
Soil protection law and land use as a challenge for climate policy

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The following articles deal with the legal challenges of climate policy in the areas of land use and land use change (LULUC) and the hitherto particularly neglected area of soil protection. Based on a comparison of the legal and political systems in Brazil, Germany and the European Union, and South Africa and Africa as a whole, the existing legal frameworks are analyzed and proposals for their further development are put forward. The focus is on climate protection policy in terms of avoiding or storing greenhouse gases. Issues of climate adaptation are not the focus of this article, although soil and land use also play an important role in this context. This article deals with legal and legal policy issues of soil protection and land use from the perspective of climate protection.

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Table of Contents

Table of Contents.....	2
I. Introduction.....	3
II. The importance of land use and soil protection in climate policy.....	4
1. Overview of the dimensions and functions of a consistent soil protection policy.....	4
2. The connection between soil protection and land use.....	5
3. The climate policy dimension of land use and soil protection	6
III. Legal and institutional challenges for law and policy in the areas of land use and soil protection.....	7
1. The knowledge problem	7
2. The question of ownership	7
3. Fragmented legal framework I: Soil protection law in a multi-level regulatory system....	8
4. Fragmented legal framework II: Soil protection law as cross-cutting law.....	8
5. Land use and soil protection as part of a comprehensive transformation	9
IV. Legal policy approaches to modern land use and soil protection law	10
1. Improving the knowledge base: governance for soil monitoring and inventories – overall and in relation to greenhouse gases.....	10
2. Regulation of soil as a medium	10
3. Reform of land use law.....	11
4. Strengthening the cross-cutting dimension of the legal framework for soil protection and land use.....	12

I. Introduction

In the past, the issues of land use and soil protection as challenges for environmental policy and environmental law have often not received the attention they deserve in science and politics.⁴ However, this seems to be changing recently. A prime example of this is the European Commission's "EU Soil Strategy for 2030" from 2021, with the programmatic subtitle "Reaping the benefits of healthy soils for people, food, nature, and the climate."⁵ It establishes a vision of healthy soils and sets a target of net-zero land consumption by 2050.

The importance of soils as carbon sinks, as mentioned by the Commission, also entered the public consciousness relatively late. This storage capacity is almost equal to that of the oceans and exceeds that of the atmosphere and terrestrial plants many times over.⁶ Soil as a carbon sink only became an official topic of negotiation at COP21 at the 2015 Climate Change Conference in Paris.⁷ This will of course change significantly with COP30 taking place in Brazil in November this year.⁸ This shift in awareness can also be seen in the increasing number of climate lawsuits relating to soil.⁹ One example of this is the ruling of the Estonian Supreme Court on March 14, 2024, which declared a permit for peat extraction to be unlawful.¹⁰

The following articles use a methodology of legal and policy comparison combined with a governance concept.¹¹ The aim of the legal and policy comparison is to identify particularly good regulatory approaches in terms of best practice, but also to identify deficits and legal loopholes. To this end, it makes sense to go beyond a pure legal comparison of existing law (*de lege lata*) and also to include political strategies and innovative political discourse.

This political dimension broadens the spectrum of interesting regulatory approaches, but at the same time contains, at least implicitly, theories about deficits and legal loopholes.

With regard to the countries and regions included in the comparison, Brazil, South Africa (and Africa as a whole) and Germany (and the European Union as a whole) were selected. Brazil was chosen because issues of land use change – particularly in the area of rainforests (deforestation) – also play an enormous role in international climate policy. The threat to soils has led to intense legal policy discussions in Brazil. Brazil also plays a special role as host of COP30, as the Brazilian presidency wants to place a special focus on land use issues.¹² The focus on South Africa (and Africa as a whole) was justified by the fact that there is also a great threat to soils here (especially desertification). At the same time, initial comprehensive efforts are being made there to establish uniform soil protection

⁴ See, for example, the systematic review of the literature in Martinho et al. *Heliyon* 10 (2024), e34307.

⁵ COM(2021) 699 final, p. 1 ff.; similar Sharififar et al. *Environmental Science and Policy* 168 (2025), 104057.

⁶ Rubio et al. *Soil Security* 14 (2024), 100124.

⁷ Rubio et al. (n 6), 2.

