Forestry in the Czech Republic is facing a historically unprecedented, mostly drought-induced decline in spruce-dominated stands, accompanied by an extensive bark beetle infestation that has spread across most of the country. As a result, the share of sanitary felling has dramatically increased, driving the total harvest to record-high levels in recent years. As a result, current forest management in the country practically resembles a crisis management dealing dominantly with unplanned disturbances. The Czech case shows clearly the essential, non-separable linkage between forest adaptation and mitigation––a simple recognition that, without adaptation, there is no mitigation. It also demonstrates the importance of tailoring the general climate smart forestry approach to regional circumstances. The current priorities of Czech forestry must be to halt forest decline, restore the lost vegetation cover on clear-cut soils, and intensify adaptive management in order to create resilient forest ecosystems than can cope better with changing climate and extreme climate events.

Cienciala, E. (2022). Climate-Smart Forestry Case Study: Czech Republic. In: Hetemäki, L., Kangas, J., Peltola, H. (eds) Forest Bioeconomy and Climate Change . Managing Forest Ecosystems, vol 42. Springer, Cham. <https://doi.org/10.1007/978-3-030-99206-4_10>

National Adaptation Strategy (NAS)

In the Czech Republic, the changes observed indicate an increasing trend in winter and summer temperatures, which has been more pronounced after 1980. In recent decades, an increasing trend is apparent in the average annual values, summer temperatures are increasing faster than winter or yearly ones. The changes in the average values are also related to extreme temperatures - the number of tropical summer days and tropical nights has grown in recent years, while the number of days of frost and ice falls. Annual precipitation in Bohemia shows a slight increase, which is more pronounced in winter, while in summer the trend is slightly downward. In Moravia, as opposed to Bohemia, the difference between winter precipitation increase and its summer decline is more significant.

In the Czech Republic conditions, climate change is seen to cause especially the more significant weather events manifested by more frequent torrential rains, longer droughts, heat waves, warmer and wetter winters with smaller amounts of snow, etc. A side-effect of regional climate change is the occurrence of episodes of high wind speeds associated with the passing of deep atmospheric depressions over the continent, especially in winter, which represents risks e.g. for forests, agriculture (soil and some crops), buildings, energy (transmission and distribution networks) and the population.

The priority sectors are forest management, agriculture, water regime in landscape and water management, urban landscape, biodiversity and ecosystem services, health, tourism, transportation, industry and energy, emergencies and protection of the population and environment.

* Forest management

There is room for improvement in supporting the natural adaptive capacities of forests and strengthening their resilience to climate change. The greatest potential can be identified in measures to achieve game populations that are sustainable for the natural regeneration of a wide range of tree species, which is currently assessed as unfulfilled, as neither the current legislation nor the proposed amendment to Act No. 449/2001 Coll. on hunting do not create sufficient conditions for achieving sustainable populations of cloven-hoofed game. Measures relating to the preference and ensuring of natural forest regeneration, increasing the ecological stability and resilience of forest stands, including the identification of risk areas for the priority implementation of adaptation measures, and support for responsible forest management are assessed as partially fulfilled. Financial support is provided for Financial support is provided for natural forest regeneration, increasing the proportion of ameliorative and stabilizing tree species, using environmentally friendly technologies, and converting and rebuilding spruce stands. Measures to protect the gene pool of native species, protect forest tree populations threatened by climate change, including measures relating to the recording and effective use of forest tree genetic resources, and measures to support the risk management system for biotic harmful agents of forest and ornamental trees are considered to be fully implemented. The measures are implemented through the Forest Fund.

