move forward to the challenges that society is calling for.

Therefore, the *Government Programme 2020-2024* sets out the objective of making environmental strategy a cross-cutting policy that considers environmental defence as a factor for prosperity and well-being of all species and human beings. This objective is set out in the field of polluted land, in an initiative that, along with the promotion of this Soil Protection Strategy 2030, plans to recover 400 ha of contaminated soil in collaboration with the competent departments and institutions, during the term of the legislature.

The need, which is also set out in the *Government Programme*, to have an industry with sufficient infrastructural support and industrial soil, considers the setting up of an interdepartmental and inter-institutional fund to promote the recycling of polluted and degraded land and encourage re-use for economic activities of land and/or industrial facilities that were abandoned due to closure or transfer of large and medium-sized companies.

Other framework documents, such as roadmaps of the *New EU Strategy for Spoil Protection and the Action Plan towards zero air, water and soil contamination* identify priorities which the strategy must address, some priorities that the European Parliament has set out in the *Resolution of the European Parliament, of 28 April, on soil protection (2021/2548(RSP))* which urges the European Commission to address all of the sources of soil contamination in the new action plan on zero contamination and in the review of the Industrial Emissions Directive.

This resolution identifies the following areas as key for soil protection:

- Inventories of contaminated land and abandoned industrial zones, as well as those subject to remediation processes.
- The application of the polluter pays principle and the articulation of mechanisms for the rehabilitation of orphaned sites, considering the possibility of funding through European fund programmes for the latter.
- Moving forward in the compilation of exhaustive information on diffuse soil contamination
- Increased efforts to study the close relationship between soil health and water pollution, proposing the promotion of digital tools to monitor the status of water and soil.
- Adoption of regulatory measures to prevent and mitigate soil contamination by chemical substances, particularly persistent and bio-accumulative chemical substances (including plastics and micro-plastics).

These challenges are joined by others, such as the implementation of a policy for the re-use of vacant industrial land, the need to move forward in the application of sanitation technologies that minimise landfill or increasing knowledge of contamination that is leading to growing concern, those caused by per- and polyfluoroalkyl substances (PFAS).

All of this should be addressed from the conviction that the recovery of contaminated soil is an opportunity to increase the resilience of our society and social sustainability, hence reducing unequal impacts on different groups of citizens.

1 ACQUIRE AND DEVELOP KNOWLEDGE

1.1 Increase accessibility to available data.

Design and implement a new IT tool, coordinated with INGURUNET, which supports information and services for the inventory of potentially contaminated soils and the administrative registration of soil quality.

1.2 Increase knowledge of the state of conservation and evolution of soil health and identify vulnerable zones and map them.

Keep information on point-source soil contamination and supporting instruments up to date. Carry out a new global update of the inventory.

Promote knowledge of the scope of diffuse contamination and emerging contaminants.

1.3 Foster research and knowledge generation and transfer.

Increase the importance of projects intended to develop knowledge to address the problem of contaminated / degraded soils in programmes to support research, particularly projects for the promotion of the use of clean-up technologies other than excavation and landfill.

Increase knowledge of the resistance to antibiotics as emerging pollutants in the environment.

Move forward in the application of innovative phytomanagement strategies.

2 REGULATORY AND GOVERNANCE FRAMEWORK

2.1 Guarantee the coherence and transversality of the policy for sustainable soil management through the consolidation of inter-institutional coordination mechanisms and the representation of key players.

Consolidate collaboration mechanisms with other administrations and key players in the fields of water protection and the re-use of degraded vacant land.

2.2 Assess and tap the potential of the current regulatory legal framework for soil protection and develop new regulatory tools.

Approve a new decree for the accreditation of entities researching and restoring contaminated sites.

2.3 Develop technical and methodological instruments that allow for sustainable soil management, prioritising those that facilitate restoration and the reduction of risks for human health.

Develop and update the methodological guides that support the application of Decree 209/2019, of 26 December, enacting Law 4/2015, of 25 June, on the prevention and correction of soil contamination.

3 SUSTAINABLE MANAGEMENT

3.3 Work on the inter-relationship between water and soil and strengthen the protection of water resources.

Move forward in the protection and restoration of surface and groundwater affected by contaminated sites due to industrial activities and deposits for the elimination of waste, including projects to monitor water affected by these sources of contamination, studies and actions to improve water quality in certain sectors and the definition of threshold values for different substances and application of target concentration and intervention criteria and values.

3.4 Contribute the protection, conservation and restoration of the natural soil functions.

Foster the research and restoration of potentially contaminated soils in protected areas.

3.6 Move forward in the prevention and restoration of point-source contamination of industrial sites.

Optimise the use of sectorial environmental instruments to guarantee the prevention of impact on soil.

Implement the necessary mechanisms to achieve this legislature's objective of restoring 400 ha of contaminated soil in collaboration with the competent departments and institutions.

3.7 Move towards an integrated restoration and re-use policy for degraded vacant land with swift procedures.

Speed up the processing of the Soil Quality Declaration and the Fitness for Use Declaration.

Design and implement an integrated restoration and re-use policy for degraded vacant land that enables the objectives for the term of this legislature to be achieved in this field.

This action will include the setting up of an interdepartmental and inter-institutional fund to promote the recycling of polluted and degraded vacant land and encourage re-use for economic activities of industrial soil and/or facilities that were disused due to closure or transfer of large and medium-sized companies.

4 AWARENESS AND TRAINING

4.3 Increase the presence of the Basque Country in inter-regional and international initiatives.

Participate actively in specific initiatives on contaminated sites (Autonomous Communities Forum, Common Forum on Contaminated Land in Europe and International Committee on Contaminated Land).

5.6

Excavated soils and circular economy

EXCAVATED SOILS / CIRCULAR ECONOMY

Introduction

According to the *Global Material Resources Outlook to 2060* (OECD, 2018), worldwide consumption of materials like biomass, fossil fuels, metals and minerals is set to double over the coming forty years and annual waste generation will increase by 70% from now to 2050. These figures, along with others, such as estimates that half of the total greenhouse gas emissions (GHG) and more than 90% of biodiversity loss and water stress is due to the extraction and transformation of resources, have led Europe to promote a strategy aimed at an economy that is climate neutral, efficient in the use of resources and competitive, through the *Green Deal*.

Consequently, there is no other option than to move towards a growth model that returns more to the planet than is extracted from it, keeping resource consumption within the planet's limits, reducing the consumption footprint and doubling the utilisation rate of circular material over the next decade.

As far as soil protection is concerned, the new *European Union Circular Economy Action Plan* focuses this challenge on a key value chain that aims to promote circularity principles throughout the lifecycle of buildings, addressing a series of lines of action that include, first of all, initiatives to reduce soil sealing, secondly, initiatives to rehabilitate abandoned or contaminated brownfields and, finally, those to increase the safe, sustainable and circular use of excavated soils. All of these initiatives, which require coordinated, urgent and integrated actions are object of this *Soil Protection Strategy 2030*, whereby the latter ones, those related to excavated materials, are the focus of this section and share the objective with the *Waste Prevention and Management Plan 2030: "Making the circular economy a reality"*.

Assessment

The construction sector requires vast amounts of resources and accounts for about 50% of all extracted material, in addition to being responsible for over 35% of the total waste generated in the EU. It is estimated that GHG emissions from material extraction, manufacturing of construction products and the construction and renovation of buildings fluctuates between 5% and 12% of total national GHG emissions. Greater material efficiency could save 80% of those emissions.

