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ARTICLE

Climate adaptation law: a European perspective

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Abstract
In contrast to climate protection law, which regulates the mitigation of climate change, climate adaptation law deals with the management of the unavoidable consequences of climate change. This article provides an overview of its legal basis from a European perspective. In addition to international law, especially the Paris Agreement, EU law is of central importance in this respect. It is primarily shaped by the EU Climate Law enacted in 2021. However, this Law only sets a general framework and is further defined by legal acts of various sectoral policies, especially in the field of environment. Climate adaptation regulations at the level of European member states are presented using the example of Germany, where a Federal Climate Adaptation Act is currently being drafted. Due to Germany's federal state structure, state legislation is also analysed. Most of the German states ("Länder") have their own climate laws, although their content varies. The municipal level is only addressed with restraint in these laws. The reasons for this are of a fiscal constitutional nature and will be explained in more detail.

Keywords International climate adaptation law · EU climate adaptation law · German climate adaptation law · Mainstreaming of climate adaptation · Climate adaptation strategies · Municipal climate adaptation concepts

1 Introduction

Along with rising temperatures, the world is experiencing an increase in extreme weather events. Storms, floods, droughts and heat waves claim human lives, cause damage to ecosystems and lead to economic disadvantages. The frequency and

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intensity of these extreme weather events will continue to increase.[1] Climate change impacts are having far-reaching effects, also in Europe and the territory of the European Union (EU).[2] Water shortages in the EU have affected economic activities in the fields of agriculture, aquaculture, tourism, power plant cooling, and inland navigation. Additionally, the health and well-being of Europeans is affected, who increasingly suffer from heat waves.[3] Halting all greenhouse gas emissions would still not prevent the climate change impacts that are already occurring.[4] These consequences will continue for decades, even if global and European efforts to cut greenhouse gas emissions prove effective.[5] In addition to taking climate protection measures, it is therefore also necessary to adapt to the unavoidable consequences of climate change.[6]

In accordance with the Paris Agreement (PA)[7] and the European Climate Law[8] (CL), climate adaptation measures are activities which enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change. Climate and thus climate change affects many environmental compartments and sectors. This results in a particular complexity of both the possible impacts and the measures and instruments for adaptation, which extend to very different areas of policy fields.[9] In some cases, for instance, the focus is on technological solutions (e.g. the construction of dikes and dams for protection against floods), while other approaches pursue nature-based solutions (e.g. renaturation measures) to strengthen ecosystem functions which naturally increase resilience to the impacts of climate change.[10] Moreover, the design of adaptation instruments depends not only on the specifics of individual sectors, but also on concrete regional or local circumstances, which is why planning instruments are of particular importance for spatial climate adaptation measures.[11]

The described diversity and contextuality of adaptation needs and adaptation instruments and the need for further dynamic development due to the fact that there are still many uncertainties regarding the climate change, gives climate adaptation law its own character.[12] There are no measurable targets such as the ”2 degree or 1.5 degree target“ or budgeting of greenhouse gas emissions as there are in climate change mitigation.[13] Rather, specific requirements are placed on climate adaptation

[1] EEA (2020, 153 ff.).

[2] European Commission (2021a, 1).

[3] Ibid.

[4] Ibid.

[5] Ibid.

[6] Mayer, B (2021, 143).

[7] Paris Agreement, UNFCCC, FCCC/CP/2015/L.9/Rev.1 and German Federal Law Gazette (BGBl.) II 2016, 1082.

[8] Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality, OJ L 243, 9.7.2021, 1–17.

[9] Albrecht, J (2020, 13).

[10] Saurer, J (2022, 514) with further references.

[11] Saurer, J (2022, 514) with further references; Birkmann, J and Blätgen, T (2018, 1102 ff).

[12] Kment, M (2010, 70); Saurer, J (2022, 514).

[13] Saurer, J (2022, 514); Mayer, B (2021, 164 f.); BMUV (2022, 8).

law, such as the promotion of raising awareness, knowledge generation, uncertainty assessment and flexibility.[14] In addition to overarching climate adaptation regulations in special climate laws, climate adaptation regulations have found their way into the laws of the affected policy fields (so-called "mainstreaming").[15] Since climate change is a global problem, adaptation law exists at all levels of the multi-level system. The scope and degree of the concretisation of adaptation law approaches vary. They are condensed from international law to European law to national law.[16]

The aim of this article is to trace climate adaptation law at the above-mentioned levels from a European perspective. In addition to climate adaptation law at the international level (2.) and EU level (3.), the legal situation at the national level is presented, using Germany as an example (4.). The article concludes with an outlook for the forthcoming adoption of a Federal Climate Adaptation Law in Germany and its added value.

2 International law

Climate adaptation is a subject of international law and since the adoption of the United Nations Framework Convention on Climate Change (UNFCCC) it has gained significantly in importance to date.[17]

2.1 United Nations Framework Convention on Climate Change

Adaptation is receiving legal attention for the first time in the United Nations Framework Convention on Climate Change (UNFCCC, 1992).[18] The UNFCCC is a framework convention that sets out the general objectives and principles, leaving agreements on details and specifics at the second stage to subsequent agreements.[19] Even though climate adaptation is hardly mentioned in the Convention's target setting, which focuses instead on stabilization of greenhouse gas concentrations in the atmosphere (cf. Art. 2), climate adaptation is mentioned in the subsequent articles. According to Art. 3 para. 3, the Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. This so-called adaptation principle is further specified in Art. 4, which regulates that all contracting Parties are required to develop, implement, publish and regularly update national programmes which are provided for measures to facilitate adequate adaptation to climate change, Art. 4 para. 1 lit. b. Furthermore, the Parties commit to cooperate in their adaptation efforts (Art. 4 para. 1 lit. e, agree to take

[14] Kment, M (2010, 68 ff.). See also the five principles for considering adaptation in environmental law identified by Craig, R K (2010, 9 ff.).

[15] Runhaar, H et al. (2018) with further references.

[16] Müller, T (2008, 194); Kment, M (2010, 64).

[17] Saurer, J (2022, 514).

[18] United Nations, FCCC/INFORMAL/84 GE.05–62220 (E) 200,705 and German Federal Law Gazette (BGBl.) II 1997, 1054.

[19] Kment, M (2010, 64).

adaptation into account in their social, economic and environmental policies and actions as far as possible (Art. 4 para. 1 lit. f), and also agree to carry out relevant impact assessments (Art. 4 para. 1 lit. f). The developed countries further committed to contributing financially to adaptation in developing countries (Art. 4 para. 4).[20]

2.2 Cancun Adaptation Framework

The Kyoto Protocol (1997)[21] has made little progress in terms of concretising the very general adaptation obligations of the UNFCCC.[22] However, a step forward was made by the 2007 Bali Action Plan providing "enhanced action on adaptation "[23] and especially by the Cancun Adaptation Framework, which was established at the COP[24] 16 in 2010. The Cancun Adaptation Framework aims to strengthen action on adaptation in developing countries through international cooperation and invites all parties to the UNFCCC not only to undertake but also to increase their financial and technical support as well as strengthening and/or establishing regional centres and networks in order to promote better planning and implementation of adaptation measures. The framework also aims to boost research, assessments and technology cooperation on adaptation, as well as strengthening education and public awareness. The conference established a process for the least developed countries and other interested developing countries to formulate and implement national adaptation plans.[25] The advances which were made during this period and which led to the Cancun Adaptation Framework are considered to be"of great significance and far-reaching," allowing the establishment of different lines of work that evolved in the following years as well as incorporating new elements and allowing adaptation to achieve greater prominence on the international agenda.[26]

2.3 Paris Agreement

The Paris Agreement[27] adopted at COP 21 in 2015, superseding the Kyoto Protocol, mentions the goal of climate adaptation in a central position (Art. 2 para. 1 b) PA). It thus adds it to the climate protection goal of Art. 2 para. 1 a) PA, which is to limit global warming to 2 degrees, or preferably 1.5 degrees, compared to pre-industrial times.[28] Art. 7 para. 1 PA substantiates the global adaptation targets, namely

[20] Mayer, B (2021, 164).