Greater progress can be seen in the protection and restoration of the natural water regime in forests, where measures aimed at protecting and restoring the natural water regime in forests are assessed as being continuously fulfilled or fulfilled. A review of technical standards in this area has been completed. Measures to retain water in forests are being successfully implemented through financial support for the restoration of wetlands, natural watercourses in forests, and small water reservoirs. In order to prevent or slow down surface runoff of rainwater and soil erosion during logging and forest restoration, and to stabilize the area of forest types affected by water, a process of revising regional forest development plans (OPRL) has been initiated. The expected timeframe for the revision of all 41 OPRLs is 2024. Reserves can be identified as part of the revision of the existing drainage system for forest land using natural and near-natural methods, where it is necessary to achieve a consensual interdepartmental view on the implementation of measures.

* Agriculture

In order to increase the effectiveness of land consolidation with regard to climate change, certain reserves can be identified in the area of organizational support for the implementation of land consolidation with regard to climate change, although the tasks related to their financial and material support and their implementation, especially with regard to increasing the retention capacity of the landscape, are assessed as being fulfilled on an ongoing basis or as having been fulfilled. The subsidy title "Regulation of runoff from drainage facilities" prepared by the Ministry of Agriculture has not yet been opened due to insufficient records of buildings and their condition, considerable fragmentation of ownership of buildings (inadequate legislation) and the related low interest of potential applicants. Investments in land purchases are being successfully stimulated in order to improve the relationship to the land used.

In terms of securing and preserving genetic resources in agriculture, we are successfully expanding and improving the current scope of support and solutions within the National Program for the Conservation and Use of Genetic Resources of Plants, Animals, and Microorganisms Important for Nutrition and Agriculture.

In terms of halting soil degradation through excessive erosion, nutrient depletion, loss of organic matter and compaction, there is room for improvement in the implementation of measures aimed at halting soil degradation, in particular the reduction of water and wind erosion of agricultural land, which is caused, among other things, by delays in the preparation and implementation of anti-erosion regulations. In areas threatened by wind erosion, financial support is provided for the construction or reconstruction of windbreaks. As part of the implementation of the NAP adaptation and the Concept for Combating Drought, a project is being implemented to support water infiltration and retention in degraded agricultural soils. Organic farming is developing successfully.

In terms of limiting the occurrence and impact of agricultural drought, tasks related to the construction and modernization of irrigation systems and maximizing the efficiency of soil moisture use are considered to be ongoing or completed. At the same time, insufficient attention has been paid to minimizing the impact of inappropriate drainage systems on accelerated water runoff from the landscape. The preparation of a general plan for drainage structures has not yet been commissioned.

While measures aimed at strengthening the stability and biodiversity of agroecosystems are currently assessed as partially fulfilled with reference to the ongoing preparation of the CAP after 2020, tasks focusing on research in the area of mitigating and preventing the possible impacts of climate change on the agricultural sector are being fulfilled within the framework of specific TAČR research projects. As part of the CAP review at EU level, the requirement for crop diversification has only been partially tightened.

Tasks aimed at ensuring the sustainability of agricultural management in the countryside and its productive function are assessed as being fulfilled on an ongoing basis or as having been fulfilled (in accordance with the CAP). As part of the support for the diversification of agricultural activities, small agricultural enterprises are being prioritized within the framework of the support provided by the RDP, and agrotourism is being promoted. It has not yet been possible to define areas of arable land in floodplains that are subject to flooding during increased flows (Q5 – Q20), to establish appropriate farming methods, and to motivate agricultural operators in floodplains to apply appropriate farming practices.

In the area of improving risk management in agriculture, a Framework Program for Addressing Risks and Crises in Agriculture has been created, and the availability of an early warning system for extreme weather events has been developed as part of the Intersucho project. Agricultural insurance is also being successfully used and provided. There is still room for improvement in supporting the pest risk management system.

* Water regime in landscape and water management

In terms of increasing the natural retention capacity of watercourses and floodplains, the following can be considered positive: ongoing financial support for the comprehensive revitalization and spontaneous renaturation of watercourses and floodplains, as well as ongoing revitalization and renaturation of watercourses and floodplains in accordance with national river basin plans. However, there has not yet been any cataloguing of floodplains with proposals for areas suitable for afforestation or the creation of a mosaic of floodplain forests and meadows as part of water management planning for the purpose of flood mitigation.