In the Basque Country, the data available for excavated soils is limited and imprecise. Indeed, the generation of soils and stones is a parameter that has recently been included in the Basque Government's inventory of construction and demolition waste. In accordance with data for 2018, the total amount of excavated materials for that year amounted to 10 million tonnes, making this the highest sub-stream of those included in the inventory.

Without taking into consideration the natural materials that were handled in landfills, the quantity of which is difficult to estimate, of the 625,405 tonnes of soil whose quality was affected to some degree in 2018, 602.299 tonnes (96%) were characterised and handled as non-hazardous waste. The clear prevalence of these materials over those classified as hazardous is a recurring phenomenon, limiting the weight of the latter over total excavated soils to 1-4% since 2015.

These materials come from sites whose quality is affected and require special attention. Above all, when excavation and authorised landfill is the way of acting on a significant part of the soils that are subjected to some type of action; either due to clean-up requirements (when the site has been declared as contaminated) or for construction reasons (when the presence of altered soil on the site does not pose an unacceptable risk to the new use,

the construction project includes excavation, and therefore, the management of excavated materials).

Although the available data makes it difficult to calculate the amount of altered materials that are handled for merely construction reasons following their excavation, indirect data points towards it being more than 75% of the total. This fact highlights the need to move forward in this field; not only in the definition of criteria for re-use/remediation, but also in the consideration of formulas that reduce excavation volumes at potentially contaminated sites.

As for the destination of soils, stones and excavated materials and in light of the lack of reliable data, it is only possible to make a rough estimate; 20% will have been re-used and 80% deposited in the landfill. This waste represents the greatest stream eliminated via landfill. More specifically, 436,446 t of this type of material were deposited in landfills in the Basque Autonomous Community in 2020.

Legal and Planning Context

Based on this data, it has been considered opportune to devote a specific section to actions on the sub-stream of excavated soils in the *Basque Waste Prevention and Management Plan 2030*, and to the development of the *Basque Circular Economy Strategy 2030*. Within this sub-stream, special attention should be paid to those materials extracted from sites where potentially contaminating activities have been developed.

Furthermore, due to its direct relationship with circularity in waste management, the actions of the *Basque Waste Prevention and Management Plan 2030* related to the recovery of waste in applications that involve contact with soil and, therefore, a potential impact on the quality of this resource, have been included in this chapter.

Future Challenges

The *Government Programme 2020-2024* assumes the need to foster a new circular economy model in which the life cycle of products and materials is maintained for as long as possible. To do so, along with the roll-out of the *Basque Circular Economy Strategy 2030*, it assumes diverse initiatives, including all of those in Commitment 132 (Reduce waste and increase recycling and re-use) which make a significant contribution to the management of excavated soil.

Among them, the tenth initiative directly affects the object of this section: increase the recyclability of construction and demolition waste, which includes excavated materials. However, there are others that will contribute decisively to reaching the objectives; the establishment of an eco-fee or fee for dumping (Initiative 5) and the promotion of a public management centre for selective collection, sorting, storage, and re-use of non-hazardous industrial waste (Initiative 3) which will include the handling of excavated materials. On the other hand, the preparation of regulations that will lead the Basque Country to become a zero-waste region will be another of the bases for the success of this strategy.

In this respect the Regional Planning Guidelines for the Basque Autonomous Community consider moving towards zero net land degradation through the re-use and recycling of the land and the promotion of the circular economy for the re-use of excavated soils as a result of the needs of the construction projects.

However, it is the *Waste Prevention and Management Plan 2030* that provides the guidelines to implement the actions and instruments that enable the management of excavated soils to be optimised. In addition to the actions that are included in the following table, several are considered to be key for the success of the plan and have a direct impact on the different lines:

- **Key Action 1.** Investment plan and roadmap to support priority investments that minimise dumping and foster circularity.
- **Key Action 3.** Legislative developments in terms of waste (framework legislation, Decrees enabling new uses and the prohibition of dumping, etc.)
- **Key Action 4.** Taxes on the dumping and incineration of waste and on aggregate extraction.
- **Key Action 6.** Integrated public-private solution for the intermediate storage, adaptation and quality control of aggregates, soils and other secondary raw materials.

1 ACQUIRE AND DEVELOP KNOWLEDGE

1.2 Increase knowledge of the state of conservation and evolution of soil health and identify vulnerable zones and map them.

Improve the inventories of soil streams, adapting them to the new European regulations in the field.

2 REGULATORY AND GOVERNANCE FRAMEWORK

2.1 Guarantee the coherence and transversality of the policy for sustainable soil management through the consolidation of inter-institutional coordination mechanisms and the representation of key players.

Foster the integration of prevention criteria and the re-use and restoration of excavated soil in urban planning in Basque municipalities.

2.2 Assess and tap the potential of the current regulatory legal framework for soil protection and develop new regulatory tools.

Incorporate re-use/restoration criteria of excavated soils in the new construction and demolition waste management regulation.

2.3 Develop technical and methodological instruments that allow for sustainable soil management, prioritising those that facilitate restoration and the reduction of risks for human health.

Develop criteria to re-use/restore excavated soils and foster its re-use/restoration on the source site and at other locations.

3 GESTIÓN SOSTENIBLE

3.8 Create the necessary conditions to encourage the prevention, restoration, re-use and management of excavation materials in a circular economy environment.

Optimise the management of soil (excluding the top layer which should previously be removed and re-used in the re-vegetation process of the project area or, in the case of being surplus, in another project that may require it in the surrounding area) and natural stones in landfills through the incorporation of improvements to the authorisation process for earth and stone landfill, the integration of their monitoring in the inventory of construction and demolition waste and the promotion of collaboration with Town Halls for their inspection.

Identify and evaluate mechanisms to implement alternatives to excavation in construction projects and foster the re-use of the excavated materials in those cases in which excavation is essential.

Foster the use of surplus organic earth in the restoration of degraded areas or in the improvement of agricultural soil, preferably in the surrounding area so that the biological diversity of the destination soil is similar to that of its origin.

3.9 Guarantee that the re-use of materials in applications in contact with soil is carried out safely for this resource.

Study and foster the possible destinations for the re-use of excavated materials (for example; regeneration of quarries or mining spaces).

Develop technical and methodological instruments that regulate the production and use of technosoils.

5.7

Mitigation and adaption to climate change

Introduction

In recent centuries, the Basque Country has been heavily dependent on fossil fuels due to its clear industrial nature. Consequently, it has contributed significantly to global warming. In recent decades, however, the contribution of developed regions, such as the Basque Country, to greenhouse gas (GHG) emissions has stabilised and has even started to descend. In spite of this, global emissions continue to be on the increase today as a result of the development of emerging countries and the historic contribution of industrialised regions.

Global warming, far from being a strictly atmospheric phenomenon, will have major consequences for soil. High temperatures may result in increased vegetation growth with the corresponding increase in the amount of soil organic carbon or, on the other hand, increase the decomposition and mineralisation of organic matter in soil, reducing its carbon content. At the same time, decomposition may be increased due to the increasing concentration of carbon dioxide in the atmosphere. This leads to soil microorganisms breaking down organic matter faster, accelerating climate change due to the release of even more carbon dioxide. If the change in rainfall patterns is added to this, soil moisture content may be affected, altering the assimilation of nutrients by vegetation and reducing its productivity. There is currently a high degree of uncertainty regarding the potential effects that climate change may have on soil organic matter content.

Furthermore, the expected decrease in rainfall, with regime changes, will result in a higher number of consecutive dry days and more concentrated rainfall at certain times of the year. This, combined with greater evapotranspiration (temperature), will lead to a loss of soil moisture for extended periods of the year.

