

Gefördert durch:



aufgrund eines Beschlusses
des Deutschen Bundestages



at the National Association of Agricultural Extension Services of Ukraine



Soil protection-related legislation and strategies in the European Union (status 2022)

Dr. agr. Andrea Beste

January 2023

About the "German-Ukrainian Agricultural Policy Dialogue (APD)" project

The German-Ukrainian Agricultural Policy Dialogue (APD) project has been funded by the Federal Ministry of Food and Agriculture (BMEL) since 2006 and implemented on its behalf through the mandatory GFA Consulting Group GmbH. The beneficiary of the project is the Ministry of Agrarian Policy and Food of Ukraine. Component 1 of ODA (Agricultural Policy Dialogue) is implemented by the consortium consisting of IAK Agrar Consulting GmbH, Leibniz Institute of Agricultural Development in Transition Economies (IAMO) and AFC Agriculture and Finance Consultants GmbH (AFC). Land law advice is provided within the framework of ODA as component 2 (expert dialogue on soil) and is implemented by BVVG Bodenverwertungs- und -verwaltungs GmbH. Since 2006, the expert dialogue on soil has been making important contributions to current land policy priority topics by providing demand-oriented advice. Taking into account German and international experience and the EU Association Agreement, Ukraine's soil policy is thus intended to make a greater contribution to increasing the competitiveness of agriculture and forestry and to developing effective and transparent land administration.



www.apd-ukraine.de

Author

Dr. agr. Andrea Beste, Agronomist, Graduate Geographer and Soil Expert



www.gesunde-erde.net

Disclaimer

This article was prepared with the support of the "Expert Dialogue on Soil" component of the German-Ukrainian Agricultural Policy Dialogue (APD), with the involvement of an expert on soil protection. The author is solely responsible for the technical content of this article. Any views, conclusions, suggestions or recommendations contained herein reflect the personal opinion of the author and do not necessarily reflect the views of APD.

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Introduction

"Successful climate and biodiversity protection policy cannot do without the inclusion of soil. Not wanting to protect it to the same extent as air, water or endangered species and their habitats is a political decision and, in view of the progressive loss of soil (quality) in Europe, unsustainable in the long run".

Thomas Strassburger, Soil Protection Expert in the Directorate General Environment of the EU Commission, 2011¹

Soil is one of the most important resources for human, animal and plant life on Earth. Soil enables vegetation and thus controls the climate on earth. Without its purifying function, there would be no clean drinking water. Soils provide the most important means of life - food - as well as raw materials for many other products. The ability of humans to use this resource purposefully was and is the basis for the emergence of all cultures worldwide.

While the state of soils is important for several areas of international interest, including biodiversity conservation and climate change adaptation and mitigation, soil degradation and the need for sustainable soil and land management have received little attention from international organisations, apart from the United Nations Convention to Combat Desertification (UNCCD). In recent years, however, there has been an increased focus on soils at international, regional and local levels, reflected in a growing number of international strategies, policies and initiatives².

Soil protection and land conservation were first given central importance in the European Union by the 6th EU Environment Action Programme in 2001. In this programme, the European Commission was called upon to develop a comprehensive thematic soil protection strategy for Europe. The

Communication to the Member States and the Parliament on Soil Protection "Towards a Soil Protection Strategy", prepared by the Commission in 2002, was a first step. After protracted negotiations and a withdrawal of a legislative proposal by the EU Commission in 2014, the EU is currently embarking on a renewed legislative initiative.

Due to the EU candidate status Ukraine has received in June 2022, it is of high importance for Ukrainian partners to learn more about EU requirements and strategies in the field of soil protection. This paper aims to provide an overview of the status of EU legislation on soil and to list and describe further legislation relevant for soil as well as existing and planned strategies (e.g. within the new European Green Deal) related to soil protection.