In terms of effective protection and use of water resources, the following tasks can be positively evaluated in particular: the development of a comprehensive concept for managing drought and water shortages and for preventing emergencies caused by long-term water shortages (Concept for protection against the consequences of drought for the territory of the Czech Republic, drafting of an amendment to the Water Act with regard to drought management, development and implementation of the HAMR early warning system for drought), re-evaluation of the current use of water reservoirs and water management systems and optimization of their management (reviewing and updating the operating rules for waterworks based on simulation modeling of water management solutions for reservoirs or entire water management systems and based on knowledge of the impacts of climate change) and supplying areas with insufficient water resources by transferring water from other water supply systems (evaluation of the potential of individual balance-active parts of river basins in terms of the possibility of water transfers to balance-passive parts of other river basins, including the identification of suitable locations for the processing of specific studies). Ponds also have a positive effect on water retention in the landscape. Reserves in the fulfillment of this specific objective are particularly evident in the area of preventive protection of water resources (ensuring purposeful forest management in water resource protection zones and creating more detailed plans for the care of CHOPAV) and taking adaptation measures into account in water supply and sewerage development plans.

Strategie přizpůsobení se změně klimatu v podmínkách ČR [Internet]. Available from: <https://mzp.gov.cz/system/files/2025-03/OAZK_Narodni_adaptacni_strategie-aktualizace_20211026.pdf>

National Adaptation Plan (NAP)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sector / area of interest | Percentage of tasks completed /  fulfilled on an ongoing basis | Specific objectives | SC | Overall overview |
| Forest management | 74% | Supporting the natural adaptive abilities of forests and strengthening their resilience to climate change. | 1 | Partially filled |
| Protecting and restoring the natural water regime in forests. | 2 | Partially filled |
| Agriculture | 71% | Increasing the effectiveness of land consolidation with regard to climate change | 3 | Partially filled |
| Securing and preserving genetic resources in agriculture | 4 | Filled continuously |
| Stopping soil degradation caused by excessive erosion, nutrient depletion, loss of organic matter, and compaction | 5 | Partially filled |
| Limiting the occurrence and impacts of agricultural drought | 6 | Partially filled |
| Enhancing the stability and biodiversity of agroecosystems | 7 | Partially filled |
| Ensuring the sustainability and productive function of agricultural management in the landscape in order to reduce the negative impacts of climate change | 8 | Partially filled |
| Improving risk management in agriculture | 9 | Partially filled |
| Water regime in the landscape and water management | 67% | Increasing the natural retention capacity of watercourses and floodplains | 11 | Partially filled |
| Effective protection and use of water resources | 12 | Partially filled |

Vyhodnocení plnění Národního akčního plánu adaptace na změnu klimatu Obsah [Internet]. [cited 2025 Aug 6]. Available from: <https://mzp.gov.cz/system/files/2025-03/OAZK-Vyhodnoceni_NAP_AZK-20200221.002.pdf>

Climate Risk Assessment (CRA)

* Forest management

The vulnerability of the forestry sector (Figure 12) to climate change is assessed as high, with only two indicators classified as purely positive. This sector is sensitive to all manifestations of climate change and, thanks to its landscape-forming and hydrological function, significantly influences the potential impacts of climate change in other sectors of the Czech economy.

Exposure indicators such as "Number of months with climatic drought" or "Extremely strong wind" are assessed as neutral or are expected to develop negatively in connection with climate change. In addition, the combination of drought and a prolonged growing season significantly exacerbates the damage caused by insect pests in forests.

In terms of sensitivity, the indicator "Volume of incidental logging" and the related indicator "Total area of clearings" are rated negatively. The exposed soil in the cleared area completely loses its original properties and is difficult to reforest. To increase the resilience of forests to the effects of climate change, it is therefore desirable to limit the creation of clearings after logging, even in the case of incidental logging after calamities. In order to increase the resilience of forests to the effects of climate change, it is therefore desirable to limit the creation of clearings after logging, even in the case of incidental logging after calamities. An unsatisfactory state and development of sensitivity is also observed in the health of forests from the point of view of defoliation.