On the other hand, extreme events associated with climate change may exacerbate the effects of several of the threats faced by soil. Therefore, prolonged droughts and more irregular rainfall linked to global warming, combined with the unsustainable use of water and various unsustainable human practices may lead to the expansion of the desertification phenomenon, which is particularly relevant in the south of the Basque Country. The foreseeable intensification of the hydrological cycle, causing an increased frequency of droughts and floods, and the expected aggravation of episodes of strong winds may trigger a weakening of the vegetation cover protecting the soil and more aggressive soil erosion.

Soil sealing or compaction, as a result of human-induced activities, also pose diverse risks for global warming and proper soil conservation. Developed soil loses its atmospheric carbon sequestration capacity, and compacted soil increases its anaerobiosis and reduces the proportion of large pores, which may promote CH_4 and N_2O emissions, both of which contribute to climate change.

Finally, global warming and all of the threats it represents in relation to soil have a direct effect on biodiversity and, therefore, on the functional sustainability of the soil ecosystem.

Assessment

In the Basque Country, a region in which climate predictions for 2100 foresee a drop of 15% in average precipitation and an increase in atmospheric temperature of 1.5 – 5 ºC, the climate variations are already a reality. On the Basque coast, the average sea surface temperature reached 16.7 °C in 2018, which is an increase of 8.4% compared with 15.4 ºC in 1978. The increase in sea level during the period 1993-2017 was 70 mm. As a result of these alterations, 82% of habitats located in the Mediterranean biogeographical region are exposed to climate change, compared to 63% of habitats in the Atlantic biogeographical region. Furthermore, analysis of the level of vulnerability and risk of climate change in Basque municipalities indicates that 100% are at risk of heat waves, 81% are at risk of flooding due to intense or persistent rain, 23% of flooding derived from rising sea levels and 100% risk an increase in droughts.

In view of this situation, the Basque Country has been stepping up its efforts to mitigate its contribution to global warming for years. In 2019, total GHG emissions in the Basque Country amounted to 18.6 Mt CO_2e, and diffuse emissions stood at 10

Mt CO_2e, having been reduced by 27% and 11%, respectively, since 2005. By sectors, transport, energy transformation and industry contribute the most with a total emission of 6.4 Mt CO2e (35% of the total) 6.1 Mt CO_2e (33%) and 3.4 Mt CO_2e (18% of the total), respectively. In the case of industrial activities, this register has led to a reduction of 48% compared with 2005, largely due to the efforts made by the sector and the significant number of Basque companies affected by the European Emissions Trading System (EU-ETS). Although emissions in the transport sector have increased by 14% compared with 2005, it is gradually moving towards a zero-emissions sector in which the electrification of the fleet of vehicles and the promotion of non-motorised modes of transportation are emerging as its cornerstones.

Legal and Planning Context

In line with the guidelines that set out the long-term strategy for a climate neutral Europe by 2050, the Basque Country has taken important steps in its climate change policy, whereby mitigation and adaptation are starting to be present in major sectorial planning.

The *Basque Energy Transition and Climate Change Law*, whose approval is scheduled for the end of 2022, will include diverse initiatives in which soil, an important carbon sink, is managed as a tool for climate change mitigation. Among them, reforestation of large areas to enhance carbon sequestration capacity, recovery of degraded soil under sustainability standards through green infrastructure, implementation of sustainable agricultural and forestry practices to increase the carbon present in the soil, combating erosion by means of green cover and vegetable barriers, recovery of degraded soils for industrial uses and the limitation of land development by the inability of developed land to absorb and accumulate carbon stand out.

Although the *Basque Climate Change Strategy 2050 (Klima 2050)* does not make many direct mentions to soil as a concept, its *Goal 5: Making the primary sector more resilient and cutting its emissions*, highlights its importance in climate change mitigation and adaptation, particularly agricultural and rural land. For this reason, it proposes fostering agricultural production with lower GHG emissions, increasing the potential of the carbon sink and adapting the practices and management of the primary sector to the new climate conditions.

Future Challenges

Such is the magnitude of climate change that measures in the short-medium term are still vital, despite the huge effort that has been made for years to reduce the Basque Country's contribution to global warming.

Whilst the new *European Strategy on Adaptation to Climate* Change does not specifically address the soil resource and merely states that climate change will influence the availability of basic natural resources (water, soil), the long-term strategy for a climate neutral Europe by 2050 identifies maintaining and increasing the natural sinks of forests, soil, agricultural land and coastal wetlands as one of the greatest challenges of the future.

In the Basque context, failure to consider carbon absorption by soil (including its enhancement and protection) as a mitigation measure would be a major flaw in the soil policy. Mitigation must go beyond stopping emissions and changing the energy system or the transport model. Soil should be considered as vital in climate change mitigation as it is the main carbon pool and the main elements of atmospheric carbon sequestration.

Actions to foster organic carbon in agricultural soil through new crops and experimental or pre-industrial operations, or the creation of forest areas, preferably managed under sustainable schemes, mark the path that the Basque Country must follow over the coming years in the field of climate change.

Soil should be considered as an adaptation to climate change tool given the key role that low permeability conditions and vegetation cover may play in the regulation of the water cycle and buffering the adverse effects of extreme weather events. The shift in forestry policy to avoid logging techniques that leave large areas of land susceptible to landslides exposed, actions for the permeation of urban land and the mitigation of the heat island effect, solutions based on nature to avoid river and tidal flooding or actions that contribute to avoiding desertification, particularly in southern areas of the Basque Country, are some of the other challenges to be addressed by the Basque Country in the short-medium term.

1 ACQUIRE AND DEVELOP KNOWLEDGE

1.2 Increase knowledge of the state of conservation and evolution of soil health and identify vulnerable zones and map them.

Increase knowledge of the soil parameters that play a role in climate change mitigation and adaptation and in the effects of climate change on the health of this resource in different climate scenarios (soil organic carbon, erosion, moisture level).

Quantify and monitor the amount of organic carbon in soil through diverse actions.