⁸ In the "six pillars" of its strategic agenda, the Brazilian Presidency explicitly mentions, among other things, the "protection of forests, oceans, and biodiversity" (pillar 2) and the "transformation of agriculture and food systems" (pillar 3). see the fourth letter from the Brazilian Presidency dated June 20, 2025 (https://unfccc.int/sites/default/files/resource/Fourth_CPD_Letter.pdf).

⁹ See for an overview e.g. Ginzky et al., *International Yearbook of Soil Law and Policy* 2022/Hannam, 2024, 51 (60 ff.).

¹⁰ Excerpts from this judgement with a commentary are printed in the case law section of *KlimR* 10/2025..

¹¹ For a similar approach see e.g. Peake/Robb *Soil Security* 6 (2022) 100055.

¹² See n 8.

legislation.¹³ Finally, with regard to Germany and the European Union as a whole, concrete efforts to create a legal framework at both the national and European levels are becoming increasingly apparent. This reflects an increasingly threatening situation for soil functions.

II. The importance of land use and soil protection in climate policy

Healthy soils are essential for human life. As prerequisites and starting points for a consistent soil protection policy, we will first outline the functions of soils, the threats they face, and corresponding approaches for a consistent soil protection policy (1). This reveals a close connection between issues of soil protection and land use (2). Particular attention will be paid here to the climate policy functions of soils (3).

1. Overview of the dimensions and functions of a consistent soil protection policy

All civilizations depend on healthy soils, at least to secure their food supply. It is therefore not without reason that we can speak of “soil as the foundation of all civilization.”¹⁴ Entire societies and ecosystems have collapsed as a result of climatic changes, but also due to anthropogenic influences such as soil-damaging land use.¹⁵ This historical perspective highlights how important the preservation or restoration of healthy soils is for the existence of civilization.

Addressing issues of soil protection first requires an examination of the concept of soil itself. However, there is no uniform and universally accepted definition of the term “soil,” so that the following articles can only offer a vague approximation without clear contours. The UN focuses on composition and formation: soil is also defined as a natural body consisting of layers (soil horizons) composed of weathered mineral substances, organic material, air, and water. Soil is the end product of the combined influence of climate, topography, organisms (flora, fauna, and humans) on source materials (original rocks and minerals) over time.¹⁶ These conceptual problems are reflected in the attempts at definition by national legislators: For example, Section 2 (1) of the Federal Soil Protection Act (BBodSchG) defines soil as “the upper layer of the earth's crust,” but restricts this to “insofar as it is the carrier of the soil functions mentioned in paragraph 2, including the liquid components (soil solution) and the gaseous components (soil air), excluding groundwater and water beds.”¹⁷

Furthermore, the extremely complex issue of soil protection requires systematization in order to understand the diversity of functions, but also the challenges that legislators face and which they must

¹³ Ruppel/Ginzky/Murray, Legal Pathways to Sustainable Soil Management in Africa: Insights from Botswana, Burkina Faso, Cameroon, Kenya, Madagascar, Morocco, Mozambique, Namibia, South Africa, Uganda and Zambia, 2025.

¹⁴ Rubio et al. (n 6).

¹⁵ Tu et al. Global and Planetary Change 229 (2023) 104222; Wiener Radiocarbon 56 (2014), p. 1 ff.

¹⁶ UN, Framework for the Development of Environment Statistics 2013, p. 6, <https://unstats.un.org/unsd/environment/FDES/MS%201.4%20Soils.pdf> (accessed 25.9.2025); FAO Soils Portal key definitions webpage, <http://www.fao.org/soils-portal/about/all-definitions/en/>.

¹⁷ According to this, soil fulfils the following functions within the meaning of the law: “1. Natural functions as a) the basis of life and habitat for humans, animals, plants and soil organisms, b) a component of the ecosystem, in particular with its water and nutrient cycles, c) a decomposition, compensation and construction medium for material effects due to its filtering, buffering and material conversion properties, in particular also for the protection of groundwater, 2. functions as an archive of natural and cultural history, and 3. Utilisation functions as a) raw material deposits, b) areas for settlement and recreation, c) locations for agricultural and forestry use, d) locations for other economic and public uses, transport, supply and disposal.”

address with innovative legislative techniques. A functional legal and political approach must not be limited to soil protection as an end in itself. Rather, the legal and political shaping of the complex issue of soils and their protection requires a perspective that focuses on soil functions and services.¹⁸ Only by understanding why human civilization depends on healthy soils can we identify options for action to protect and preserve them.