The adaptation capacity of the sector is also assessed negatively, mainly due to the unsuitable composition of tree species with a predominance of spruce monocultures, which are poorly resistant to drought and other disturbances, especially insect pests. The sector's adaptation capacity to climate change can therefore be increased primarily by increasing the proportion of tree species that are more resistant to drought (e.g., beech or oak), but also by applying understory and selective management methods that do not create clearings, which will make it possible to achieve the set target state.

* Agriculture

Agriculture, along with several other sectors (forestry, water management, and water regime in the landscape), is the most vulnerable sector (Figure 13). The main manifestations of climate change to which agriculture is sensitive are "rising temperatures" and "prolonged drought." These manifestations are associated with reduced soil water content, changes in soil structure, and soil erosion, which is influenced, among other things, by hydrometeorological phenomena (extreme precipitation and wind). Agriculture is also one of the few sectors for which "Vegetation fires" are relevant, particularly in view of the prevailing type of agricultural activity (size of land blocks, cultivation plans, loss of humus layer) and also the damage caused by this manifestation of climate change.

In terms of sensitivity to climate change, the agricultural sector is assessed rather negatively. The sensitivity of this sector is mainly due to the high proportion of large land blocks that are farmed inappropriately (i.e., they have an unsuitable crop structure, low organic content in the soil, excessive use of mineral fertilizers and pesticides) and are threatened by wind and water erosion. Despite the long-term increase in the proportion of permanent grassland (see indicator "Cultivated agricultural land"), which are less sensitive to the effects of climate change, the adaptive capacity of agriculture is very low and inappropriate farming practices persist in the Czech Republic, leading to soil degradation and thus increasing vulnerability to the effects of climate change. With increasing exposure to certain manifestations of climate change, increased pressure on water withdrawals for agriculture and possible salinization in connection with high evaporation and water seepage during irrigation can be expected in the future. The adaptability of agricultural land and agriculture as a whole must be increased in the future. Although the proportion of organically farmed agricultural land is growing slightly, the agricultural sector is still not prepared for ongoing and expected climate change, especially with regard to increasing manifestations of drought.

* Water regime in landscape and water management

The water management sector, together with the agriculture and forestry sectors, is the most vulnerable to the effects of climate change (Figure 14). This is due to the geographical location of the Czech Republic on the "roof of Europe," where water mainly flows out of the country and water management is almost entirely dependent on water that falls in the form of atmospheric precipitation. This is one of the reasons why slowing down its outflow from the landscape in the Czech Republic is a priority and key issue in water management. Changes in precipitation patterns and moisture balance associated with climate change therefore have a direct impact on the water management sector. The situation is further exacerbated by the continuing decline in the retention capacity of the landscape.

Exposure indicators of climate change that affect water management were were assessed as predominantly negative for 2017. Although the total precipitation in the Czech Republic was normal (see indicator Precipitation as a percentage of the long-term normal), increasing spatial variability of precipitation with the largest deficit in the South Moravian Region and above-average temperatures led to the development of drought in parts of the Czech Republic. This can be documented by significantly above-average evaporation, a negative moisture balance of grassland, and low moisture reserves in the soil. Climatic drought was reflected in low surface and groundwater levels, i.e., hydrological drought. In terms of development, the significant rise in air temperature, which increases the risk of drought, and, in most years, low water reserves in snow, which could mitigate drought, are particularly unfavourable. Only mountainous areas, especially in the north of the Czech Republic, are affected by drought.