1. Soil protection legislation

1.1 European history of soil protection legislation

So far, there is no Europe-wide political concept for soil protection comparable to the concepts that exist for air and water. Soil protection and land conservation were first given central importance by the 6th EU Environmental Action Programme in 2001. In this programme, the European Commission was asked to develop a comprehensive thematic soil protection strategy for Europe. The Commission's 2002 Communication to Member States and Parliament on Soil Protection "Towards a Soil Protection Strategy" was a first step. Subsequently, a Soil Framework Directive was drafted. It included legislation to establish a EU-wide soil information and monitoring system and detailed recommendations for future soil protection measures. The adoption of this first framework directive for Europe failed after years of negotiations in 2010 due to a blocking minority

of 5 Member States led by Germany in the Council of the EU, mainly due to pressure from the agricultural lobby, even though officially the main argument was that the principle of subsidiarity^a had not been fulfilled³. The proposal was withdrawn by the EU Commission in 2014.

Soil sealing and contaminated sites

Sealing

There are "Best Practice [Guidelines](#) on Limiting, Mitigating and Compensating for Soil Sealing" at EU level from 2012. However, these are only in the nature of "Commission Staff Working Documents" and are thus neither a strategy nor a binding instruction for action.

Contaminated sites

There is currently no EU-wide regulation on contaminated sites. The [European Regional Development Fund \(ERDF\)](#) offers the possibility of financial support for municipal land recycling measures, remediation of contaminated sites and contaminated site research.

1.1.1 Overview of the state of soils in Europe

Soil hosts more than 25% of all biodiversity on the planet and is the fundamental basis of the food chain for humans and above-ground animals and plants. This fragile layer is expected to feed nearly 10 billion people worldwide by 2050 and filter drinking water suitable for their consumption⁴. Agricultural soils in Europe are strongly affected by soil degradation processes⁵: Soil erosion, soil contamination, soil compaction, soil sealing and the loss of soil organic matter and biodiversity remain the greatest threats to soil health in Europe. Soil erosion by water is about 1.6 times higher than soil formation rates on all land in Europe

^a In accordance with the principle of subsidiarity, the Union shall take action in areas which do not fall within its exclusive competence only if and insofar as the objectives of the proposed action cannot be sufficiently achieved by the Member States, either at central level or at regional and local level, but can rather, by reason of the scale or effects of the proposed action, be better achieved at Union level. [Article 5 \(3\) TFEU](#)

and 2 times higher on agricultural land⁶ . Every year, about one billion tonnes of soil fall victim to erosion in the EU⁷ . About 23 % of soils in the EU show critically high soil compaction⁸ . Soil organic carbon stocks in European peatlands could decrease by 13-36 % by the end of the century⁹ . In all regions of Europe, earthworm species diversity has been negatively affected by increasing land use intensity¹⁰ . Various forms of soil degradation (unsuitable tillage practices, soil pollution, compaction, soil sealing, organic carbon decline), climate change and intensive human use pose a serious threat to microorganisms, fauna and soil functions¹¹ . High concentrations of cadmium have been found in agricultural soils, mainly from mineral fertilisers¹² , and copper from pesticides has been measured at high levels in vineyards and orchards¹³ .

Land cover change and farming intensity have a significant impact on soil condition and soil biodiversity in the EU¹⁴ . Progress in the remediation of polluted soils has been relatively slow¹⁵ . Soil sealing remains an intensive form of soil degradation, with 2.43% of EU land already sealed¹⁶ . Between 2012 and 2018, more than 400 km² net of land was 'consumed' in this way each year in the EU¹⁷ . Overall, soil degradation costs the EU tens of billions of euros every year¹⁸ .

On the other hand, arable land and grassland provide €76 billion worth of ecosystem services annually in the EU, with less than a third coming from crop production and the rest from other ecosystem services¹⁹ .

1.1.2 Legislation of the Member States

At national level, the situation varies considerably across EU Member States. Only a very limited number of Member States have comprehensive soil protection policies, but these are often limited to soil pollution and soil sealing.

Example Germany: With the entry into force of the [Federal Soil Protection Act](#) in 1999, the German legislature took the first step towards giving greater weight to soil as a protected resource. The aim of the law is to preserve soil functions, to protect it from damage and to restore it after damage. In doing so, soil use is to be carried out in such a way that no harmful soil changes occur, and in addition, the consumption of soil through sealing is to be kept as low as possible. The law is a great step forward, but criticism from the scientific community and associations pointed out, soon after it was passed, that the law was strongly geared to the problems of contaminated sites and contamination and neglected precautionary soil protection. It was thus unbalanced with regard to the spectrum of possible soil problems in agriculture²⁰.