The European Commission's definition of when soils are healthy can serve as a starting point.¹⁹ According to this definition, a good chemical, biological, and physical condition can be determined by the fact that soils can provide as many ecosystem services as possible, which the Commission lists as follows:

- (1) Production of food and biomass, including in agriculture and forestry: soils thus serve directly or indirectly to provide food (products harvested from fields, animals for consumption).
- (2) Absorption, storage,²⁰ and filtration of water and conversion of nutrients and substances, thereby protecting groundwater bodies
- (3) Provision of the basis for life and biodiversity, including habitats, species, and genes
- (4) Acting as CO₂ reservoirs: This primarily reflects the climate protection function of soils.
- (5) Providing a physical platform and cultural services for people and their activities
- (6) Acting as a source of raw materials: Wood, minerals contained in the soil that can be extracted.
- (7) Acting as an archive of geological, geomorphological, and archaeological heritage: cultural landscapes.

A systematic examination of the greatest threats to soil, such as increasing soil erosion, deterioration of soil structure, soil sealing, acidification, or salinization, can be a central starting point for legal policy considerations on soil protection.

2. The connection between soil protection and land use

A special area of soil protection law and policy is the regulation of land use and land use change, which primarily addresses land acquisition and distribution in addition to land use conflicts.²¹ Land use encompasses the measures, activities, and interventions that humans undertake in a particular type of land cover in order to produce, change, or maintain it. This definition of land use establishes a direct connection between land cover and human actions in their environment.²²

The terminology of land and land use is widely used, as evidenced by relevant analyses by the IPCC²³ or the WBGU²⁴. For example, the IPCC defines land as “the terrestrial part of the biosphere that includes natural resources (soil, near-surface air, vegetation and other biota, and water), ecological processes,

¹⁸ Mason et al. *Frontiers in Soil Science* 3 (2023), 1 (2).

¹⁹ COM(2021) 699 final, 5.

²⁰ Shariffar et al. (n 5).

²¹ Hartmann et al., *Land Policies in Europe: Land-Use Planning, Property Rights, and Spatial Development*/Hartmann et al., 2025, 3 (5 f.).

²² UN, *Manual of the Basic Set of Environment Statistics of the FDES 2013*, p. 7, https://unstats.un.org/unsd/environment/FDES/MS_1.2.1_2.3.1_Land%20Cover_Land%20Use.pdf (accessed 25.9.2025).

²³ IPCC, *Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*, 2019.

²⁴ WBGU, *Rethinking Land in the Anthropocene: from Separation to Integration*, 2021, p. 15.

topography, and human settlements and infrastructure that function within this system.” The collective term biota, which is rarely used in everyday language, refers to “all living organisms in an ecosystem, such as plants, animals, fungi, and bacteria.”²⁵ This broader perspective, which goes beyond soil in the narrower sense, is to be welcomed in view of the close connections between soil as a resource and what happens on it, in non-technical terms.

This term is functionally very similar to the internationally used term “land.” However, linguistic difficulties occasionally arise in German, for example because a term such as ‘Landverschlechterung’ (corresponding to the English term “land degradation”²⁶) is unusual in common usage. In the following, an attempt will be made to address this by viewing soil protection and land use as parallel political challenges.

3. The climate policy dimension of land use and soil protection

Intact soils are essential for addressing human challenges such as maintaining or restoring food security and biodiversity.²⁷ In this context, the primary focus will be on the climate policy dimension of land use and soil protection. Indeed, soils play a central role in achieving international and national climate targets.

The climate policy relevance of soils should not be underestimated.²⁸ Soils are the most important terrestrial carbon sink and, from a global perspective, the second most important CO₂ storage medium after the oceans,²⁹ with an estimated global storage volume of 1.5 billion tons of CO₂.³⁰ This means that soils store two to three times as much carbon globally as the entire atmosphere (and even more than the atmosphere and the Earth's total vegetation biomass combined).³¹ When intact, soils are therefore our most effective land-based allies in climate protection – when damaged, however, they become immense sources of emissions.

In order to classify and systematize the savings potential, a distinction can be made between different soil types and their types of use. While forests, their sustainable use, and the problem of deforestation have long been the focus of climate policy interest, the paramount importance of preserving and restoring moors is now increasingly recognized.³²

²⁵ This is the definition given in a lexicon published by the Federal Ministry of Research, Technology, and Space (<https://www.pflanzenforschung.de/de/pflanzenwissen/lexikon-a-z/biota-1132>).