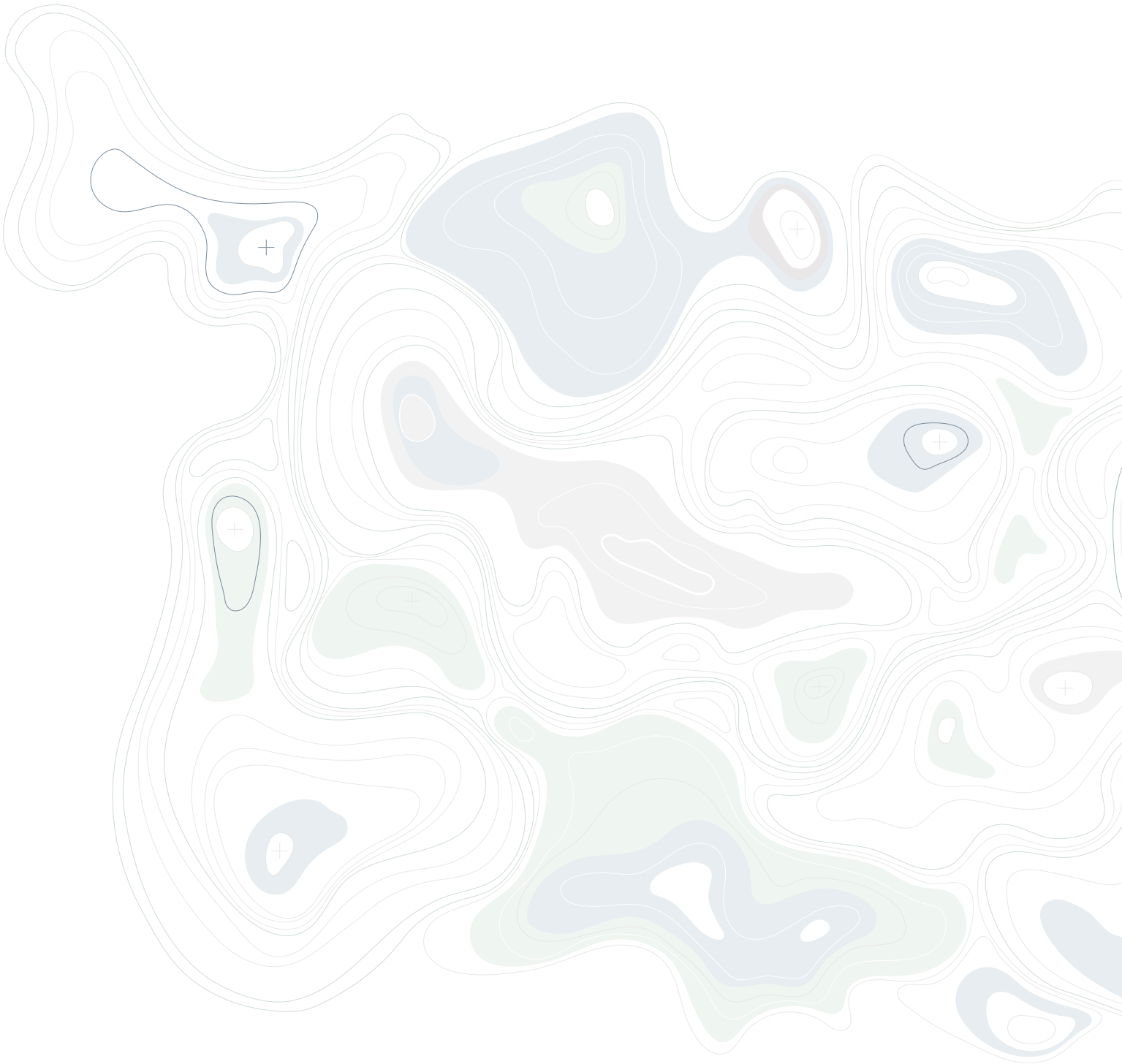
Identify and prioritise the region's zones at risk of the most relevant threats in the Basque Country, integrating the potential contribution to climate change (landslides).

3 SUSTAINABLE MANAGEMENT

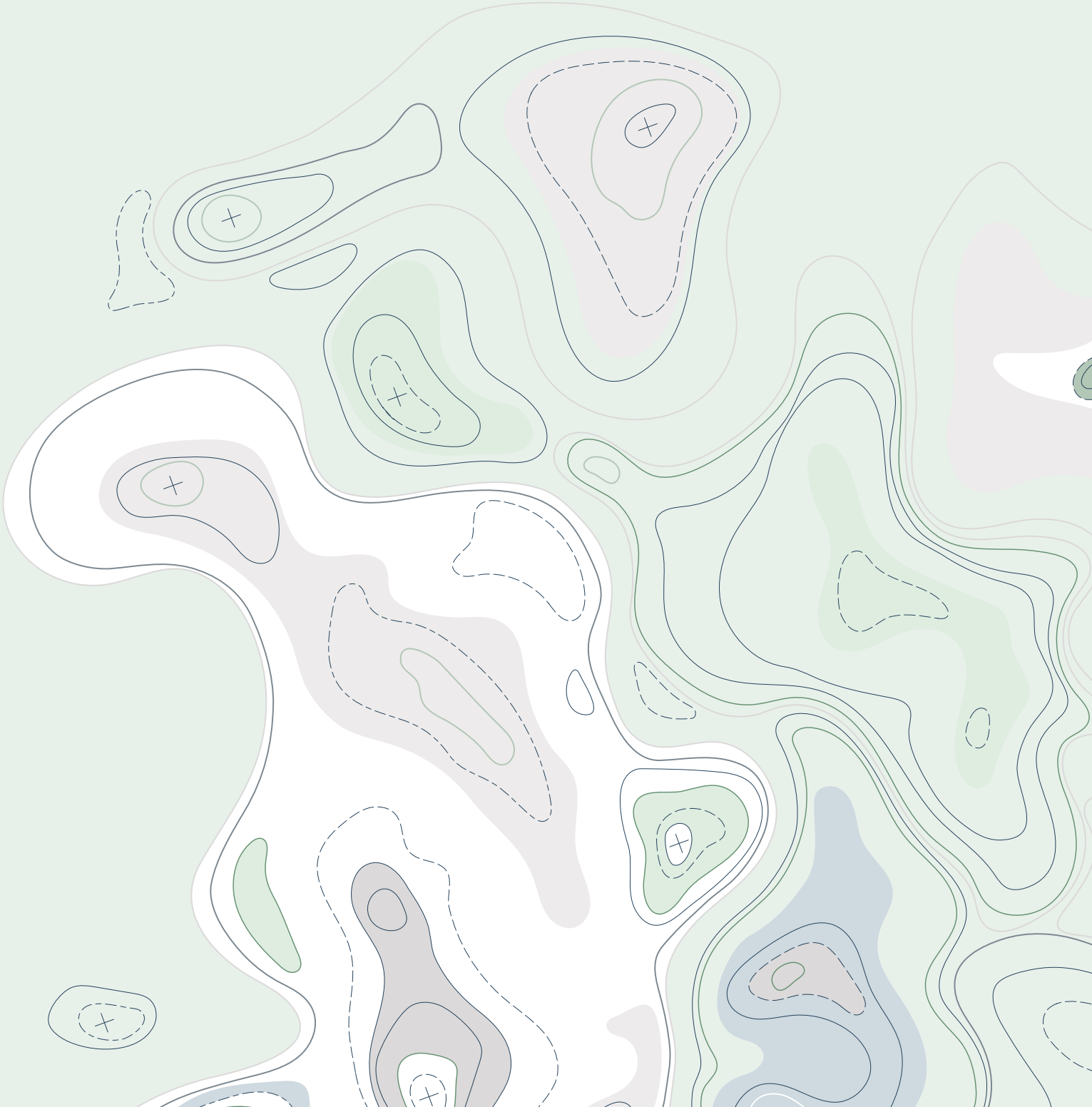
3.10 Define an action framework to optimise the role of soil in the mitigation and adaptation to climate change.

Identify and foster the implementation of climate change mitigation measures aimed at encouraging carbon sequestration, reducing emissions from soil and increasing the resilience of the region.

Incorporate funding of innovation projects into climate actions that analyse the role of soil in climate change adaptation and mitigation into in order to develop criteria and tools.



06.
MANAGEMENT MODEL



6.1

Governance and participation: the management model of the soil protection policy in the Basque Country

As already mentioned, this *Soil Protection Strategy 2030* is characterised by a degree of transversality. Although it must be considered as an opportunity due to the amount of common interests it combines, it does not cease to be a challenge overall, from the definition of goals to the design of an efficient governance system.

Like the rest of the elements in this strategy, the governance system must evolve towards a scheme that allows progress to be made in the coordinated fulfilment of the goals but with a high degree of autonomy for all those responsible for the policies and actions involved.

> The success of the *Soil Protection Policy 2030* depends entirely on the degree of involvement of the public administrations, private sector and citizens, as well as a flexible and efficient governance system that respects the autonomy of the policies that contribute towards the fulfilment of objectives.