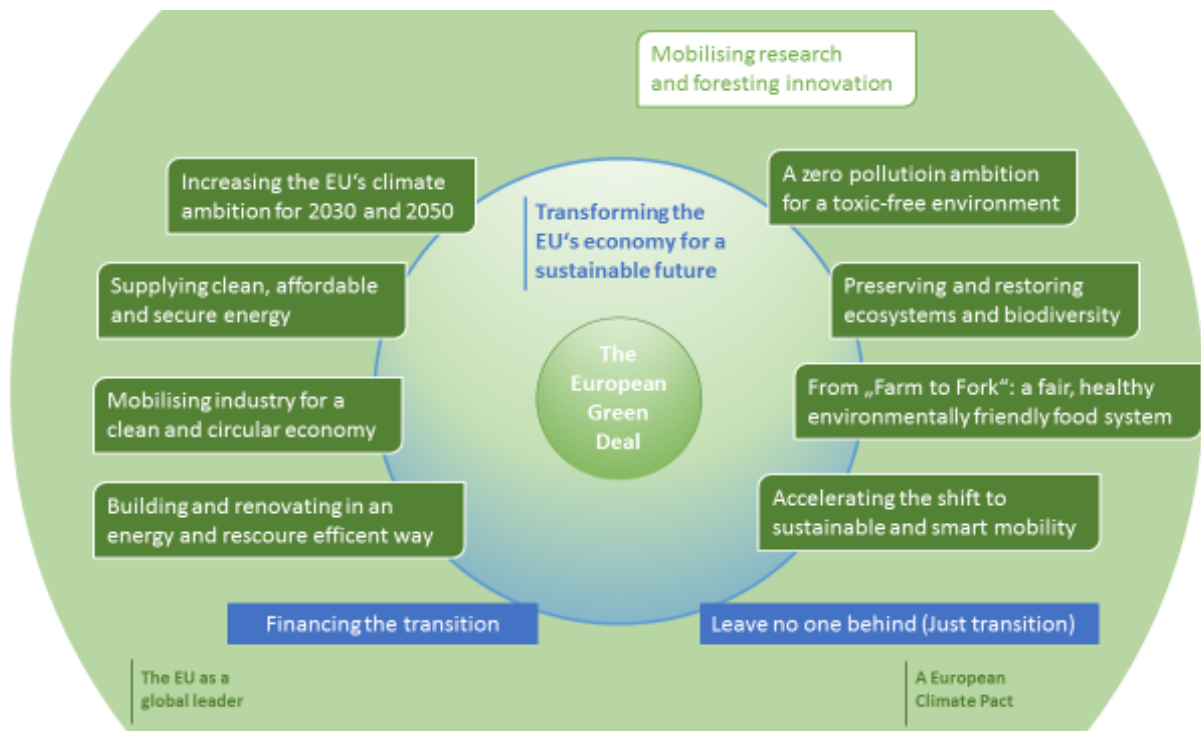
Most other Member States only have soil protection measures in their general environmental legislation, and only in isolated cases. According to the EU Commission, national legislation or regulations on soil protection have not been able to sufficiently prevent soil degradation in the EU as a whole. In addition, the fact that soil is a common good and has cross-border functions in the climate sector (soils as CO₂ reservoirs) is neglected.

1.2 Current activities on EU soil legislation

1.2.1 Soil Strategy

The [Soil Strategy](#) is embedded in the [European Green Deal](#) and is the preparatory strategy for the Soil Health Act, but does not yet have a legislative character itself. The Green Deal aims to ensure Europe's climate neutrality by 2050 and to improve the sustainability of the economy. Main areas are: Finance, energy supply, transport, trade, industry, agriculture, forestry. The package of measures also includes actions and regulations to protect soils. Further soil-related

strategies and action plans planned within the Green Deal can be found in Chapter 4.



Source: Montanarella/Panagos 2021²¹

In the [Soil Strategy](#) for an EU-wide framework for the protection and sustainable use of soil, presented at a press conference of the EU Commission on 17.11.21, the EU Commission addressed the various threats to soil and regretted, that there is still no EU-wide protection framework for soil as there is for air and water.