[21] Kyoto Protocol to the United Nations Framework Convention on Climate Change, 1998; German Federal Law Gazette (BGBl.) II 2002, 966.

[22] Kment, M (2010, 64); Mayer, B (2021, 147).

[23] FCCC/CP/2007/6/Add.1, 1/CP.13, p. 4; https://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf.

[24] Conference of the Parties, cf. Art. 7 UNFCCC.

[25] Decision 1/CP.16, The Cancun Agreements, No. 15 ff., https://unfccc.int/sites/default/files/resource/docs/2010/cop16/eng/07a01.pdf?download.

[26] Di Pietro Paolo, L (2020).

[27] Paris Agreement, UNFCCC, Home, FCC/CP/2015/L.9/Rev.1 and German Federal Law Gazette (BGBl. II) 2016, 1082.

[28] Saurer, J (2022, 514).

enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change. Climate adaptation is regarded as a "global challenge faced by all, with local, subnational, national, regional and international dimensions", which makes a contribution to the long-term global response to climate change to protect people, livelihoods and ecosystems (Art. 7 para. 2 PA). The provision also takes developing countries into account due to their particular vulnerability to the adverse effects of climate change. Art. 7 para. 4 PA states the significance of the current need for adaptation and that greater levels of mitigation can reduce the need for additional adaptation efforts, and that failure to implement mitigation measures can lead to greater adaptation needs and hence greater adaptation costs. This emphasises the interrelatedness between mitigation and adaptation.[29] Moreover, the PA calls for commitments to mutual support and strengthening international cooperation, making explicit reference to the Cancun Adaptation Framework (Para. 6, 7). Each Party shall engage in adaptation planning processes and the implementation of actions (Para. 9), which may also include the assessment of climate change impacts and vulnerability, monitoring and evaluation. The Parties should also submit and update periodically an adaptation communication (Para. 10). However, the planning and communication obligations only apply "as appropriate". International support shall be provided to developing countries to fulfil the above-mentioned obligations (Para. 13). In general, financial support is to be provided to developing countries to assist them with respect to both mitigation and adaptation (Art. 9 PA).

2.4 Glasgow climate pact

The "Glasgow Climate Pact" adopted at the COP 26 in November 2021 pays special attention to climate adaptation.[30] It emphasises the urgency of scaling up action and support in the field of climate adaptation through financing, capacity building and technology transfer.[31] To strengthen the financing of adaptation measures, this decision provides the Adaptation Fund[32] and the Least Developed Countries Fund[33]. [34] Both funds are mandated to deal with concrete finance adaptation projects in developing countries that are particularly vulnerable to the adverse impacts of climate change. Furthermore, it was decided to establish and launch a comprehensive two-year Glasgow–Sharm el-Sheikh work programme to work towards defining what a global goal regarding adaptation would look like.[35]

Despite the UNFCCC regime's increasing emphasis on climate adaptation, the broad formulation of Art. 7 PA in connection with the extensive use of the verbs

[29] Saurer, J (2022, 514); on this already Müller, T (2008, 234).

[30] UNFCCC (n.d.).

[31] Decision -/CP.26 Glasgow Climate Pact, No. 6, https://unfccc.int/sites/default/files/resource/cop26_auv_2f_cover_decision.pdf.

[32] Adaptation Fund (n.d.).

[33] The Global Environment Facility (n.d.).

[34] Decision -/CP.26 Glasgow Climate Pact, No. 6.

[35] Decision -/CMA.3 Glasgow–Sharm el-Sheikh work programme on the global goal on adaptation, https://unfccc.int/sites/default/files/resource/cma3_auv_4ac_Global_Goal.pdf.

"recognize" and "recommend" is criticised as a "declaratory, superficial and general approach to adaptation".[36] Most treaty provisions or decisions of the conference of the parties (COP) on climate adaptation are relatively vague and do not have a high degree of binding force.[37] However, as mentioned above, the states are also required to adopt measures and report on their implementation. In general, international law can only be responsible for distributing cost burdens, setting guidelines for bilateral or multinational interaction (especially for rendering support to developing countries) and providing an impetus to take adaptation measures.[38] The choice of adaptation-relevant means and methods is left to the individual states. Nevertheless, a further concretisation of the adaptation goals seems possible and necessary, as the establishment of the Glasgow-Sharm el-Sheikh work programme shows.

3 European law

The special focus of this contribution is on the European level, which is decisively shaped by the law of the European Union (EU). In this respect, it should be noted first that the EU creates a legal intermediate level for its Member States, such as France or Germany, which other states—for example, those on the Asian or American continent—do not have regarding the realisation of their international adaptation obligations.[39] Not only does the EU play a decisive role as a negotiating and contracting partner at the international level in terms of shaping the international climate agreements, but it also plays a leading role in its internal relations with its Member States when it comes to transposing the international regulations into national law.[40] The EU acquires its creative power through its special powers of action, in particular its legislative powers. In this way, it can translate the requirements of international law in the area of environmental law into directive provisions and anchor them quickly in the national legal systems through the Member States' obligation to implement them.[41] When legislative acts are issued as regulations (cf. Art. 288 Treaty on the Functioning of the European Union—TFEU[42]), then they actually are directly applicable. Against this backdrop, the EU is also referred to as an "implementation catalyst" for international law.[43] It has already made considerable use of its legislative powers in the area of climate adaptation, be it through the adoption of the overarching Climate Law (3.1), or through mainstreaming in various sectoral policy fields (3.2).

[36] Douka, A (2020, 3).

[37] Mayer, B (2021, 148 f.): "range from hortatory to nugatory, imposing few if any obligations on states".

[38] Kment, M (2010, 65).

[39] Kment, M (2010, 65).

[40] Kment, M, ibid.; Müller, T (2008, 199 f.).

[41] Kment, M, ibid.

[42] Consolidated version of the Treaty on the Functioning of the European Union, OJ C 326, 26.10.2012, p. 47–390.

[43] Kment, M (2010, 65).

3.1 European Climate Law

The most important law at the European Level in the field of climate adaptation is the European Climate Law—CL[44] which was adopted in 2021. It contains ambitious regulations on climate protection (e.g. raising the EU's greenhouse gas reduction target from 40 to 55% by 2030) as well as on climate adaptation. The objectives of climate adaptation are set out in Art. 5 para. 1 CL. In accordance with the objectives of the Paris Agreement, the Member States shall ensure continuous progress in enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change. To achieve these objectives, the law formulates a series of mandates for action to the European Commission as well as the EU Member States. This includes the adoption of adaptation strategies, the evaluation of the progress of climate adaptation at national and EU level, broad public participation and the introduction of a scientific advisory body at European level.

3.1.1 Adoption of adaptation strategies

As an instrument for achieving the adaptation targets, Art. 5 para. 2 obliges the EU Commission to adopt an EU strategy on adaptation to climate change in line with the PA and shall review it every 5 years (first time in 2023). This thus consolidates the already existing obligation of the EU as a member of the Paris Agreement.[45] In February 2021 the European Commission adopted an EU strategy for adaptation to climate change,[46] which builds on the first EU adaptation strategy from 2013.[47] While the 2013 strategy focused strongly on knowledge creation in order to be able to proceed in a fact-based manner, the 2021 strategy focuses on the development of solutions from planning to implementation of adaptation measures.[48]

Overarching goal of the new climate adaptation strategy is to achieve a climate-resilient society in Europe by 2050. To achieve this goal the strategy includes four principal objectives: 1. *smarter* adaptation (more and better data on climate-related risks and losses), 2. *faster* adaptation (solutions to help reduce climate-related risk, increase climate protection and safeguard the availability of fresh water) and 3. *more systemic* adaptation (integrating adaptation into macro-fiscal policy, nature-based solutions for adaptation, local adaptation action). The fourth objective concerns the intensification of international measures for adaptation to climate change through the provision of resources, by prioritising action and increasing effectiveness, through the scaling up of international finance and through stronger global engagement.

Not only the European Commission but also the Member States are obliged to adopt and implement adaptation strategies and plans, taking into consideration the EU climate adaptation strategy (Art. 5 Abs. 4 CL). The national adaptation

[44] Regulation (EU) 2021/1119 of 30 June 2021 establishing the framework for achieving climate neutrality, OJ EU L 243, 9.7.2021, 1.