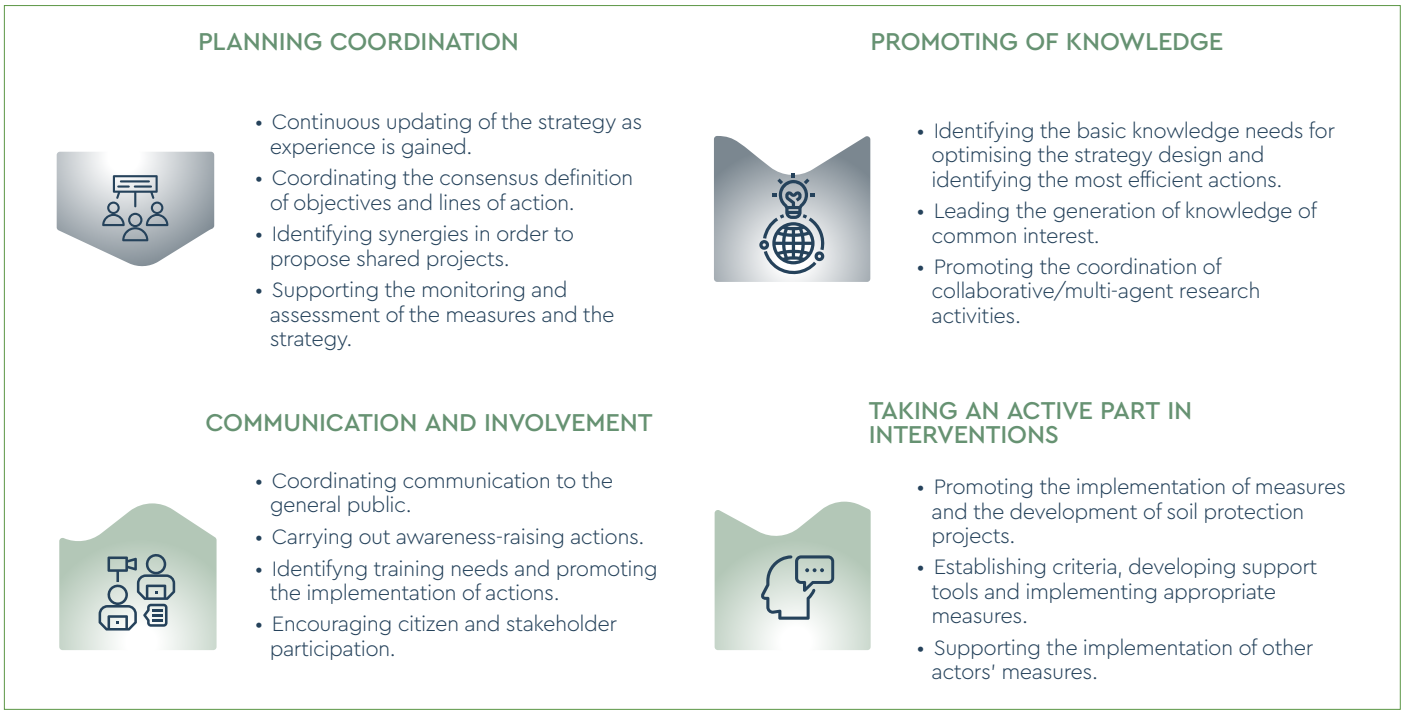
The design of an initial governance system requires some premises of the soil protection policy to be taken into consideration:

- Sustainable soil management and its protection from an integrated perspective are relatively new concepts, which initially require reflections that will move slowly whilst the plans and actions that are underway will maintain their inertia. The governance system must consider this circumstance in the process of advancing towards a situation in which the stakeholders move towards the common goals in a coordinated way.
- The integration of soil protection criteria in diverse policies that play a role in the management of this resource is not sufficient to guarantee the effectiveness of this strategy. Soil is the raw material of numerous policies that interact with it to varying degrees and in different ways. Therefore, the governance system must be flexible to enable the most sustainable expression of each of these policies.
- In order to add the number and variety of stakeholders with a role in soil protection to the action, the governance system will be transversal and participative, as well as inspiring, so that all parties get actively involved in the definition of objectives and the synergic and coordinated implementation of actions that lead to increased management efficiency.
- This Soil Protection Strategy 2030 goes beyond what is strictly environmental. It is a planning action by the Basque Government in which the Deputy Ministry for Environmental Sustainability assumes the role of driver and catalyst, focusing its main activity on those key tasks that support all parties in the fulfilment of the final objectives.
- In view of the increasing complexity in the management frameworks derived from the proliferation of plans and strategies, it is necessary to opt for a minimum structure that uses existing mechanisms and structures as far as possible.

Bearing in mind these conditions, the strategy will be managed following the model described below.

1. **Department for Economic Development.** Sustainability and the Environment The Deputy Ministry for Environmental Sustainability heads the coordination and promotion of the strategy through the implementation of the successive action plans in collaboration with the Deputy Ministry for Agriculture, Fisheries and Food Policy and the Deputy Ministry for Regional Planning and Urban Agenda within the Department for Regional Planning, Housing and Transport.
2. **Deputy Ministry for Environmental Sustainability.** It is responsible for the assessment and monitoring of the implementation of the strategy.
3. **Technical Secretariat for the Strategy.** The Deputy Ministry for Environmental Sustainability, with the support of Ihobe, assumes the technical tasks of analysis, diagnosis, planning and assessment of the soil protection policy in order to bring criteria together and identify potential action measures. It will implement the transversal actions that are included in the Action Plans in relation to the functions that appear in **Figure 15**.
4. **Political and technical coordination mechanism between the different administrations** for the implementation and monitoring of the strategy's actions, which serves as a meeting point between those responsible for the development of the policies and instruments related to soil protection in the represented institutions, so that synergies are generated, increasing the management efficiency.
5. **Technical Committee,** which will be responsible for implementing the strategy and will be able to delegate certain actions to specific work groups, due to their magnitude or transversality. It will meet at least twice a year. Initially, the technical committee will be made up of representatives of the Department for Economic Development, Sustainability and the Environment, Department for Regional Planning, Urban Development and Urban Regeneration and the Department for Health. ELIKA, IHOBE, NEIKER, SPRILUR, URA and VISESA will also participate.