As part of the EU Soil Strategy, the Commission also intends to develop measures to ensure that soil contamination no longer poses a health or environmental risk by 2050. In addition, a new soil health law (see 1.2.2) is announced by 2023 to ensure a level playing field and a high level of environmental and health protection. A new EU Soil Observatory will collect policy-relevant data and

develop indicators for regular assessment and progress towards the ambitious goals of the Green Deal.

Healthy soils are essential for climate neutrality, a clean and circular economy, and the mitigation of desertification and land degradation. They are also important for reversing biodiversity loss, providing healthy food and protecting human health.

The [mission "A Soil Deal for Europe"](#), of which the Soil Protection Strategy is a part, is rooted in research and innovation. It supports the implementation of the strategy by finding solutions to protect and restore soil health.

Goals:

- Soil health for climate protection and adaptation to climate change
- Soil health and the circular economy
- Soil biodiversity for human, animal and plant health
- Healthy soils for clean water
- Sustainable land management (SSM) as the new normality
- Prevention of desertification
- Pollution prevention
- Restoration of degraded soils and remediation of contaminated sites
- Improving digital knowledge, monitoring and research on soils
- Enabling the transition to healthy soils

Excursus

When are soils healthy?

Soils are healthy when they are in a good chemical, biological and physical condition and can thus permanently provide as many of the following ecosystem services as possible:

- Food and biomass production, including agriculture and forestry;
- Absorption, storage and filtration of water and transformation of nutrients and substances and thus protection of groundwater bodies;
- Providing the basis for life and biodiversity, including habitats, species and genes;
- Function as CO₂ reservoirs;
- Providing a physical platform and delivering cultural services to people and their activities;
- Function as a source of raw materials;
- Function as archives of geological, geomorphological and archaeological heritage.

From: EU Soil Strategy for 2030

1.2.2 Soil Health Act

In the second quarter of 2023, the EU Commission wants to adopt a European soil health law. It is to specify the prerequisites for healthy soil, determine options for soil monitoring and lay down rules for the sustainable use and restoration of soils. Until 24 October 2022, all EU citizens had the opportunity to participate in an [online survey on the planned law](#).

2. EU regulations that have a direct impact on soil

2.1 Common Agricultural Policy (CAP)

The Common Agricultural Policy (CAP) is one of the most important areas of European policy. Even though the member states are increasingly given more scope and responsibility in the implementation of the CAP through the new implementation model, the CAP remains one of the most communitarised policy areas of the EU. In the "conditionality" obligations of the regulation on the strategic plans ([EU 2021/2115](#)) of the 2023 agricultural reform, the receipt of direct payments is linked, among other things, to the maintenance of a good agricultural and environmental condition (GAEC) of the farmland. The focus is on limiting erosion, maintaining and increasing organic matter and avoiding compaction. However, the requirements for achieving a good agricultural and ecological condition of the farmland have so far been vaguely formulated.

According to an assessment published by Birdlife Europe and the European Environmental Bureau 2022²², EU Member States are not using the resources of the Common Agricultural Policy (CAP) to combat environmental degradation caused by intensive farming practices. The assessment shows that member states' strategic plans for the CAP 2023-2027 are inadequate. For example, they fail to adequately protect and sustainably manage valuable grassland and show too little ambition for the protection of the EU's soils.

2.2 Nitrates Directive

The aim of Directive [91/676/EEC](#) is to protect waters from pollution by nitrates from agriculture. It is one of the oldest EU directives, but it is also an important piece of legislation for achieving the goals of the Green Deal. The Nitrates

Directive is also a fundamental measure under the Water Framework Directive (see 3.1).

The directive prescribes a limit for nitrate in groundwater of no more than 50 mg per litre. This limit not only serves to protect groundwater and drinking water, it also protects soils from over-intensive nitrogen fertilisation, which impairs soil life and makes the soil ecosystem and crops more susceptible to one-sided pest development and diseases.