[45] Saurer, J (2022, 515).

[46] European Commission (2021a, 1).

[47] European Commission (2013).

[48] European Commission (2021b).

strategies shall be based on robust climate change and vulnerability assessment, progress assessments and indicators and guided by the best available and most recent scientific evidence. They shall take into account the particular vulnerability of the relevant sectors (inter alia, agriculture, and of water and food systems, as well as food security) and promote nature-based solutions as well as ecosystem-based adaptation. The strategies are to be updated regularly and the updated information must be included in the reports which have to be submitted under Art. 19 para. 1 of the Governance Regulation.[49]

3.1.2 Assessment of union measures and national measures

Furthermore, the Climate Law requires monitoring the success of climate adaptation, whereby a distinction is made between the assessment of Union progress and measures and of national progress and measures[50]:

The assessment of Union progress and measures is regulated in Art. 6 CL und includes the assessment of the *collective progress* on adaptation made by all Member States (para. 1) and the review of the *consistency of Union measures* with ensuring progress on adaptation (para. 2). Both assessments shall be conducted by the European Commission until 2023, and every 5 years thereafter. The conclusions of the assessments under para. 1 shall be submitted by the Commission to the Parliament and Council (Art. 6 para 1 sent. 2 CL). In the case of inconsistency of the measures or if the results of the assessments under para. 1 or 2 show, that the progress is insufficient, the Commission shall take the necessary measures in accordance with the primary law ("Treaties") (Art. 6 para. 3 CL).

A special and innovative instrument to assess Union measures with regard to climate adaptation is the implementation of a climate target compatibility check for EU legal acts and measures under Art. 6 para. 4 CL[51]: Accordingly, the Commission shall assess the consistency of any *draft measure or legislative proposal* (including budgetary proposals) with ensuring progress on adaptation. It shall endeavour to align the measures or proposals with the adaptation progress. In any case of non-alignment, the Commission shall provide the reasons for the non-alignment. This is a procedural instrument which is similar to an environmental or sustainability impact assessment. The aim is to ensure that EU law conforms to the objectives of climate adaptation as closely as possible.

Additionally, the Art. 7 CL stipulates the assessment of *national measures* by the European Commission. Subject of the assessment is the consistency of relevant national measures by ensuring progress on adaptation and taking into account the national adaptation strategies. The Commission shall submit the conclusions of that assessment to the European Parliament and to the Council (ibid., para. 1). In the event of any inconsistency, the Commission may issue recommendations to the Member State (ibid., para. 2) which must, within six months, notify the Commission of how it intends to take due account of the recommendations. Furthermore, the

[49] Regulation (EU) 2018/1999, OJ L 328, 21.12.2018, 1–77.

[50] Schlacke, S et al. (2021, 622 f.).

[51] Schlacke, S et al. (2021, 622.).

Member State is to report how it has taken due account of the recommendations. If the Member State fails to address the issue, that Member State is required to Member State provide its reasoning (ibid., para. 3).

3.1.3 Public participation

As known from other EU environmental legislations, the Commission should involve the public in the implementation of the EU Climate Law (Art. 9 CL). This obligation also relates to the implementation of climate adaptation goals. The Commission shall engage with all parts of society to enable and empower them to take action towards a just and socially fair transition to a climate-resilient society. It shall facilitate an inclusive and accessible process at all levels, including at national, regional and local level and with social partners, academia, the business community, citizens and civil society, for the exchange of best practices and to identify actions to contribute to the achievement of the objectives of the CL (ibid., para. 1).

The Commission shall use all appropriate instruments, to engage citizens, social partners and stakeholders, and foster dialogue and the diffusion of science-based information about climate change and its social and gender equality aspects (ibid., para. 2). The European Climate Pact,[52] which is an EU initiative involving interest groups from civil society in the design of measures at European level, should also be used by the Commission for public participation, without, however, formalising the European Climate Pact in law, as proposed by the Parliament.[53]

3.1.4 Advisory board on climate change

Art. 3 CL introduces a new scientific advisory body at EU level, the"European Scientific Advisory Board on Climate Change ". It shall serve as a point of reference for the Union on scientific knowledge relating to climate change by virtue of its independence and scientific and technical expertise (ibid., para 1).[54] The Advisory board shall consist of 15 scientific experts and shall cover a broad range of relevant disciplines.[55] The members are independent of Member States and Union institutions in their positions and work programme.[56]

The tasks of the advisory board are listed in Art. 3 para. 2 and include among others the provision of scientific advice and the issuing of reports on existing and proposed Union measures, the exchange of independent scientific knowledge, the identification of actions and opportunities needed to successfully achieve the Union climate targets and the raising of awareness on climate change and its impacts. These tasks are to be interpreted not only in terms of climate protection, but also climate

[52] European Union (n.d.).

[53] European Parliament, P9_TA(2020)0253, amendment 83, pp. 60 f.; Schlacke, S et al. (2021, 624).

[54] The establishment of the Advisory Board is based on an amendment to the Regulation (EC) No. 401/2009 on the European Environment Agency and the European Environment Information and Observation Network, in which a new Art. 10a was inserted (Art. 12 CL).

[55] Art. 10a para. 2 of the Regulation (EC) No. 401/2009 as amended by Art. 12 CL.

[56] Art. 10a para. 4, ibid.

adaptation. The Advisory Board shall be guided in its work by the best available and most recent scientific evidence, including the latest reports of the IPCC, IPBES and other international bodies (Art. 3 para. 2). It should complement the work of the European Environment Agency (EEA) while acting independently in discharging its tasks.[57]

With the establishment of the Scientific Advisory Board, the EU is following the example of Member State climate advisory bodies,[58] although the Member State bodies differ in their tasks.[59] The proposal of the European Parliament to push for the introduction of climate advisory bodies in all EU Member States,[60] however, did not find its way into the Climate Change Act. Instead, Art. 3 para. 4 CL states that each Member State "is invited" to establish a national climate advisory body. When a Member State decides to establish such an advisory body, it shall inform the European Environment Agency (EEA) thereof.

Despite its legal nature as a regulation, the EU Climate Change Act is characterised by a framework character as it sets adaptation targets and provides a procedural framework (i.e. strategies for achieving the targets, monitoring and public participation) while the substantiation of the measures is reserved for further legal acts.[61] This regulatory approach is also referred to as policy planning law.[62] Such a regulated and controlled policy planning appears to be necessary to properly steer the complex transformation towards a climate-adapted environment, economy and society and to achieve a strong political and legal commitment to the goals of climate adaptation.[63] Due to the high degree of abstraction of the regulations of the Climate Law, it should be clarified that this kind of regulated policy planning is not a guarantee, but an important support for achieving climate adaptation in the EU and in the Member States.

3.2 Climate adaptation in the legal acts of sectoral policy fields

Beyond the overarching EU Climate Law, the EU has also mainstreamed climate adaptation through various directives and regulations concerning sectoral policies.

[57] Art. 10a para. 3, ibid.

[58] E.g., Expert Council on Climate Issues under Sec. 11 and 12 of the German Climate Protection Act (Klimaschutzgesetz – KSG).

[59] Climate Advisory bodies also exist in other European states such as Denmark, Finland, France, Ireland and Sweden, see Schlacke, S et al. (2021, 624) with further references.

[60] Cf. European Parliament, P9_TA(2020)0253, amendment 76, 46 f.

[61] Schlacke, S et al. (2021, 622).

[62] Reese, M (2020, 641).

[63] Cf. Reese, M (2020, 642).