²⁶ Compare e.g. the definition of IPCC (n 23), 4.1.3.

²⁷ WBGU (n 24), p. 21 ff.

²⁸ UBA, Rolle der Böden bei der Eindämmung des Klimawandels, 2022, p. 17 ff.; IPCC (n 23), p. 131 ff.

²⁹ European Commission, Soil: the hidden part of the climate cycle, https://climate.ec.europa.eu/system/files/2016-11/soil_and_climate_en.pdf.

³⁰ European Commission (n 29), p. 5.

³¹ Le Quéré et al., 2016, cited after UBA (n 28).

³² See also, in particular, the article on Germany and Europe by Reinholz/Rodi in KlimR 10/2025 and on this webpage for more details, <https://www.ikem.de/en/cop30/>.

III. Legal and institutional challenges for law and policy in the areas of land use and soil protection

1. The knowledge problem

Regulation in the area of soil protection and land use begins – more so than in other policy areas – with an enormous knowledge problem. Issues relating to soil conditions and the details of actual land use are extremely fragmented and highly heterogeneous in nature, which can only be recognised on site.

A consistent soil protection and land use policy requires the most accurate possible recording of these practices on site: What types of soil are there and what condition are they in? What changes are emerging and how can land use practices and their negative effects be characterised? A large number of investigations and studies are currently working on this key preliminary question for efficient and targeted regulation. Reference should be made here, for example, to the statements of the IPCC,³³ the EEA³⁴ or the Federal Environment Agency.³⁵

However, it is the legislator who is called upon to provide procedures and instruments for this knowledge challenge. For good reasons, the European legal framework, which is nearing completion, is taking this approach, as can already be seen from the short title ‘Soil Monitoring Directive’.³⁶

2. The question of ownership

The regulation of soil (and land use) must be based on the fact that, worldwide, soil is generally owned, either by the state or by private individuals. Common use in the sense of the classic ‘commons’ is virtually non-existent.

Public and, even more so, private ownership of land pursues specific interests that are often damaging to the soil and do not generally serve the common interest in healthy soil.³⁷ In economic terms, these are externalities.

This question of ownership is relevant to soil protection and land use policy in several respects: traditional regulation in the form of public law aims to control the behaviour of private landowners. It therefore constitutes an intervention in the fundamental right to property that requires justification (at least in the case of private ownership).³⁸ In the case of public property, the state has more extensive control options, depending on whether the state itself (federal or state) or independent legal entities under public law (such as municipalities) are the landowners. The respective public-law corporation is, of course, largely free to engage in soil protection on its land. It can also commission nature conservation associations to do so.³⁹

An exciting and, at present, little-researched question is the extent to which private law can be used to control behaviour. One option is along the lines of contractual nature conservation law. This costs

³³ IPCC (n 23).

³⁴ EEA, The State of Soils in Europe: Fully evidenced assessment of the pressures driving soil degradation, 2024.

³⁵ UBA (n 28).

³⁶ COM(2023) 416 final.

³⁷ Fox, Utah Law Review 2024, 1 (10 ff.).

³⁸ In the USA, approximately two-thirds of the land is privately owned, cf. Fox (n 37), 10 mwN.

³⁹ See Ginzky et al., International Yearbook of Soil Law and Policy 2017/Owley, 2018, 339 (344 f.) for international examples.

money and does not bind the parties involved on a permanent basis.⁴⁰ A second option lies in obligations enshrined in land registry law.⁴¹ As a rule, this can also only be done on a voluntary basis on the basis of private self-commitments, i.e. contractually agreed or stipulated in a will.

3. Fragmented legal framework I: Soil protection law in a multi-level regulatory system

The legal framework for land use and soil protection is extremely fragmented. This is primarily due to the fact that, particularly within the European Union, it is part of a multi-level regulatory system ranging from international to regional and local legal frameworks.⁴²

First at local and regional level, then possibly within the framework of supra-regional authorities,⁴³ national legislation is enacted, which in turn must be based on a higher-level multilateral and transnational framework such as that of the European Union, provided that the nation state is part of such an association.