Figure 15. Tasks of the Secretariat for the Strategy



6.2

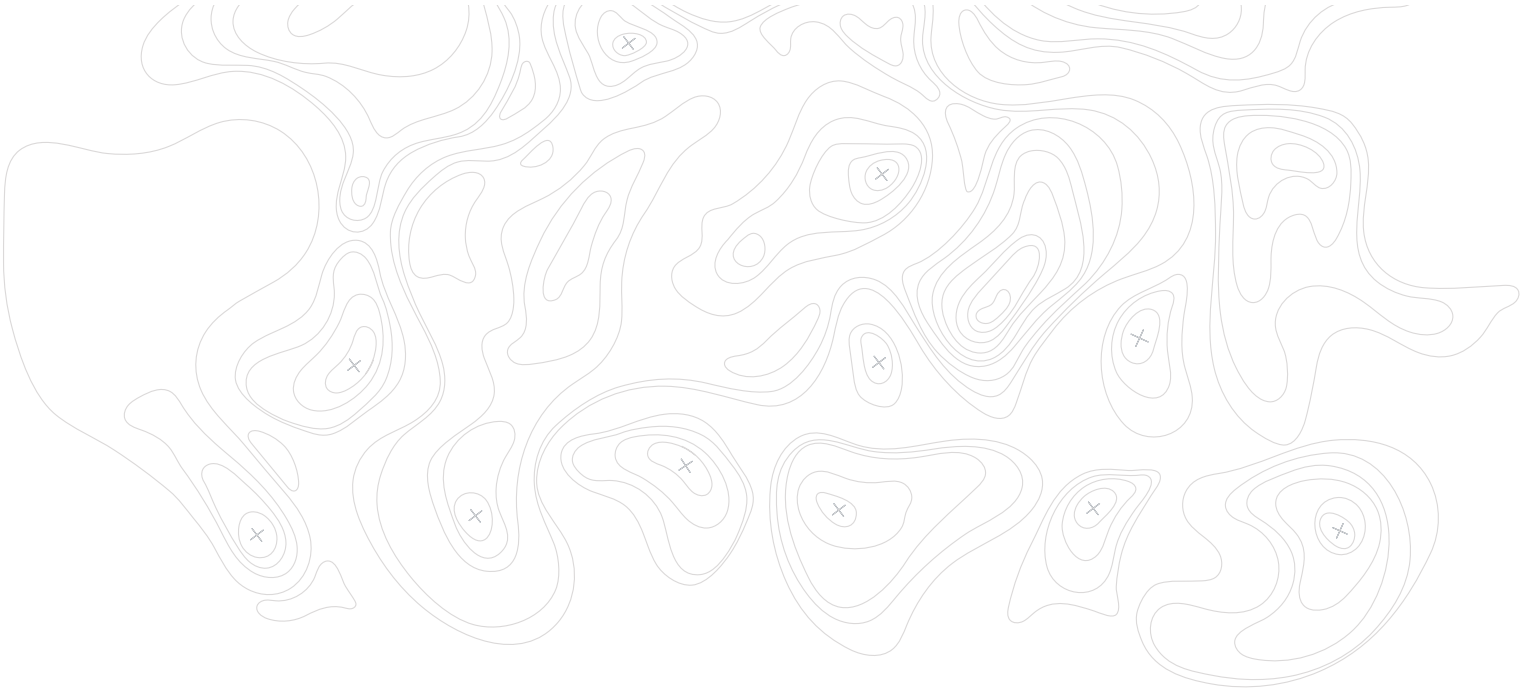
Economic analysis of the strategy

The *Soil Protection Strategy 2030* has a time horizon of 2030, more than 8 years of implementation divided into two Action Plans, the first of which will kick off with the approval of the strategy and will be developed as the degree of progress of the scheduled actions is regularly assessed.

At the time of preparing this strategy, the economic forecast for the Basque Country presents a high degree of uncertainty, as does the entire environment, due to the health crisis caused by COVID-19 and the precariousness of its future development. Although it is true that the Basque Country's economy was well positioned within its geographical area at the start of the health crisis, with a GDP per capita measured in terms of purchasing power parity that was 18% higher than the European average, one of the best connectivities between medium-sized European cities and average productivity per hour worked in excess of the European average in all of the economic sectors, the crisis caused by the pandemic has led to the biggest economic slowdown worldwide, with the Basque Country's GDP falling by 9.5% in 2020.[7] This abrupt fall in the evolution of the GDP, which ended a period of growth sustained over 6 years, was caused by the collapse of economic activity, with the industrial sector being hit the hardest, and by national and international demand. Along the same lines, the pandemic has also adversely affected employment with a drop in the employment rate of 2.4% over the past year, a figure that appears to have been softened by the use of furlough schemes, which are not included in the calculation of the unemployment rate.

The forecast for the evolution of the Basque economy for the coming years suggests that the unemployment rate will start to rebound in 2021, foreseeing an increase of 7%, whilst it is expected that economic growth will start to recover in the second half of 2021, with forecasts fluctuating between 5.3% and 8.4% in 2021 and between 5.0% and 7.5% in 2022.[8]

If we add the strategy's time horizon until 2030 to the high degree of uncertainty associated with economic forecasts, it is essential to assume a conservative profile in relation to the estimate of expenditure. Therefore, the budgets associated with the Department for Economic Development, Sustainability and the Environment will be used as a reference framework. The estimated budget does not include funds intended for personnel, as only the operational budget is considered. The budgetary resources required for the development of the actions planned for 2022 are:



7 Source: Department for the Economy and Finance (April 2021) and Eustat.

8 Source: Department for the Economy and Finance, CEPREDE, BBVA, AFI, Laboral Kutxa, Funcas, Confebask and Hispalink.

Budget by lines of action (€)	2022	%
Acquire and develop knowledge	**959,700**	**2.93 %**
Increase accessibility to existing information	50,000	5.2 %
Increase knowledge of the state of conservation and evolution of soil health and identify vulnerable zones and map them	447,500	46.66 %
Research, knowledge generation and transfer	462,000	48.14 %
Regulatory and governance framework	**185,000**	**0.13 %**
Coherence and transversality of the policy	50,000	27.03 %
Regulatory legal framework	35,000	18.92 %
Technical and methodological instruments	100,000	54.05 %
Sustainable Soil Management	**31,552,500**	**96.3 %**
Regional and urban planning	60,000	0.19 %
Sustainable management of agricultural soil		
Water - soil interrelation	350,000	1.11 %
Protection, conservation and restoration of natural soil functions	100,000	0.32 %
Protection of human health		
Prevention and recovery of industrial soil contamination	700,000	2.22 %
Remediation and re-use of vacant land	30,300,000	96.03 %
Prevention, recovery, re-use and management of excavation materials		
Re-use of materials in secured applications		
Action framework for the role of soil in the mitigation and adaptation to climate change	42,500	0.13 %
Awareness and Training	**68,000**	**0.2 %**
Incorporate soil conservation concepts in education and training		
Raise awareness and involve society in sustainable soil management	62,000	91.18 %
Increase the presence of the Basque Country in inter-regional and international initiatives	6,000	8.82 %
Total 2022	**32,765,200**	**23.82 %**

As has already been mentioned numerous times throughout this document, soil protection is a transversal element that derives from and affects numerous sectorial policies, whose management involves all levels of the administration, as well as the private sector and citizens in general. Furthermore, conservation of this resource presents obvious and highly significant interactions with other plans, not only those related to the environment, but also those of a marked transversal nature. Therefore, in addition to the Department for Economic Development, Sustainability and the Environment's budgetary resources, other Departments must be considered, such as the Department for Health or the Regional Planning Division, as well as the Provincial Councils or Town Halls that also play a vital role in the implementation of this strategy.

The uncertainty associated with the budgetary estimate increases as we move forward in the strategy's time horizon, which is why the budgetary estimates set out in this document will be subject to the budgetary mandates established by the Basque Parliament. However, in order to fulfil the Action Plan as effectively as possible, it is necessary to establish the budgetary context over the entire time horizon. The corresponding operational budget is set out in the following table:

Budget by lines of action (€)	2022	Period 2023 - 2030	Total	%
Acquire and develop knowledge	**959,700**	**5,119,500**	**6,079,200**	**4.42 %**
Increase accessibility to existing information	50,000	500,000	550,000	9.05 %
Increase knowledge of the state of conservation and evolution of soil health and identify vulnerable zones and map them	447,500	2,652,500	3,100,000	50.99 %
Research, knowledge generation and transfer	462,000	1,967,000	2,429,000	39.96 %
Regulatory and governance framework	**185,000**	**450,000**	**635,000**	**0.46 %**
Coherence and transversality of the policy	50,000	100,000	150,000	23.62 %
Regulatory legal framework	35,000	50,000	85,000	13.39 %
Technical and methodological instruments	100,000	300,000	400,000	62.99 %
Sustainable Soil Management	**31,552,500**	**98,802,500**	**130,355,000**	**94.78 %**
Regional and urban planning	60,000	480,000	540,000	0.41 %
Sustainable management of agricultural soil		70,000,000[9]	70,000,000	53.7 %
Interrelation between soil and water	350,000	2,395,000	2,745,000	2.11 %
Protection, conservation and restoration of natural soil functions	100,000	1,000,000	1,100,000	0.84 %
Protection of human health				
Prevention and recovery of industrial soil contamination	700,000	5,600,000	6,300,000	4.83 %
Remediation and re-use of vacant land	30,300,000	19,200,000	49,500,000	37.97 %
Prevention, recovery, re-use and management of excavation materials				
Re-use of materials in secured applications				
Action framework for the role of soil in the mitigation and adaptation to climate change	42,500	127,500	170,000	0.14 %
Awareness and Training	**68,000**	**398,000**	**466,000**	**0.34 %**
Incorporate soil conservation concepts in education and training				
Raise awareness and involve society in sustainable soil management	62,000	348,000	410,000	87.98 %
Increase the presence of the Basque Country in inter-regional and international initiatives	6,000	50,000	56,000	12.02 %
Total	**32,765,200**	**104,770,000**	**137,535,200**	**100 %**
%	**23.82 %**	**76.18 %**	**100 %**	