3.2.1 EIA Directive

An important example is the EIA Amendment Directive 2014/52/EU,[64] which explicitly requires the consideration of climate change and climate adaptation in the Environmental Impact Assessment (EIA). Climate adaptation is mentioned in recital 13 as one of the reasons for the adoption of the EIA Amendment Directive as it will cause further negative environmental impacts and endanger economic development. In this respect, it is not only appropriate to assess the impact of projects on the climate (e.g. through greenhouse gas emissions), but also "their vulnerability to climate change". According to Art. 3 para. 2 of the Directive, the effects of the project on the protected items of the EIA include such effects as are to be expected due to vulnerability to major accidents and/or disasters (which may also include, for example, flooding or rising sea level). A description of the "vulnerability of the project to climate change" is a mandatory part of the EIA report and must therefore be taken into account in the consideration of the project approval.[65]

3.2.2 Regulation on infrastructure funding

Great care is also taken to ensure that European funding is used in line with the goal of climate adaptation. In the area of infrastructure funding, for example, Regulation 2021/1060/EU[66] lays down common provisions for funds such as the European Regional Development Fund, the European Social Fund Plus, the Cohesion Fund, linking the funding of medium- and long-term infrastructure investments to the requirement of ensuring climate compatibility. Accordingly, the managing authority must ensure the climate proofing of investments in infrastructure which have an expected lifespan of at least 5 years (Art. 2 no. 42 and Art. 73 para. 2 j of the Regulation). This is intended to prevent infrastructure from being vulnerable to potential long-term climate impacts (cf. Art. 2 no. 42 of the Regulation).

3.2.3 Taxonomy Regulation

Climate adaptation is also the subject of the Taxonomy Regulation[67] adopted in 2020, which regulates transparency for companies and investors for investments

[64] Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, OJ L 124, 25.4.2014, 1–18.

[65] Art. 5 para. 1 in conjunction with Annex IV, No. 5 lit. f of the EIA Directive.

[66] Regulation (EU) 2021/1060 of the European Parliament and of the Council of 24 June 2021 laying down common provisions on the European Regional Development Fund, the European Social Fund Plus, the Cohesion Fund, the Just Transition Fund and the European Maritime, Fisheries and Aquaculture Fund and financial rules for those and for the Asylum, Migration and Integration Fund, the Internal Security Fund and the Instrument for Financial Support for Border Management and Visa Policy, OJ L 231 of 30.6.2021, 159.

[67] Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088, OJ L 198, 22.6.2020, 13–43.

in projects and economic activities. According to Art. 1 para. 1, the Taxonomy Regulation contains criteria for determining whether an economic activity is to be classified as environmentally sustainable, in order to be able to determine the degree of environmental sustainability of an investment. Climate change adaptation is one of the six environmental objectives pursued (cf. Art. 9 of the regulation). Other goals are: climate change mitigation, sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, and the protection and restoration of biodiversity and ecosystems. The criteria for determining the conditions under which a particular economic activity is considered qualified to significantly contribute to and establish climate change mitigation or adaptation were further specified in December 2021.[68]

3.2.4 Floods Directive

Another example of the mandatory consideration of climate adaptation is the Floods Directive 2007/60/EC, FD,[69] which aims to create a framework for the assessment and management of flood risks in the EU.[70] The increase in floods constitutes a climate change impact.[71] In this sense, the Directive mentions in the 2nd recital that climate change contributes to an increase in the likelihood and adverse impacts of flood events. The impacts of climate change on the flood hazard are explicitly taken into account in the provisions on preliminary flood risk assessment (cf. Art. 4 para. 2 FD).[72] Furthermore, the projected impacts of climate change on the flood hazard also have to be considered in the periodic review and updating of the preliminary flood risk assessment and the flood risk management plans (cf. Art. 14 para. 4 FD). Guidance Document No. 24 of the European Commission provides detailed recommendations on how to take climate change into account in the various elements of flood risk management.[73]

3.2.5 Water Framework Directive

However, there are also laws that do not explicitly mention climate adaptation, but do leave room for it to be taken into account, such as the Water Framework Directive (2000/60/EC, WFD). Climate change is not explicitly mentioned in the text of the WFD. Nevertheless, there is agreement that climate change should and can be taken

[68] Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives, OJ L 442, 9.12.2021, 1–349.

[69] Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks, OJ L 288, 6.11.2007, 27–34.

[70] Albrecht, J et al. (2018, 111 ff.).

[71] Douka, A (2020, 5).

[72] Reese, M (2011a, 22).

[73] European Commission (2009, 74 ff.).

into account in river basin management under the WFD.[74] The reasons are seen in the regulatory approach of the WFD, which provides, in addition to extensive monitoring regulations (cf. Art. 8 WFD), for mandatory river basin management planning combined with a cyclical review of progress and updating obligations (cf. Art. 13 WFD).[75] This allows for a flexible[76] response to climatic changes and their impacts. The ambitious goals for improving water quality in the EU, i.e. the achievement of a good water status for all water bodies (cf. Art. 4 WFD), also contributes to improving the resilience of water ecosystems to climate change. The qualified, goal-oriented and regulatory approach leaves the choice of means up to the user of the law concerning how to achieve the goal, thus creating additional room for manoeuvre.[77] Moreover, the European Commission has established guidelines on how to interpret and apply the WFD with regard to climate adaptation.[78]

4 National law: the example of Germany

The European perspective would be incomplete without also taking into account the law of the European nation states. In many areas, this is decisively shaped by EU law, but also sets its own accents depending on the distribution of legislative competence between the EU and the Member States. In the following, the legal situation will be presented by using the example of the Federal Republic of Germany. Since it is a federal state, a distinction must be made between Federal law and the law of the 16 federal states (*"Länder"*).

4.1 The path to federal climate adaptation law

There is no overarching climate adaptation law yet at the federal level in Germany. The Federal Climate Protection Act adopted in 2019[79] only governs climate protection (i.e. the reduction of greenhouse gas emissions). The subsequent proposal of the Federal Council *(Bundesrat)* to anchor climate adaptation in the Federal Climate Protection Act as well was unsuccessful.[80]

[74] Gies, M, Albrecht, J and Sienkiewicz, J (2014, 144); Albrecht, J et al. (2018, 102). Nevertheless, some voices call for the explicit anchoring of concrete climate adaptation requirements in the text of the WFD to ensure that climate change is actually taken into account in practical implementation; for more details see Reese, M (2011b, 70 ff.).

[75] Guidance Document No. 24 describes certain principles on how climate adaptation can be taken into account, European Commission (2009, 42 ff.).

[76] On the relevance of flexibility for climate adaptation, see Craig, R K (2010, 9 ff.).

[77] Kment, M (2010, 70).

[78] European Commission (2009).

[79] Bundes-Klimaschutzgesetz, adopted 12 December 2019, entered into force on 19 December 2019, German Federal Law Gazette (BGBl.) I, 2513.

[80] BT-Drs. 19/30230, 2 July 2021, 31 ff., 37.

The German *Adaptation Strategy*[81] adopted by the Federal Government in 2008 sets the political framework for climate adaptation and enables the Federal Government to take a cross-sectoral approach.[82] This ensures that the existing objectives of the sectoral policies can also be realised under the conditions of climate change. It describes the consequences of climate change for 15 fields of action and presents options for action. The fields of action include Health, Construction, Water management, Soil, Biodiversity, Agriculture, Forestry, Fisheries, Energy, Finance, Transport, Industry and trade and Tourism. In addition, there are two cross-cutting issues: Land use planning and disaster control. In order to do justice to the large number of sectors and actors affected, the DAS formulates the goal of anchoring climate adaptation in all relevant sectoral policies and integrating it into long-term planning.[83]

The German Adaptation Strategy (DAS) does not stand alone, but is underpinned and updated by various instruments. *Action plans* on adaptation (APA I 2011,[84] APA II 2015, APA III 2020) substantiate the DAS with concrete measures. The action plans II and III are included in so called *Progress reports on the DAS*, which were adopted in 2015[85] and 2020[86] with concrete steps for further development and implementation of the DAS. Further instruments to support the implementation of the DAS are *Monitoring reports*, which were adopted in 2015[87] and 2019[88] and describe the effects of climate change and adaptation measures. They substantiate the impacts of climate change with scientific data and inform the public and decision-makers in all sectors. The *Vulnerability analysis* (2015)[89] and the *Climate impact and risk analysis* ("KWRA ", 2021)[90] describe the affectedness and adaptation capacity in various fields of action.