On a global scale, the transfer of excess nitrogen and phosphorus into the environment already exceeds the safe pollution limits of our planet and poses a serious threat to nature and the climate. Europe is a significant contributor to this type of pollution and the European Environment Agency (EEA) estimates that in Europe the limit for nitrogen losses will be exceeded by a factor of 3.3 and the limit for phosphorus losses by a factor of 2²³.

The Biodiversity Strategy (s. 4.2) and the Farm-to-Fork Strategy (s. 4.6) set a common target to reduce nutrient losses to the environment by at least 50 % by 2030 while maintaining soil fertility. Due to the negative effects of excessive fertiliser intensities on the soil microbiome, the directive is not only of high importance for water quality, but also for soil fertility (s. 1.1.1).

The Nitrates Directive obliges the Member States,

- to identify waters affected by and at risk of nitrate pollution and designate as nitrate vulnerable zones the areas draining into those waters where agriculture contributes significantly to that pollution;

- to develop action programs with measures to reduce and prevent nitrate pollution, apply these programs in the areas at risk from nitrate or throughout the territory, and reinforce these measures as soon as it becomes apparent that they are not sufficient to achieve the objectives of the Directive.

It also provides for the Commission to inform the European Parliament and the Council every four years of the state of implementation of the Directive on the basis of reports from the Member States.

Since 2012, scientific and technical advice for the establishment of action programmes for Member States has been available for each type of action²⁴.

In its [report on the implementation of the 2021 Nitrates Directive](#), the EU Commission regrets that 13 Member States have not submitted information on nitrogen inputs to water from agricultural sources. Based on the data of those Member States that have submitted this information, agriculture is responsible for 22% to 99% of total nitrogen inputs to the environment (77% on average), making it the most important source.

2.3 EU Fertiliser Products Regulation

The Regulation ([EU 2019/1009](#)) laying down rules for making EU fertiliser products available on the market, extended the harmonisation legislation for making EU fertiliser products available on the European Single Market and established specific principles for affixing the CE marking. It will enter into force in 2022. In the context of the circular economy, the regulation now also covers fertilisers made from secondary raw materials, i.e. organic fertilisers and compost. In addition, thresholds for heavy metals and pollutants were set (Annex 1, Part II). In general, EU fertiliser products must be sufficiently effective

and pose no risk to human, animal or plant health, safety or the environment. The EU Fertiliser Products Regulation replaces the previous European legal basis, Regulation ([EU No. 2003/2003](#)), and in particular extends the scope to soil improvers, growing media and plant biostimulants. Since fertiliser products can differ in their mode of operation, the safety and quality requirements have been adapted depending on the intended use. In future, EU fertiliser products will therefore be assigned to individual product function categories, for each of which special safety and quality requirements apply, in order to ensure adequate soil and water protection as well as food quality.

[FAQs related to the Regulation on fertilising products](#)

2.4 Pesticides Directive

The Directive ([2009/128/EU](#)) establishing a framework for Community action to achieve the sustainable use of pesticides aims to protect human health and the environment from the potential risks and impacts of pesticides. By limiting the use of pesticides and supporting the introduction of precautionary measures, this directive also has a direct impact on the soil ecosystem, which is affected by the use of pesticides. The Directive is currently under revision as it has so far failed to achieve the pesticide reduction target²⁵. The effects of pesticides on selected soil organisms are regulated in the criteria of the Plant Protection Products Authorisation Regulation ([EU 1107/2009](#)). However, the impairment of soil ecosystems is primarily determined by the specifications in the type and quantity of application in the 2009/128 EU and its implementation. In the [European Court of Auditors' special report on the implementation of the 2020 Pesticides Directive](#), the Court states that only limited progress has been made in measuring and reducing the risks of plant protection product use. Although

the application of the principles of integrated pest management is obligatory for users, compliance is only controlled to a limited extent by the member states. In order to counteract the growing biodiversity crisis, the EU Commission presented [a draft of a new regulation on the sustainable use of pesticides](#) in 2022. This sets binding reduction targets for the first time (see annex for the difference between directive and regulation) and is intended to ensure a more sustainable use of pesticides. The proposal is currently being negotiated in the Council and Parliament.