9 Included in the CAP 2023-27 budget.

6.3

Strategy Monitoring and Assessment

As the *Soil Protection Strategy 2030* is an unprecedented planning document involving a wide range of bodies with competences in very different fields of intervention and goals and actions in progress, it will require a monitoring and assessment mechanism with evolution potential in accordance with the level of progress of the strategy and the level of knowledge at each moment.

On the other hand, the monitoring and assessment mechanism should allow the level of progress of the actions proposed to be assessed at each moment and the effectiveness of these actions on environmental enhancement to be measured via a system of indicators.

The strategy's monitoring and assessment mechanisms, developed in the form of a continuous improvement cycle, are as follows:

- **Action Plans.** These documents will set out the specific actions to be developed over the lifetime of the strategy. They will also enable the goals and indicators that evaluate the effectiveness of the soil protection policy to be defined in greater detail. This document includes an initial action plan that will evolve with the contributions made through the biennial monitoring reports and the assessment report that will be drawn up halfway through the strategy's lifetime, as indicated below.
- **Biennial Monitoring Reports.** Every two years, the degree of progress of the actions scheduled in the action plan will be assessed, enabling their scope to be adjusted to the situation at each moment, and propose, where appropriate, the formulation of new activities and projects. The first biennial report will be drawn up at the end of 2024.
- **Action Plan Assessment Report.** An assessment report will be drawn up halfway through the strategy's lifetime, i.e. at the end of 2016. This report will be prepared by an independent, external body, bearing in mind transparency, participation and collaboration criteria and will include the evolution of the indicators on the scorecard.

Furthermore, depending on needs, specific sectorial reports and analysis may be drawn up, complementing the different documents that form part of the monitoring and assessment mechanism.

On the other hand, the scorecard designed to measure the effectiveness of the actions has been organised by operational questions, as are the actions, depending on the fields of action, based, when available, on the goals set out in the strategies of each of the areas on a Basque Autonomous Community or European level.

What can be considered to be basic indicators have initially been included in the scorecard, prevailing those for which data is currently available. The first biennial monitoring report will propose a new detailed scorecard that will be used to monitor the achievements of those set out in the strategy more thoroughly and those of the different sectorial areas, in particular.

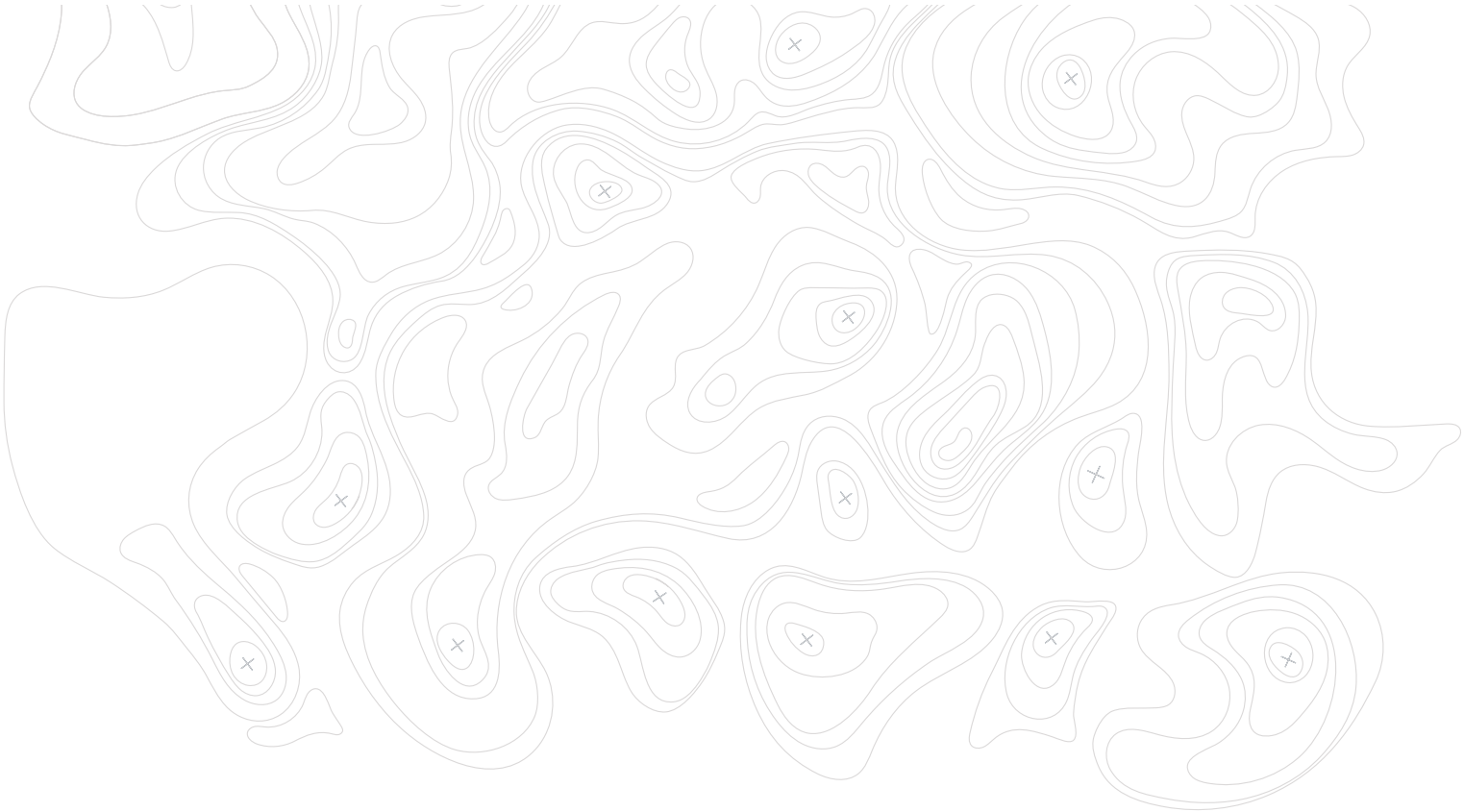
It must not be forgotten that the European Commission intends to present a legally binding proposal of nature restoration objectives at the end of 2021, which will probably add new indicators to this scorecard.

In view of all these circumstances, the indicators of the preliminary scorecard have been classified into two groups; on one hand, those for which there is a goal and, on the other hand, those whose mere monitoring can provide relevant information for the areas on which they are based, regardless of the fact that targets may be established in the future.