Since climate adaptation has not been included in the federal climate protection law, the enactment of a separate climate adaptation law is now being discussed and prepared. The Federal Environment Minister of the previous government, in office until 2021, already announced that "reliable financial and legal framework conditions for effective climate adaptation" should be created.[91] The current federal government has now explicitly anchored this plan in its coalition agreement: "With a Climate Adaptation Act, we will create a framework for implementing a national climate adaptation strategy with measurable targets, for example in the fields of heat prevention, health and allergy prevention and water infrastructure, together with the *Länder*, and to be able to take follow-up action in good time."[92] In May 2022, the

[81] Bundesregierung (German Federal Government) 2008.

[82] Bundesregierung (German Federal Government) 2020.

[83] Bundesregierung (2008, 5).

[84] Bundesregierung (2011).

[85] Bundesregierung (2015b).

[86] Bundesregierung (2020).

[87] Bundesregierung (2015a).

[88] Bundesregierung (2019).

[89] Buth, M et al. (2015).

[90] Kahlenborn, W et al. (2021).

[91] UBA (2021).

[92] SPD, Bündnis 90/Die Grünen and FDP (2021, 32).

new Federal Environment Minister presented an emergency programme for adaptation to climate change, which serves to quickly put the first steps and measures into practice.[93]

The emergency programme focuses on supporting municipalities by expanding funding programmes and capacity building, providing tailor-made on-site advice and better training for local experts, and raising awareness among citizens and educating them.[94] Further steps are to follow with the Climate Adaptation Act. A first draft of the Act was presented in April 2023.[95] This includes regulations for even more consistent governance at the federal level, similar to the Climate Protection Act. The Act is intended to create a framework for setting measurable climate adaptation targets, measures for their implementation and a mechanism for regular review.[96] The basic obligation to take climate adaptation into account in all public sector planning and decisions as well as to take on a function as a role model for federal properties is also anchored.[97] Beside the Climate Adaptation Act the emergency programme announces a new precautionary adaptation strategy[98] and joint financing by the federal and state governments.[99]

4.2 Climate adaptation in sectoral federal laws

Before an overarching climate adaptation law was presented at the federal level, climate adaptation had been already anchored in a number of sectoral laws (explicitly or implicitly).

4.2.1 Spatial Planning Act (ROG)

With the amendment of the Spatial Planning Act (Raumordnungsgesetz, ROG) in 2008,[100] climate protection and climate adaptation were introduced as principles of spatial planning (Sect. 2 para. 2 no. 6 sent. 7 ROG). This provided the framework for adding the aspect of adaptation to climate change to spatial planning plans and for drawing the attention of spatial planning authorities to climate change management issues.[101]

[93] BMUV (2022).

[94] BMUV (2022, 8).

[95] Federal Climate Adaptation Act (Draft of the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection), 4 April 2023 (BMUV 2023).

[96] Cf. Section 3 ff. Federal Climate Adaptation Act (Draft), BMUV 2023).

[97] Cf. Section 7 and 8 Federal Climate Adaptation Act (Draft), BMUV (2023).

[98] BMUV (2022, 8).

[99] BMUV (2022, 9).

[100] Gesetz zur Neufassung des Raumordnungsgesetzes und zur Änderung anderer Vorschriften, adopted on 22 December 2008, German Federal Law Gazette (BGBl.) I, 2986.

[101] Fischer, C (2013, 271).

4.2.2 Federal Building Code (BauGB)

One of the most important examples is the Federal Building Code (BauGB) which was amended several times to integrate climate adaption issues in urban planning law. The so-called Climate Protection Amendment of 2011 (Klimaschutz-Novelle),[102] explicitly aimed to take greater account of climate protection and climate adaptation in urban development. This amendment introduced a "climate protection clause" into the BauGB (cf. Section 1a para. 5 BauGB). According to this clause, the requirements of climate change are to be taken into account not only by measures that counteract climate change but also by those that serve to adapt to climate change. This principle is to be taken into account in the weighing process when drawing up urban land use plans.[103]

In accordance with the Climate Protection Amendment of 2011, deficits in climate adaptation can also serve as justification for urban restructuring measures (Sec. 171a ff. BauGB) and, since the further amendment to the BauGB in 2013,[104] also as justification for urban redevelopment measures (Sec. 136 ff. BauGB).[105] In addition, it was regulated that urban redevelopment measures should contribute to the development of the built structure in all parts of the federal territory in accordance with the general requirements for climate protection and climate adaptation, Sect. 136 para. 4 p. 2 no. 1 BauGB. While urban redevelopment measures tend to be small-scale (e.g. unsealing of backyards), urban restructuring measures involve the conversion or demolition of entire houses or rows of houses.[106] Further examples for the consideration of climate change are the introduction of different categories for the description and designation of climate adaptation concerns in preparatory urban land use plans and legally binding urban land use plans (cf. Sec. 5 and 9 BauGB).[107] As part of the 2017 amendment to the BauGB, for instance, municipalities were given the opportunity to designate areas for the retention and infiltration of precipitation water in legally binding land use plans (Sec. 9 para. 1 no. 16d BauGB).[108]

4.2.3 Federal Water Act (WHG)

Climate adaptation issues are also explicitly mentioned in the Federal Water Act (WHG).[109] For example, one of the principles of sustainable water management is to prevent possible consequences of climate change (Sec. 6 para. 1 no. 5 WHG).

[102] Gesetz zur Förderung des Klimaschutzes bei der Entwicklung in den Städten und Gemeinden, adopted on 22 July 2011, German Federal Law Gazette (BGBl.) I, 1509.

[103] Bubeck, P, Klimmer, L and Albrecht, J (2017, 301).

[104] Gesetz zur Stärkung der Innenentwicklung in den Städten und Gemeinden und weiteren Fortentwicklung des Städtebaurechts, adopted on 11 June 2013, German Federal Law Gazette (BGBl.) I, 1548.

[105] Albrecht, J (2020, 16).

[106] Pannicke-Prochnow, N et al. (2021, 181, 183).

[107] Bubeck, P et al. (2016, 301); Pannicke-Prochnow, N et al. (2021, 190).

[108] Art. 2 of Act for the Further Improvement of Flood Protection and for the Simplification of Flood Protection Procedures of 30 June 2017, German Federal Law Gazette (BGBl. I), 2193.

[109] Albrecht, J (2020, 17 ff.).

This was justified by the fact that water management is affected by climate change in many ways (e.g. water temperature, low water levels and floods, water shortage).[110] In the law, climate change is also explicitly mentioned in connection with flood protection. The obligation to take climate change into account within the framework of flood risk management planning (Sec. 75 WHG) was adopted from the Floods Directive. The Flood Protection Amendment Act of 2017,[111] which has facilitated the planning and approval of flood protection facilities (Sec. 71, 71a WHG), was also a result of climate change adaptation considerations.[112] Furthermore, the possibility of designating flood generation areas in hilly and mountainous regions was introduced (cf. Sec. 78d WHG). The designation allows for maintaining and strengthening decentralised water retention in those areas to reduce floods downstream.[113] Last but not least, climate change must be taken into account within the framework of the legal instruments of water supply and wastewater disposal.[114]

4.3 Law of the German States (*"Länder"*)

Climate adaptation has also been taken into account in sectoral laws at the state level. Overarching climate adaptation regulations are legally anchored in the Länder climate protection laws, which exist in 12 of the 16 states. An exception is the Rhineland-Palatinate Climate Protection Act (LKSG 2014),[115] whose purpose is limited to mitigation (i.e. reducing greenhouse gas emissions). However, climate adaptation regulations are included in all of the other 11 state climate protection acts.

A first type of laws is focused on climate protection, whereas climate adaptation is only marginally regulated (Baden-Württemberg—KSG BW 2013,[116] Schleswig–Holstein—EWKG 2017[117]). A second type of laws (Bremen—BremKEG 2015,[118] Berlin—EWG 2016,[119] Hamburg—HmbKliSchG 2020,[120]

[110] BR-Drs. 280/1/09 of 4. 5.2009, 5.

[111] See footnote 108.

[112] Bundesregierung (German Federal Government), Entwurf eines Gesetzes zur weiteren Verbesserung des Hochwasserschutzes und zur Vereinfachung von Verfahren des Hochwasserschutzes, 18 January 2017, BT-Drs. 18/10879, 1.

[113] For more details see Albrecht, J and Nicolic Popadic, S (2022).

[114] Albrecht, J (2020, 18 ff.).