International law relevant to soil protection is extremely fragmented and contains few concrete standards.⁴⁴ International climate law is certainly a relevant legal matter given the relevance of soils as greenhouse gas sinks, but it contains virtually no concrete statements.⁴⁵ Specific legal acts are vaguely worded, such as the European Soil Charter, which was adopted by the Council of Europe in 1972, the World Soil Charter of 1991 and the Global Soil Partnership of 2012, both of which were adopted by the Food and Agriculture Organisation of the United Nations. Relatively concrete standards can only be found in relation to specific land uses and soils, such as the Ramsar Convention on Wetlands or the United Nations Convention to Combat Desertification (UNCCD). In addition, there are a number of other standards that are relevant to land use and soil protection, such as the human right to food⁴⁶ or the United Nations' Sustainable Development Goals (SDGs).⁴⁷

4. Fragmented legal framework II: Soil protection law as cross-cutting law

Another difficulty in creating a consistent legal and political framework for soil protection and land use is that these areas of law – like climate law – are classic cross-cutting issues. This means that standards from a variety of legal and political areas are or may be relevant to the goals of sustainable land use and ensuring sufficiently good soil quality. The following articles bring together ideas and approaches. Below is an overview of important regulatory complexes with a pronounced interaction with land use and soil protection; their significance naturally varies between the countries and regions compared.

⁴⁰ Ginzky et al. (n 39), 345.

⁴¹ Ginzky et al. (n 39), 346 ff.

⁴² On the fragmentation of soil protection law in the multi-level system, see e.g. Martinho et al. (n 4).

⁴³ In Germany, this refers in particular to the federal states.

⁴⁴ See also UBA, Improving International Soil Policy – Analysis and Recommendations, 2020; for an overview, see Ruppel Soil Security 6 (2022), 10056.

⁴⁵ The Paris Agreement mentions food production security as a climate policy consideration, at least in the preamble and in Article 2.

⁴⁶ See Art. 25 (1) of the United Nations Universal Declaration of Human Rights: "Everyone has the right to a standard of living that ensures his and his family's health and well-being, including food, clothing, housing..."

⁴⁷ See Ruppel (n 44), 2 f.; Ginzky et al. (n 39), 340 f.

The policy areas of soil protection and land use are centrally concerned with resolving (land) use conflicts. This addresses the traditional policy and legal area of national and regional planning, and for urban areas, urban planning and urban development law and policy.⁴⁸ The challenges of climate change in particular are giving rise to interesting sector-specific innovations, such as climate risk zoning.⁴⁹

It stands to reason that many standards of general environmental law can play a role in the spectrum under consideration. For example, according to Article 3 of the Environmental Impact Assessment Directive (EIA Directive), an environmental impact assessment must always take into account the effects of a project on soil or climate. In 2014, the factor 'land area' was added, so that land use has been included in environmental impact assessments ever since.⁵⁰ The same applies to landscape conservation and nature conservation law (especially biodiversity).

Key climate-relevant land uses are traditionally covered by specific bodies of law, such as forestry and forest law on the one hand and agricultural law on the other. All of the following articles highlight key aspects of these areas of law.⁵¹

The list of other areas of law with implications for soil protection and sustainable land use is long. Examples include the importance of waste law in relation to the remediation of contaminated soil, chemicals law in relation to fertilisers or pesticides,⁵² and mining law.⁵³ Water law should also be highlighted here, given its importance for peatlands, which are so relevant to climate policy.⁵⁴

5. Land use and soil protection as part of a comprehensive transformation

When land use and soil protection are viewed from a climatic perspective, it becomes clear that this is an unprecedented, enormous transformation process. Law and politics have set themselves the goal of steering and transforming the economy and society, with an objective that will fundamentally change living and economic conditions. This brings with it several problems.

First of all, it is a planning process that spans decades, as can be clearly seen in the EU soil protection strategy with its targets for 2050.⁵⁵ The law must steer this process unerringly over a long period of time (even in the event of a change of majority). At the same time, however, the (planning) regulations must also be sufficiently flexible to allow future democratically legitimised legislators room for manoeuvre and to adapt the law to changed circumstances.⁵⁶

Such profound transformations have a fundamental impact over decades on traditional forms of land use, which are of great importance to regional communities. There will be winners and losers, and the

⁴⁸ Ruppel KlimR 10/2025, II.2.b.ff and on this webpage, <https://www.ikem.de/en/cop30/>.