INDICATOR	DATA	GOALS	
	2020	2025	2030
NATURAL ENVIRONMENT: NATURAL SOIL			
Protected land area (over the total surface area of the Basque Country)	22.94 %		30 %
Strictly protected land area of the protected spaces including all of the primary and old-growth forests that remain in the region (over the total surface area of the Basque Country)[10]			10 %
CONTAMINATED SITES			
Proportion of potentially contaminated sites returned to the market after taking actions to guarantee their quality (%)	20 %	25 %	30 %
Surface area of sites restored[11]	49.27	400 Ha (2020-2024)	900 Ha (2020-2030)

Despite an attempt to incorporate at least one indicator for each of the areas, this has not always been possible. This is the case of transversal actions which are solely monitored through their level of implementation. However, due to their transversal nature, they will have an impact on several other areas and their indicators. Conversely, indicators initially considered within specific areas may be used to evaluate the evolution of other more transversal ones. Therefore, indicators from agriculture, livestock and forestry, to name just one field, will be interpreted from their contribution to climate change mitigation, for example.

The following table includes the second group of indicators, for which the data recorded in 2020 is provided (2019 for some of them). For most of them, if not all of them, there is a series of data that will allow for detailed monitoring of soil protection trends.



10 This indicator is currently being calculated.

11 This indicator derives from the "Government Programme 2020-2024. XII Legislature. Euskadi in Motion". It corresponds to an accumulated figure for the period considered by the programme (2020-2024) and an extrapolation for 2020- 2030.

INDICATOR	DATA 2020
REGIONAL PLANNING	
Evolution of land development / qualification (ha)	48.4
Proportion of land subject to urban transformation with respect to the total surface area of the Basque Autonomous Community (%)	6.79
Proportion of land for development with respect to the total surface area of urban and development land (%)	20.29
AGRICULTURE, LIVESTOCK AND FORESTRY	
Soil devoted to organic grazing (%)	4.16
Soil assigned to agri-environmental measures (ha)	34,122
Proportion of useful agricultural area assigned to agri-environmental measures (%)	17
Indigenous forest area (ha)	192,173
Certified forest area (ha)	96,563 (2019)
CONTAMINATED SITES	
Number of sites on which potentially soil-contaminating activities have been developed	12,445
Surface area on which potentially soil-contaminating activities have been developed (ha)	9,644
EXCAVATED SOIL AND CIRCULAR ECONOMY	
Reduction in excavated soil waste generation over the GDP for the construction sector with respect to waste generated in 2020.	
Recovery of:	
Excavated natural materials	
Non-natural excavated soil and stones	
MITIGATION AND ADAPTION TO CLIMATE CHANGE	
Removal of greenhouse gases (GHG) in the LULUCF (Land Use, Land Use Change and Forestry) sector (kt of CO_2-eq)	1,680 (2019)
Agricultural land emissions (fertilisation) (kt de CO_2-eq)	166.29 (2019)

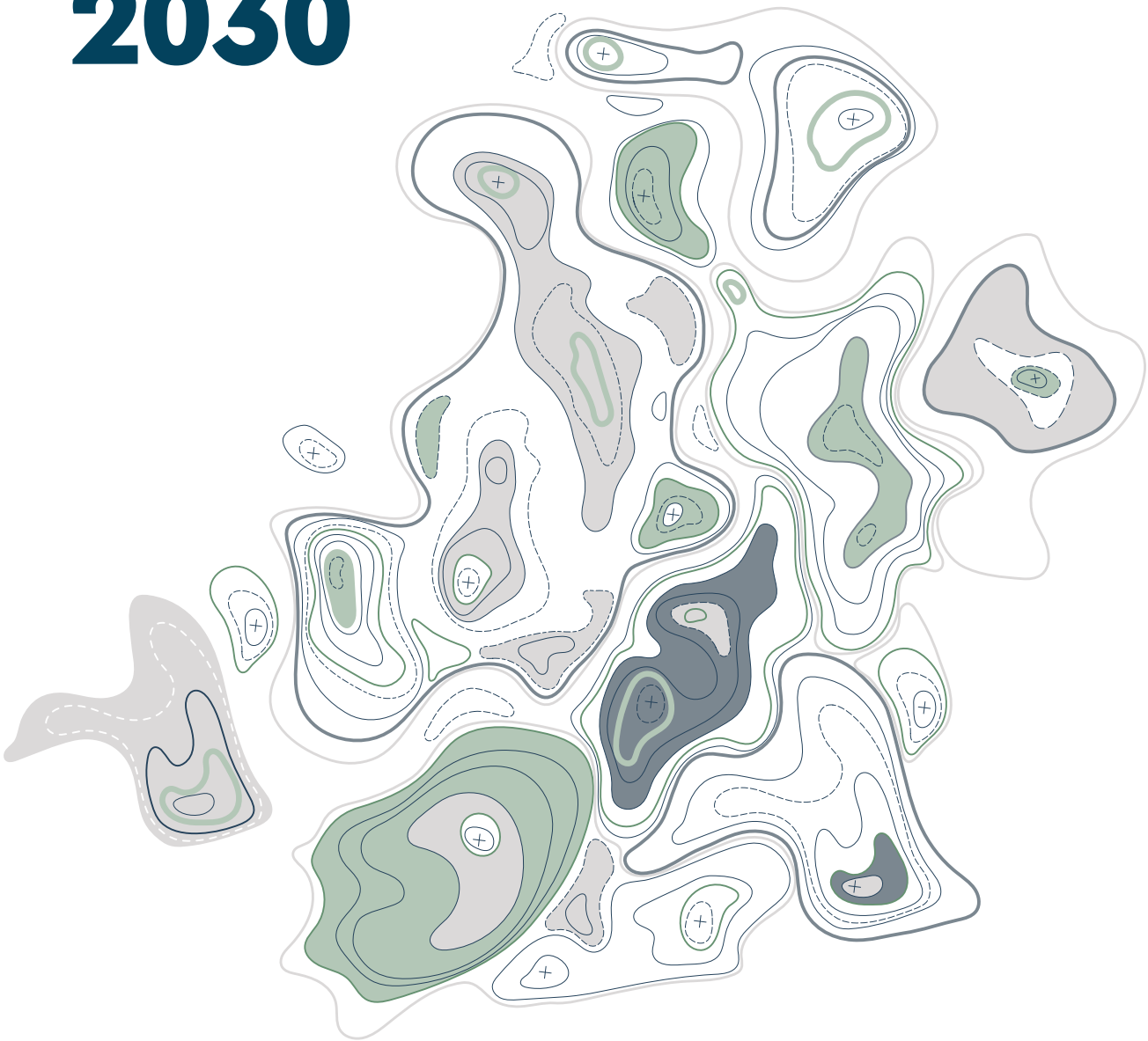
A specific case is the excavated soil and circular economy indicators. Three indicators that come directly from the *Waste Prevention and Management Plan 2030* have been included in this strategy. Although the plan includes goals for all of them, only their evolution will be monitored for the purposes of soil protection.

The indicators related to the monitoring of the level of implementation of the strategy's actions will also form part of the scorecard and are included in the following table.

INDICATOR	TARGET 2026	TARGET 2030
Level of implementation of the actions set out in the strategy	50 %	100 %
Preparation of biennial monitoring reports	2	4
Preparation of assessment reports	1	2

All of the information generated in the monitoring of the *Soil Protection Strategy 2030* will be available via the Basque Government's Department for the Environment website: **www.ingurumena.eus**

BASQUE SOIL PROTECTION STRATEGY 2030



EUSKO JAURLARITZA GOBIERNO VASCO

EKONOMIAREN GARAPEN, JASANGARRITASUN ETA INGURUMEN SAILA

DEPARTAMENTO DE DESARROLLO ECONÓMICO, SOSTENIBILIDAD Y MEDIO AMBIENTE