[115] Landesgesetz zur Förderung des Klimaschutzes Rheinland-Pfalz (Landesklimaschutzgesetz – LKSG), adopted on 19 August 2014, GVBl., 188.

[116] Klimaschutzgesetz Baden-Württemberg (KSG BW), adopted on 23 July 2013, GBl. 2013, 229.

[117] Gesetz zur Energiewende und zum Klimaschutz in Schleswig–Holstein (Energiewende- und Klimaschutzgesetz Schleswig–Holstein – EWKG), adopted on 7 March 2017, GVOBl., 124.

[118] BremischesKlimaschutz- und Energiegesetz (BremKEG), adopted on 24 March 2015 (Brem.GBl., 124).

[119] Berliner Klimaschutz- und Energiewendegesetz – EWG Bln, adopted on 22 March 2016, GVBl. 2016, 122.

[120] Hamburgisches Gesetz zum Schutz des Klimas (Hamburgisches Klimaschutzgesetz – HmbKliSchG), adopted on 20 February 2020 (HmbGVBl., 148).

Bavaria—BayKlimaG 2020,[121] Lower Saxony—NKlimaG 2020,[122] Hesse—HKlimaG 2023[123]) contain extended regulations on climate adaptation in addition to the regulations on climate protection. The Thuringian Climate Act (ThürKlimaG 2018)[124] regulates climate protection and climate adaptation equally. Finally, a standalone Climate Adaptation Act passed in North Rhine-Westphalia (KlAnG 2021)[125] alongside with the State Climate Protection Act.[126]

This finding shows the increasing importance of climate adaptation, which is more and more being perceived as an independent task alongside climate protection. The legal formulation of overarching climate adaptation law is thus already significantly more developed in the German federal states than at the federal level.[127] There are only three federal states (Saxony, Saxony-Anhalt, Brandenburg) in which no climate law exists or is in preparation.[128] The content of the laws with regard to climate adaptation has similarities, but also differences. Most of the laws contain regulations on the issues of climate adaptation, and on obligations for public bodies, which regulate especially the establishment of planning instruments and monitoring reports, and the appointment of councils of experts including their functions and, partly, regulations for municipalities.

4.3.1 Goals of climate adaptation

Climate adaptation is at least implicitly mentioned as an objective in almost all laws (except LKSG Rhineland-Palatinate). Unlike climate change mitigation goals, climate adaptation goals are difficult to define and to measure, because they cannot be determined by concrete quantitative targets such as the reduction of emissions. Rather, the structure and extent of the measures required vary due to regional differences concerning climate risks.[129] Therefore, it is necessary to set qualitative as well as quantitative targets in the relevant fields. Accordingly, some laws contain somewhat more specific objectives, which name the most important fields of action or sectors (cf. Section 10 para. 1 ThürKlimaG), such as health protection, preservation of natural resources or a promotion of a sustainable and competitive economy.

[121] Bayerisches Klimaschutzgesetz (BayKlimaG), adopted on 23 November 2020 (GVBl., 598, 656).

[122] Niedersächsisches Gesetz zur Förderung des Klimaschutzes und zur Minderung der Folgen des Klimawandels.
(Niedersächsisches Klimagesetz – NKlimaG), adopted on 10 December 2020, Nds. GVBl. 2020, 464.

[123] Hessisches Gesetz zur Förderung des Klimaschutzes und zur Anpassung an die Folgen des Klimawandels (Hessisches Klimagesetz – HKlimaG), adopted on 26 January 2023 (GVBl., 42).

[124] Thüringer Gesetz zum Klimaschutz und zur Anpassung an die Folgen des Klimawandels (Thüringer Klimagesetz – ThürKlimaG), adopted on 18 December 2018, GVBl., 817.

[125] Klimaanpassungsgesetz Nordrhein-Westfalen (KlAnG), GV. NRW. 2021, 910.

[126] Gesetz zur Neufassung des Klimaschutzgesetzes Nordrhein-Westfalen, adopted on 8 July 2021, GV. NRW, 908.

[127] Saurer, J (2022, 518).

[128] In Mecklenburg-Western Pomerania, the process of creating climate protection legislation has begun; cf. Romberg (2022).

[129] See Ford, J D and Berrang-Ford, L (2016).

In some cases, additional guiding principles are mentioned, e.g. principles of hazard prevention and precaution.[130]

4.3.2 Obligations for public bodies

Some concrete obligations apply primarily to state governments and senates, as they are obliged to establish adaptation plans and strategies, to set up climate advisory councils and to carry out climate monitoring (in some instances, subordinate authorities are also responsible for the latter obligation). In addition, they are to act as role models in climate adaptation, contribute to raising awareness among citizens, provide advice and create appropriate supportive structures. In some states, tasks or obligations in the field of climate adaptation are also imposed on other public bodies.[131] Section 6 para. 1 KlAnG NW includes a general clause according to which public bodies must take into account the objectives of climate adaptation in their planning and decision-making. Occasionally, the climate laws also address citizens to cooperate in climate adaptation (appealing character[132]).

Particularly noteworthy are regulations in the KlAnG NW, according to which legislative processes shall be examined in terms of their compatibility with the goal of climate adaptation. This Act obliges the government to ensure that the objectives of the Act are taken into account in the norm-setting process of legal ordinances and administrative regulations as well as in the use of funding provided by the Land.[133] The review of climate resilience compatibility in existing state laws/ordinances and other projects (Sect. 6 para. 4 sent. 2 KlAnG NW) is optional. These provisions are similar to the climate target compatibility check for EU legal acts and measures, which have to be carried out by the European Commission for legislative acts and measures under Art. 6 para. 4 CL.

4.3.3 Planning instruments

Almost all laws provide for the establishment of planning instruments to achieve climate adaptation goals. These are either plans,[134] programs,[135] or strategies.[136] The Energy and Climate Protection Program of Berlin (BEK) as well as the Hamburg climate plan cover both climate protection and climate adaptation. In some cases, the plan was developed in a participatory process involving the general public,[137] social groups[138] or public

[130] Cf. Section 10 para. 2 ThürKlimaG, Sect. 5 para. 3 NKlimaG.

[131] E.g. in Section 5 para. 1 KlAnG NW.

[132] Cf. Section 10 para. 1 ThürKlimaG, Sect. 7 KlAnG NW.

[133] Section 4 para. 6 Sent. 1 KlAnG NW.

[134] Section 6 HmbKliSchG.

[135] Section 4 and 12 EWG Bln, Sect. 11 ThürKlimaG.

[136] E.g. Section 4a KSG BW, Sect. 8 KlAnG NW, Sect. 10 EWKG SH, Sect. 3 BremEKG, Sect. 6 NKlimaG, Art. 5 para. 1 BayKlimaG, Sect. 5 para. 1 HKlimaG.

[137] E.g. Section 6 para. 4 HmbKliSchG, Sect. 4 para. 1 EWG Bln.

[138] Section 8 para. 1 KlAnG NW, Sect. 4 para. 2 sent. 2 KSG BW.

authorities.[139] Usually, the plans, programmes, concepts or strategies are adopted by the government[140] or the house of representatives.[141] In most cases, there is an obligation to update the plans regularly, usually every 5 years[142] or 4 years.[143] Few concrete specifications on the climate adaptation-related content of the plans or on the adaptation measures are to be found in the law.

4.3.4 Monitoring obligations

In most climate laws (except those of Hamburg and Bavaria) monitoring obligations are anchored to observe the changes of the climate and their consequences.[144] In some cases, however, monitoring is explicitly required only with regard to climate protection.[145] In most cases, the monitoring reports also form the basis for updating the adaptation programs[146] and strategies.[147] The laws of Hamburg[148] and Bavaria[149] regulate the reporting on the achievement of objectives and implementation of measures. However, the responsibilities and timeframes for the implementation of monitoring differ.

4.3.5 Council of experts

Almost all laws provide the establishment of a council of experts which have an advisory function (only Lower Saxony has a climate competence centre instead). Though the composition of the expert councils varies: in some states, the councils exclusively consist of scientists,[150] in other states they are mainly or partially represented by personalities from different sectors of society.[151] In most cases, the advisory boards are appointed by the ministry or senate. The functions of the advisory boards include providing advice, submitting proposals for the further development of goals and measures, and, in some cases, making public statements. However, not

[139] Section 3 BremEKG.