2.5 Sewage Sludge Directive

EU-wide soil-related sewage sludge utilisation is based on the Council Directive of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture ([86/278/EEC](#)).

The purpose of this directive is to regulate the use of sewage sludge in agriculture in such a way that harmful effects on soils, vegetation, animals and humans are prevented, while at the same time promoting the proper use of sewage sludge. EU Member States are obliged to submit a report to the EU Commission every 3 years on the proper national implementation of the Sewage Sludge Directive (Article 5 of the "Council Directive standardising and rationalising reports on the implementation of certain Directives relating to the environment" ([91/692/EEC](#))). Meanwhile, the European Sewage Sludge Directive is being evaluated and an amendment is to follow in the coming years.

3. EU regulations that indirectly affect soil

3.1 Water Framework Directive

The Water Framework Directive ([2000/60/EU](#)) not only combines modern approaches to water protection, but also bundles many individual directives of EU water law. The Directive requires a "good status" for all water bodies. This means high water quality and good living conditions for the fauna and flora living in and near the water. Ecological concerns, such as the preservation and improvement of biodiversity, are the main focus. However, the Water Framework Directive also takes into account the various uses of water bodies, for example the supply of high-quality drinking water or navigation. Since water quality is affected by inputs from agriculture, the directive also has a direct impact on soil management if implemented consistently.

3.2 Drinking Water Directive

With the Drinking Water Directive ([EU 2020/2184](#)) on the quality of water intended for human consumption, the existing quality standards were renewed and updated after a review process lasting several years (from 2015). For example, the latest findings of the World Health Organisation were obtained and various studies on special topics such as materials in contact with drinking water were commissioned. It was also the declared goal of the European Commission to anchor the concept of the WHO [Water Safety Plans](#) - presented by the WHO in 2004 - in a future EU Drinking Water Directive from the very beginning. In addition, there was the first European citizens' initiative - known as "Right2Water"²⁶ - with its demands for access for all to a safe water supply and wastewater treatment.

One of the main soil-relevant changes in the new Drinking Water Directive is the first regulation on perfluorinated and polyfluorinated alkyl substances (PFAS) in drinking water, which is relevant for polluted soils. Plants can absorb PFAS from the soil or from irrigation water and transport them into various parts of the plant (leaves, grain). These non-natural, industrially produced chemicals have water-, grease- and dirt-repellent properties and have been used since the 1950s, for example, in galvanic baths, fire extinguishing foams, non-stick cookware, outdoor clothing and food packaging, thus polluting not only water bodies but also soils. Pathways into soils are mainly extinguishing agents and sewage sludge (see 2.5). The German Ministry of the Environment has developed a [guideline for PFAS assessment](#).

With regard to plant protection products and their effect on soil organisms, the Drinking Water Directive is based on the criteria of the Plant Protection Products Authorisation Regulation ([EU 1107/2009](#)) and for nitrate on those of the Nitrates Directive (see 2.2).

4. Soil-relevant action plans and strategies planned within the Green Deal

Apart from the direct soil protection legislation described above, the [Green Deal](#) (see 1.2.1) contains other intended regulations, strategies and action plans.

4.1 Zero Pollution Action Plan

The EU Commission presented the Zero Pollution Action [Plan for Air, Water and Soil](#) (ZPAP) with Annexes in mid-May 2021. The action plan summarises a

number of existing and planned measures to help achieve the EU's zero-pollution target for a pollution-free environment.

The following goals are mentioned:

- Reduce nutrient losses, the use and risks of chemical pesticides, the use of more hazardous pesticides and the sale of antibiotics intended for livestock and aquaculture by 50%.
- Reduce microplastics released into the environment by 30%.
- Reduce air, water and soil pollution from pesticides as outlined in the Farm-to-Fork Strategy (see 4.6).

The Green Deal (s 1.2.1) also calls for better monitoring, reporting, prevention and elimination of pollution of air, water, soil and consumer products in the EU.

The measures listed in the Action Plan to achieve these goals are therefore largely activities that have already been announced in other Green Deal initiatives, including the Strategy for Sustainable Management of Chemicals (see 4.3). According to the EU Commission, the Action Plan is intended to "serve as a compass for the integration of environmental pollution into all relevant EU policies".