⁴⁹ See, for example, da Silva Martins/Sukiennik/Dieguez Leuzinger in KlimR 10/2025, II.3 and on this webpage, <https://www.ikem.de/en/cop30/>.

⁵⁰ For an empirical overview of the relevant practices in individual EU member states, see, for example, Schatz et al. Land Use Policy 111 (2021), 105730.

⁵¹ See, for example, Reinholz/Rodi (n 32) on the Common Agricultural Policy; da Silva Martins/Sukiennik/Dieguez Leuzinger (n 49) under II.3. on a climate protection-oriented agricultural policy and under II. on issues relating to stopping deforestation and reforestation.

⁵² See for further information Reinholz/Rodi (n 32).

⁵³ Ruppel (n 48), II.2.b.ee.

⁵⁴ See for further information Reinholz/Rodi (n 32).

⁵⁵ See for further information Reinholz/Rodi (n 32).

⁵⁶ See Rodi KlimR 2025, 162 ff.

legal system must be supplemented by elements of a just transition. It is not surprising that this legal policy petition plays a prominent role in Africa⁵⁷ and Brazil⁵⁸ in particular.

IV. Legal policy approaches to modern land use and soil protection law

1. Improving the knowledge base: governance for soil monitoring and inventories – overall and in relation to greenhouse gases

Of course, the systematic collection of baseline data can and should be guided by the law. Monitoring, reporting and verification are essential for making legislative land decisions in the first place. This is precisely where the new Soil Monitoring Directive, which is expected to come into force at the end of 2025 or beginning of 2026, comes in.⁵⁹

The legal policy demand for an improved legal framework to enhance the knowledge base in the areas of land use and soil protection is a recurring theme in the following articles. In the European Union, the Soil Monitoring Directive will necessarily trigger momentum in this direction once it comes into force.⁶⁰ The call for national soil information systems is also growing louder in Africa, particularly South Africa.⁶¹ In Brazil, the existing rural environmental registers (CAR) can be seen as an approach with potential for expansion.⁶²

2. Regulation of soil as a medium

Soils as environmental media are often not subject to comprehensive regulation in the same way as other environmental media such as air and water.⁶³ Like these, they are a (extremely important) public good with all the associated necessities, but also difficulties, of regulation in the public interest.⁶⁴

Given its cross-cutting nature, a holistic view plays an important role. The diverse functions of soil must be taken into account and conflicting objectives resolved (e.g. nature conservation versus climate protection). There is a growing global recognition that we need ‘soil-centric policies’⁶⁵ – in other words, a soil-centred legal policy approach.

In view of the functional diversity of intact soils, a consistent soil protection policy must be geared towards a variety of protection purposes. Even if the term ‘soil’ seems trivial from a legal point of view, its legal definition is complex, and the importance of soil as a medium – especially from a climatological point of view – as well as the diversity of this term are largely underestimated. There are 32 different soil types worldwide, 24 of which are found in the EU.⁶⁶ Even if we differentiate only according to very

⁵⁷ Ruppel (n 48), III.4.

⁵⁸ Da Silva Martins/Sukiennik/Dieguez Leuzinger (Fn. 49), VI.4.

⁵⁹ Panagos et al. Global Challenges 9 (2025), 2400336; COM(2023) 416 final.

⁶⁰ See for further information Reinholz/Rodi (n 32).

⁶¹ Ruppel (n 48), II.3.

⁶² See da Silva Martins/Sukiennik/Dieguez Leuzinger (n 49), II.2.

⁶³ For the USA, see Fox (n 37), 15 ff.

⁶⁴ Fox (n 37), 28 ff.

⁶⁵ Shariffar et al. (n 5).

⁶⁶ COM(2021) 699 final, , 1.

basic forms of use – settlements and infrastructure, agriculture, forests, nature and moors – it becomes clear how difficult it is to create an overarching comprehensive legal framework.

In the current phase of establishing a comprehensive legal and political framework for land use and soil protection, it is anything but trivial to find material standards for a holistic approach. Ultimately, an integrated consideration of different forms of land use (and the interests to be taken into account) as well as the diverse political objectives (from food security and biodiversity to climate protection) can only lead to guidelines with reservations for legal reasons.