[140] Section 8 para. 1 KlAnG NW, Sect. 4 para. 2 p. 2 KSG BW, Sect. 10 EWKG SH; Sect. 11 para. 1 ThürKlimaG.

[141] Section 4 para. 3 EWG Bln.

[142] Section 8 para. 2 KlAnG NW, Sect. 13 para. 2 ThürKlimaG, Sect. 6 para. 3 NklimaG, Sect. 5 para. 3 HKlimaG.

[143] Section 6 para. 3 HmbKliSchG.

[144] Section 9 KlanG NRW, Sect. 13 EWG Bln, Sect. 13 ThürKlimaG, Sect. 9 KSG BaWü, Sect. 11 NKlimaG.

[145] Section 5 SH, Sect. 5 BremEKG, Sect. 11 NKlimaG.

[146] Section 5 para. 3 EWG Bln; Sect. 13 para. 2 ThürKlimaG.

[147] Section 9 KlAnG NW, Sect. 9 para. 1 sent. 2 KSG BW.

[148] Section 6 para. 2 HmbKliSchG.

[149] Art. 9a i.V.m. Art. 7 sent. 2 No. 3 BayKlimaG.

[150] E.g. Section 7 HmbKliSchG, Sect. 6 BremEKG, Sect. 6 HKlimaG.

[151] Art. 8 BayKlimaG, Sect. 6 EWKG SH, Sect. 10 KSG BW, Sect. 11 KlanG NW.

all laws explicitly mandate these tasks to apply to climate adaptation, but only to climate protection.[152]

4.3.6 Provisions for municipalities

Cities and municipalities are particularly affected by the consequences of climate change due to their high population density, the high degree of sealed surface areas, exposed locations (e.g. on rivers), the density of specific infrastructures for drinking water, waste water, energy, transport, etc. and the concentration of vulnerable facilities such as hospitals, care institutions, schools and universities.[153] Therefore, they have an important role to play in climate adaptation. Section 5 para. 4 KlAnG NW stipulates that climate adaptation needs should be taken into account in the context of municipal services of general interest. However, only five states (North-Rhine Westphalia, Bavaria, Thuringia, Bremen and Hesse) explicitly provide regulations for municipalities. These formulate the possibility or recommendation that municipalities carry out their own vulnerability studies[154] and draw up their own adaptation concepts or programs of measures.[155] However, they do not contain any clear further obligations.

The reason for this restraint is the associated financing of climate adaptation measures. Up to now, climate adaptation has been a voluntary task of local authorities within the framework of local self-government—despite explicit regulations as a consideration in the Federal Building Code[156] or in the climate laws at state level. In order to oblige the municipalities to adapt to climate change, this could be regulated by state law as a mandatory task of the municipalities. Accordingly, Art. 12 draft Federal Climate Adaptation Act stipulates that states should require municipalities and counties to draw up climate adaptation concepts.[157] In accordance with the principle of connexity, which is regulated in the state constitutions, the states must provide the necessary financial resources to the municipalities in this case. In many states, however, the financing obligation impedes the process of defining new mandatory tasks significantly.[158] Section 12 ThürKlimaG and Sect. 8 HKlimaG at least stipulate that the state government shall support the municipalities financially and provide data bases and findings.

In order to oblige the municipalities to adapt to climate change, a binding commitment on the part of the federal government to increase the general financial resources of the states is therefore considered necessary.[159] Another possibility to involve the federal government in the costs would be to formulate and add a

[152] Section 6 BremEKG, Sect. 6 EWKG SH.

[153] Deutsches Institut für Urbanistik and Universität Bielefeld (2013, 8).

[154] Cf. Section 12 ThürKlimaG.

[155] Section 5 para. 3 KlAnG NW, Art. 5 para. 2 BayKlimaG, Sect. 12 ThürKlimaG, Sect. 13 BremEKG, Sect. 8 HKlimaG.

[156] See above 4.2.2.

[157] BMUV 2023.

[158] Scheller, H and Raffer, C (2022, 368).

[159] For more details, see Scheller, H and Raffer, C (2022, 368 ff.).

new joint task called "climate adaptation" to Art. 91a of the German constitution (Grundgesetz) and to anchor the tasks of the municipalities concerning climate adaptation in the federal climate adaptation law.[160] This would lead to a compulsory participation of the federal government in financing the municipal tasks, which seems appropriate having in mind the size and importance of the task. The coalition agreement provides for the anchoring of joint financing by the federal and state governments, but without explicit reference to Art. 91a Grundgesetz.[161] The Federal Ministry for the Environment, together with the Länder, has set up a working group to examine financing requirements and implementation options, which are conform with the constitution.[162]

5 Conclusions and outlook

The analysis above has shown, that climate adaptation as a cross-cutting issue is affecting various fields of action. The legal framework comes from different legal areas and levels (international, European, federal, state law). At the international and European levels overarching climate adaptation laws already exist (Paris Agreement, European Climate Law). In addition, climate adaptation is already anchored in numerous sectoral policies and sectoral laws of the EU. The European regulations are either directly applicable in the Member States or must be transposed by national law, which has led to a “Europeanisation” of national climate adaptation law. The example of Germany shows that the legislator has set its own accents in different policy areas with its national legislative competence, for example by anchoring adaptation in the Spatial Planning Act or the Building Code. However, there are still many policy areas which lack of climate adaptation regulations. Identifying these gaps and developing suitable technical solutions as well as regulatory proposals and adopting them in the political process is a major and, in consideration of the advancing climate change, urgent task for the future, given the large number of fields of action affected.

A gap existed in particular regarding the lack of a national climate adaptation law in Germany. Overarching climate adaptation regulations exist only in most of the federal states so far, though the scope and depth of regulations varies greatly. Insofar, the legal situation is fragmented. In this respect, it is welcomed that the current German government plans to pass a climate adaptation law during this legislative period. Although Germany already has a climate adaptation strategy, action plans to implement the strategy, progress reports and established monitoring reports, such an act would nevertheless result in an additional value as it could close gaps and contribute to a better interlinking between the federal and state level. A formal parliamentary act is an important instrument for controlling societal developments, triggering an implementation obligation and ensuring a continuous implementation over several legislative periods. Depending on the content, it could also be associated

[160] UBA (2021).

[161] SPD, Bündnis 90/Die Grünen and FDP (2021, 32), see also 4.1.

[162] Cf. BMUV (2022, 8).

with a material gain in substance, for instance with regard to standards and procedural regulations. Legal objectives and principles could also be significant for the interpretation of sectoral legislation. Last but not least, efforts for climate adaptation would gain in importance with a climate adaptation act and would become more visible internationally.

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Conflict of interest I have read the instructions for authors. The ethical requirements mentioned there are fulfilled. There are no conflicts of interest or competing interests.

References

Adaptation Fund (n.d.) Adaptation Fund at COP 26, https://www.adaptation-fund.org/cop26/

Albrecht J (2020) Die Stadt im Klimawandel: Handlungsfelder, Rechtsinstrumente und Perspektiven der Anpassung (climate resilient cities). Zeitschrift Für Umweltrecht 31(1):12–22

Albrecht J, Nikolic Popadic S (2022) Legal challenges of restricting land use for natural flood protection in the hinterland. In: Hartmann T, Slavíková L, Wilkinson M (eds) Spatial flood risk management. Implementing catchment-based retention and resilience on private land. Edward Elgar Publishing, Cheltenham, pp 33–51

Albrecht J et al. (2018) Klimaanpassung im Raumordnungs-, Städtebau- und Umweltfachplanungsrecht sowie im Recht der kommunalen Daseinsvorsorge, Dessau-Roßlau: Umweltbundesamt (Climate Change 03/2018)

Birkmann J, Blätgen T (2018) Klimaanpassung, In: Akademie für Raumforschung und Landesplanung (Hrsg.), Handwörterbuch der Stadt- und Raumentwicklung, Hannover, 1099–1111, https://shop.arl-net.de/media/direct/pdf/HWB%202018/Klimaanpassung.pdf