4.2 Biodiversity Strategy

The [Biodiversity Strategy](#) aims to put Europe's biodiversity on the road to recovery by 2030. The strategy aims to designate at least 30% of EU land as protected areas, limit urban sprawl, reduce the risk of pesticides, restore at least 10% of agricultural land to high biodiversity landscapes, manage 25% of EU

farmland organically, make progress in cleaning up contaminated sites, reduce soil degradation and plant more than three billion new trees.

A number of measures and commitments are to be implemented by 2030, such as the:

- Establishment of a larger EU-wide network of protected areas on land and at sea
- Establishment of an EU nature restoration plan
- Take action to enable the necessary profound change and address the global biodiversity challenges.

Since the protection of biodiversity also refers to the sub soil areas, this strategy can also have an impact on soil management requirements, both in terms of sealing and agricultural management.

4.3 Chemicals Strategy

The EU already has complex chemicals legislation, but global chemical production is expected to double by 2030. The already widespread use of chemicals will also increase, including in consumer products. The European Commission published a [Chemicals Strategy for Sustainability](#) on 14 October 2020. It is part of the EU's goal to reduce environmental and thus soil pollution to zero.

4.4 Circular Economy Action Plan

The European Commission adopted the new [Circular Economy Action Plan](#) (CEAP) in March 2020. It is one of the key building blocks of the European Green

Deal (see 1.2.1). The EU's transition to a circular economy is intended to reduce pressure on natural resources. It is also a prerequisite for achieving the EU's 2050 climate neutrality target and halting biodiversity loss. The action plan announces initiatives along the entire life cycle of products. It targets how products are designed, promotes the circular economy, encourages sustainable consumption and aims to ensure that waste is avoided and the resources used remain in the EU economy for as long as possible. Part of this plan is the Water Reuse Regulation (s 4.4.1) as well as the Sewage Sludge Directive (s 2.5) and the Fertiliser Products Regulation (2.3), which aims to harmonise and simplify the use of waste nutrients and organic fertilisers. The effects on the soil are decisively characterised by the pollutant load of the respective substrates and their general effects on soil life.

4.4.1 Water Reuse Regulation

Climate change, unpredictable weather patterns and droughts are depleting water resources in Europe. To address this, the regulation ([EU 2020/741](#)) sets minimum requirements for the use of treated wastewater for agricultural irrigation. The EU regulation for water reuse is valid from 2023 and aims to protect the environment and human and animal health. The regulation specifies:

- Harmonised minimum water quality requirements for the safe reuse of treated urban waste water for agricultural irrigation;
- Harmonised minimum requirements for monitoring, in particular for the frequency of monitoring of the individual quality parameters and for validation monitoring;

- Provisions for risk management to assess and address potential additional health risks and possible environmental risks;
- Approval requirements;
- Transparency provisions whereby key information about each water reuse project is made available to the public.

4.5 Fit-for-55 Goals

With the adoption of the [Land Use, Land Use Change and Forestry \(LULUCF\) Accounting Regulation](#) 2018 (currently being updated), these sectors should be included in the new EU energy and climate policy framework for greenhouse gas (GHG) emissions for the period 2012-2030. They should contribute to the EU's target of reducing GHG by at least [55%](#) by 2030 compared to 1990 levels.

The conservation of wetlands and the enhancement of soil organic carbon are the subject of the European [Climate Change Act](#), which aims at a climate-neutral EU by 2050 (see also 4.5.1).

4.5.1 Carbon Farming Initiative

A [carbon Farming Initiative](#) was also announced as part of the European Commission's farm-to-fork strategy. This was published in spring 2022. It is part of the EU strategy for sustainable carbon cycles. To achieve the goal of storing more greenhouse gases than are emitted by 2050, half of the CO₂ is to be stored naturally and half by technical means. Technical solutions include geoengineering techniques that are not yet fully developed, such as carbon capture and storage (CCS). According to the Commission's plans, five million