Unstable rainfall patterns can also lead to flooding, to which the Czech Republic is also highly vulnerable. Although the occurrence of significant river floods was assessed as low in 2017, the Czech economy is highly sensitive to flood risk. This is due to the location of settlements, arable land, and transport routes in flood-prone areas. Changes in land use, in particular poor management of agricultural land, the destruction of landscape features and non-forest greenery, land development and an increase in impervious surfaces, lead to faster water runoff from the landscape and thus to a higher flood risk. The declining sensitivity of water management to water shortages can be viewed positively. Water consumption in the economy is decreasing (see the indicator Water consumption by sector), the connection of the population to water management infrastructure is increasing (see the indicator Population not connected to public water supply systems) and water losses in water supply networks are decreasing (see the indicator Losses in water supply networks).

Hodnocení zranitelnosti České republiky ve vztahu ke změně klimatu k roku 2017 [Internet]. Available from: <https://cenia.gov.cz/wp-content/uploads/2020/03/Hodnocen%c3%ad-zranitelnosti-CR-vuci-ZK-2017.pdf>

Nationally Determined Contributions (NDC)

Land-use, land-use change, and forestry (LULUCF) sectors play a pivotal role in meeting global climate goals, with over 25% of 2030 mitigation pledges in Nationally Determined Contributions (NDCs) relying on land-based carbon sinks. However, systemic discrepancies between country-reported GHG inventories and model-based benchmarks—driven largely by inconsistent definitions and accounting methods—have rendered land a critical blind spot in tracking progress under the Paris Agreement. While many countries report LULUCF sectors as substantial net sinks in their NDCs (e.g. –2.9 to –4.2 Gt CO₂ e/y globally), integrated assessment models often project the land sector to be a net source (+2.0 to +2.1 Gt CO₂ e/y), indicating a significant ambition–implementation gap.

This misalignment undermines transparency and comparability, particularly when national inventories include indirect or natural carbon fluxes as anthropogenic, contrary to the narrower definitions used in global models. The result is a skewed perception of progress and mitigation ambition, which may lead to overreliance on unverified land sinks to meet net-zero targets. The paper emphasizes the urgent need for harmonized accounting rules, better data disaggregation, and explicit inclusion of LULUCF contributions in the Global Stocktake..

For countries like Czechia, whose climate strategies and NDCs increasingly depend on land-sector mitigation through forestry, soil management, and agriculture, addressing these methodological inconsistencies is essential to ensure accountability and to close the gap between pledged targets and real-world impacts

Roman-Cuesta, R.M., den Elzen, M., Araujo-Gutierrez, Z. et al. Land remains a blind spot in tracking progress under the Paris Agreement due to lack of data comparability. Commun Earth Environ 6, 598 (2025). <https://doi.org/10.1038/s43247-025-02494-9>

Czechia is making tangible progress in the economic pillar of sustainable development and the related SDGs. Decarbonisation of the Czech economy continues, with total emissions falling below 100 Mt CO2 eq. in 2023 for the first time. Since 1990, emissions have already fallen by 47 %. The energy intensity of the economy is decreasing, and the share of renewable energy is steadily increasing. Czechia steadily supports research and innovations, which is essential for the transformation of the traditional manufacturing industry into a modern, technologically advanced economy with sustainable and competitive production.

Voluntary National Review of the 2030 Agenda Czech Republic 2025 [Internet]. [cited 2025 Aug 6]. Available from: <https://hlpf.un.org/sites/default/files/vnrs/2025/VNR%202025%20Czech%20Republic%20Report.pdf>

Long Term Strategies (LTS)

GHG reductions projections in the agriculture sector by 9.4% for 2030 compared to 1990. In regards to the industry sector by 11.4% and the waste sector by 5.4%

National Inventory Report (NIR)

The drought-induced bark-beetle infestation resulted in record-high sanitary logging and total harvest more than doubled from the previous period. It turned Czech forestry from a long-term carbon sink offsetting about 6% of the country's greenhouse gas emissions since 1990 to a significant source of CO2 emissions in recent years (2018–2021). In 2020, the forestry sector contributed nearly 10% to the country's overall GHG emissions.

Agriculture -5.5%