BMUV—Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz (2022) Sofortprogramm Klimaanpassung, https://www.bmuv.de/fileadmin/Daten_BMU/Download_PDF/Klimaschutz/sofortprogramm_klimaanpassung_bf.pdf

BMUV—Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz (2023) Federal Climate Adaptation Act (Draft), 4 April 2023, https://www.bmuv.de/fileadmin/Daten_BMU/Download_PDF/Glaeserne_Gesetze/20._Lp/kang/Entwurf/kang_refe_bf.pdf

Bubeck P, Klimmer L, Albrecht J (2016) Klimaanpassung in der rechtlichen Rahmensetzung des Bundes und Auswirkungen auf die Praxis im Raumordnungs-, Städtebau- und Wasserrecht. Natur Und Recht 38(5):297–307

Bundesregierung (2008) Deutsche Anpassungsstrategie an den Klimawandel, adopted by the Federal Cabinet on 17 December 2008

Bundesregierung (2011) Aktionsplan Anpassung der Deutschen Anpassungsstrategie an den Klimawandel, adopted by the Federal Cabinet on 31 August 2011

Bundesregierung (2015a) Monitoringbericht 2015 zur deutschen Anpassungsstrategie an den Klimwandel, In: Umweltbundesamt, Dessau-Roßlau (ed)

Bundesregierung (2015b) Fortschrittsbericht zur Deutschen Anpassungsstrategie an den Klimawandel, version of 16 November 2015

Bundesregierung (2019) Monitoringbericht 2019 zur deutschen Anpassungsstrategie an den Klimwandel, In: Umweltbundesamt, Dessau-Roßlau (ed)
Bundesregierung (2020) Zweiter Fortschrittsbericht zur Deutschen Anpassungsstrategie an den Klimawandel, version of 21 October 2020
Buth M et al. (2015) Vulnerabilität Deutschlands gegenüber dem Klimawandel, Dessau-Roßlau: Umweltbundesamt (Climate Change 24/2015)
Craig RK (2010) Stationarity is dead—long live transformation: five principles for climate change adaptation law. Harv Environ Law Rev 34(1):9–73
Deutsches Institut für Urbanistik and Universität Bielefeld (ed) (2013) 'KommAKlima – Kommunale Strukturen, Prozesse und Instrumente zur Anpassung an den Klimawandel in den Bereichen Planen, Umwelt und Gesundheit. Hinweise für Kommunen', Bd. 1. https://www.uni-bielefeld.de/fakultaeten/gesundheitswissenschaften/ag/ag7/projekte/kommaklima.pdf
Di Pietro PL (2020) From the Cancun adaptation framework to the Paris agreement. In: Bueno Rubial M, Siegele L (eds) Negotiating climate change adaptation. Springer, Cham
Douka A (2020) Adaptation measures to climate change within the European floods directive (2007/60/EC). Environ Sci Proc 2(1):38. https://doi.org/10.3390/environsciproc2020002038
EEA—European Environment Agency (2020) The European environment—state and outlook 2020. Knowledge for transition to a sustainable Europe, https://www.eea.europa.eu/soer/publications/soer-2020
European Commission (2009) Guidance document No. 24—River Basin management in a changing climate (CIS)
European Commission (2013) An EU strategy on adaptation to climate change, COM(2013) 216 final
European Commission (2021a) Forging a climate-resilient Europe—the new EU strategy on adaptation to climate change, COM(2021) 82 final
European Commission (2021b) Building a climate-resilient future—a new EU strategy on adaptation to climate change, Press release, 24 February 2021, Brussels
European Union (n.d.) European Climate Pact, https://climate-pact.europa.eu/index_en
Fischer C (2013) Grundlagen und Grundstrukturen eines Klimawandelanpassungsrechts, Mohr Siebeck, Tübingen
Ford JD, Berrang-Ford L (2016) The 4Cs of adaptation tracking: consistency, comparability, comprehensiveness, coherency. Mitig Adapt Strat Glob Change 21(6):839–859
Gies M, Albrecht J, Sienkiewicz J (2014) Legal aspects of climate change adaptation. In: Rannow S, Neubert M (eds) Managing protected areas in central and eastern Europe under climate change. Springer, Dordrecht, pp 135–158
Kahlenborn W et al (2021) Klimawirkungs–und Risikoanalyse für Deutschland 2021—Kurzfassung, Dessau-Roßlau: Umweltbundesamt (Climate Change 03/2018)
Kment M (2010) Anpassung an den Klimawandel Internationaler Rahmen, europäische Strategische Adaptionsprüfung und Fortentwicklung des nationalen Verwaltungsrechts. JuristenZeitung 65(2):62–72
Mayer B (2021) Climate change adaptation and the law. Va. Environ Law J 39(2):141–176
Mecklenburg-Vorpommern', Greifswald (2022) https://rsf.uni-greifswald.de/storages/uni-greifswald/fakultaet/rsf/lehrstuehle/ls-schlacke-IFEUS/Romberg_Potenziale_Klimaschutzgesetz_MV_12.04.22.pdf
Müller T (2008) Klimawandel als Herausforderung der Rechtsordnung. In: Gesellschaft für Umweltrecht (ed), Dokumentation zur 31. Wissenschaftlichen Fachtagung der Gesellschaft für Umweltrecht e.V., Erich Schmidt Verlag, Berlin, pp 191–235
Pannicke-Prochnow N et al. (2021) Bessere Nutzung von Entsiegelungspotenzialen zur Wiederherstellung von Bodenfunktionen und zur Klimaanpassung, Dessau-Roßlau: Umweltbundesamt (UBA-Texte 141/2021)
Reese M (2011a) Das neue Recht des Hochwasserschutzes vor den Herausforderungen des Klimawandels. Natur Und Recht 33(1):19–28
Reese M (2011b) Die Anpassung an den Klimawandel im Bewirtschaftungssystem der Wasserrahmenrichtlinie. Zeitschrift Für Wasserrecht 50(2):61–82
Reese M (2020) Das EU-Klimagesetz—Nachhaltigkeit durch Umweltpolitikplanungsrecht? Zeitschrift Für Umweltrecht 31(12):641–642
Romberg B (2022) Potenziale eines Landes-Klimaschutzgesetzes. https://rsf.uni-greifswald.de/storages/uni-greifswald/fakultaet/rsf/lehrstuehle/ls-schlacke-IFEUS/Romberg_Potenziale_Klimaschutzgesetz_MV_12.04.22.pdf
Runhaar H et al (2018) Mainstreaming climate adaptation: taking stock about "what works" from empirical research worldwide. Reg Environ Change 18(4):1201–1210
Saurer J (2022) Klimaanpassung im Mehr-Ebenen-System des Rechts. Natur Und Recht 44(8):513–519

Scheller H, Raffer C (2022) Zur Diskussion gestellt: Klimaschutz als kommunale Pflichtaufgabe?! Klimaschutz als kommunale Pflichtaufgabe. In: Junkernheinrich M et al (ed) Jahrbuch für öffentliche Finanzen 1–2022, pp 351–376

Schlacke S et al (2021) Das, europäische Klimagesetz und seine Konsequenzen. Eur Z. für Wirtsch 32(14):620–626

SPD, Bündnis 90/Die Grünen and FDP (2021) Mehr Fortschritt wagen. Bündnis für Freiheit, Gerechtigkeit und Nachhaltigkeit. Koalitionsvertrag zwischen SPD, Bündnis 90/Die Grünen und FDP

The Global Environment Facility (n.d.) Least developed countries fund—LDCF. https://www.thegef.org/what-we-do/topics/least-developed-countries-fund-ldcf

UBA—Umweltbundesamt (2021) Klimaanpassung jetzt gesetzlich verankern. Vorschläge für eine wirksame Vorsorge vor Klimarisiken. https://www.umweltbundesamt.de/dokument/klimaanpassung-jetzt-gesetzlich-verankern-pdf.

UNFCCC (n.d.) Adaptation at the forefront of COP 29 outcomes in Glasgow. https://www4.unfccc.int/sites/NWPStaging/News/Pages/Adaptation-at-the-forefront-of-COP-26-outcomes-in-Glasgow.aspx