tonnes of CO₂ are to be removed EU-wide by 2030 through direct air capture, in which released carbon dioxide is to be filtered out of the air. So-called nature-based solutions include, for example, the rewetting of peatlands (organic soils) and CO₂ certificates for the storage of carbon in mineral soils. Arable and grassland areas on mineral soils can be carbon emitters or sinks, depending on management practices, soil type and climatic conditions. However, studies on the storage potential of mineral soils come to very different conclusions. The most optimistic technical estimates for the EU and UK go up to 295 Mt CO₂eq per year, the and pessimistic estimates up to 9 Mt CO₂eq. However, there are several caveats. First, carbon sequestration tends to saturate, and in addition, soil carbon accumulated over decades can be lost within a few years if climate or management changes²⁷. Furthermore, the protection of organic soils (peatlands), a reduced use of synthetic nitrogen fertiliser in favour of nitrogen fixation with legumes and a reduction in animal numbers contain far more climate protection potential than the storage of carbon in mineral soils on farmland. Humus build-up to promote soil fertility and climate adaptation is described by scientists as a significantly more important soil management measure.²⁸

4.6 Farm-to-Fork Strategy

The part of the Green Deal that concerns agriculture (see 1.2.2) is the [farm-to-fork strategy](#). What is new here is the focus on the entire food system. All stages "from field to fork" are to be made sustainable. The farm-to-fork strategy starts with the pollution of soils through the high use of pesticides in agriculture and aims to reduce the use of chemical pesticides. Excess nutrients from agricultural inputs are also described as an important source of soil pollution.

The goals include:

- Equipping 10 percent of the cultivated areas with elements to promote biodiversity. This includes flower strips, hedges, ponds and dry-stone walls.
- 50 % reduction in the use of pesticides and antibiotics by 2030.
- Reduce nutrient losses by at least 50 %.
- Organic management of 25% of EU farmland.

These measures have a direct impact on agricultural and forestry land management.

4.7 Bioeconomy Strategy

In February 2012, the European Commission presented its [bioeconomy strategy](#) to support "*the shift of the European economy towards an increased and more sustainable use of renewable resources*". With the world's population growing to 10 billion by 2050 and fossil resources running out, the aim is to promote renewable biological resources "*in order to continue to secure the supply of healthy food and feed as well as building materials, energy and other essential products*". The fundamental issue for soil is the expected competition for land in the production of biomass for food, feed, energy and industrial raw materials, and thus an exacerbation of land degradation²⁹ .

4.8 Forest Strategy

The new [EU Forest Strategy 2030](#), which replaces the EU Forest Strategy 2014-2020, is one of the flagship initiatives of the European Green Deal (s 1.2.1) and builds on the EU Biodiversity Strategy 2030 (s 4.2). The strategy aims to

contribute to achieving the EU's biodiversity targets as well as the goal of reducing greenhouse gas emissions by at least 55% by 2030 and achieving climate neutrality by 2050 (s 4.5). An important part within the strategy is taken up by the proposals for afforestation, for the protection and restoration of forests and for securing climate-smart and multifunctional forest ecosystems. The forest strategy must reconcile the use of forests as a source of wood and as a CO₂ reservoir, as well as the water balance function, the recreational function and the preservation of biodiversity. It thus has a direct impact on soil management and soil quality in forests.

4.9 Medicines Strategy

The implementation of the [Medicines Strategy](#) and the EU Strategic Approach to Medicines in the Environment are intended to combat the input of medicines into the environment. In addition, specific measures to address pollution from microplastics, persistent organic pollutants in waste and harmful persistent substances such as per- and polyfluoroalkyl substances (PFAS) in products are foreseen. Veterinary medicines and antibiotic-resistant bacteria can enter soils in areas with high animal populations³⁰. Here, the pharmaceutical strategy is intended to contribute to the protection of soils.

Appendix

Main regulatory formats of EU legislation

Directives: They are indirectly valid and are addressed to the individual member states of the European Union, i.e. they only become binding through the implementation of the national legislator, ordinance or regulation in the individual member state.

Regulations: They are directly applicable in all member states of the European Union and take precedence over national law. They override existing state regulations.

More on legislative and non-legislative acts

https://ec.europa.eu/info/law/law-making-process/types-eu-law_en

Helpful websites:

EU environmental policy:

https://ec.europa.eu/info/policies/environment_en

EU agricultural policy:

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