According to Article 1(1) of the draft directive, the aim is to achieve healthy soil by 2050, characterised by soil that can provide a wide range of ecosystem services to an extent that meets ecological, social and economic needs, prevent and mitigate the effects of climate change and biodiversity loss, and increase resilience to natural disasters and food security; in addition, soil contamination should be reduced to a level that is no longer considered harmful to human health and the environment.

The situation in Brazil is a prime example of the legal policy demand for comprehensive regulation of soil as a medium.⁶⁷

The German Soil Protection Act (BBodSchG) was originally intended to be a media-centred regulation. In its current form, however, it is so fragmented that it falls far short of the requirement for comprehensive regulation of soil as a medium.⁶⁸ The same applies to the draft European Soil Monitoring Directive. However, this is only intended as a first step towards European regulation of soil, starting with the essential fundamental issues such as a monitoring system.

The model law for sustainable soil management recently adopted by the Pan-African Parliament (PAP) represents a very interesting step in this direction.⁶⁹ It is based on a comprehensive comparative legal analysis with eleven country reports.⁷⁰

3. Reform of land use law

Regardless of the specific circumstances, the abstract nature of land use already plays an important role in the development of the ecological or climatic functions of soils: for example, there are hardly any positive effects of residential use (rather, emissions of all kinds are regularly released). In agricultural use, on the other hand, the conditions of use are decisive. Other types of use, however, have fundamentally positive (forests) or even very positive ecological or climatic effects (moors). It is therefore not surprising that the climate factor is playing an increasingly important role in the literature on soil (protection) policy.⁷¹

The question of how soils and their functions can be protected or restored depends to a large extent on the central preliminary question of how the land in question is used overall. Regardless of legal approaches, land use practices that have been deeply rooted in local communities for centuries play an essential role.⁷² Land is a scarce resource, as it is needed for various human needs such as buildings

⁶⁷ Da Silva Martins/Sukiennik/Dieguez Leuzinger (n 49), IV.1. und V.1.

⁶⁸ See Reinholz/Rodi (n 32), V.2.

⁶⁹ See the PAP press release (<https://pap.au.int/en/news/press-releases/2025-09-26/pap-analyses-draft-model-law-sustainable-soil-management-africa>) and Ruppel (n 48).

⁷⁰ See Ruppel (n 48) and the book review by Kopytsia in KlimR 10/2025.

⁷¹ See the statistics in Mason et al. (n. 18), 5 ff.

⁷² Plieninger/Höchtl/Spek Environmental Science & Policy 9 (2006), 317 ff.

and infrastructure, agriculture/food or natural purposes. These are often incompatible with each other, leading to conflicts of use. It is the task of politics and law to find practical and equitable solutions to balance these needs.

Land use practices are the result of land use policy.⁷³ As a rule, land is allocated to private (and sometimes public) owners. The question of how and by whom land is owned and used depends on factual conditions (deserts, water areas) and historically determined decisions.

On this basis, current land use policy begins with the design and framework definition of land use through public instruments such as spatial planning, expropriation, etc. It is important to note that the interests of landowners are protected by fundamental rights, especially property rights, and that public intervention must be justified.⁷⁴

Land use changes can be observed as a result of land policy (e.g. from agricultural land to urban areas or wetlands). The authorities attempt to prevent and stop illegal land use changes (such as the deforestation of tropical forests). Another branch of land policy concerns land management, whereby rules for the use of certain categories of land are established in accordance with public interests (e.g. agricultural policy).

4. Strengthening the cross-cutting dimension of the legal framework for soil protection and land use

Since soil protection and land use law – like climate law – are classic cross-cutting areas of law,⁷⁵ all relevant legal norms must be reviewed to determine whether and to what extent they can be reformed in terms of their contribution to sustainable land use and soil protection. The following contributions illustrate this particularly in the areas of agricultural law and forestry law. In this sense, the legal link between the norms of general climate law and the legal areas of land use and soil protection law must also be critically reviewed.⁷⁶

⁷³ Compare Hartmann et al., Land Policies in Europe: Land-Use Planning, Property Rights, and Spatial Development/Hartmann et al., 2025, 241 (242 ff.).

⁷⁴ Hartmann et al. (n 21), 7 ff.

⁷⁵ See III.4 above.

⁷⁶ See, for example, Reinholz/Rodi, V.2., on legal developments in the German Climate Protection Act (KSG); for Brazil, see da Silva Martins/Sukiennik/Leuzinger, V.2.