III. NATURAL ASSET BASE

Natural assets, comprising land and ecosystems, water, renewable natural resources, energy carriers, and biodiversity provide incessant flow of environmental services to human economy. Depletion of the natural asset base leads to the decline in the extent and abundance of these vital services. Therefore, protection and sustainable use of natural asset base and services derived from the natural environment are a prerequisite of the green growth. One of the guiding principles of green growth is keeping the natural asset base not declining and maintaining or restoring quality of natural resource stocks and biological diversity.

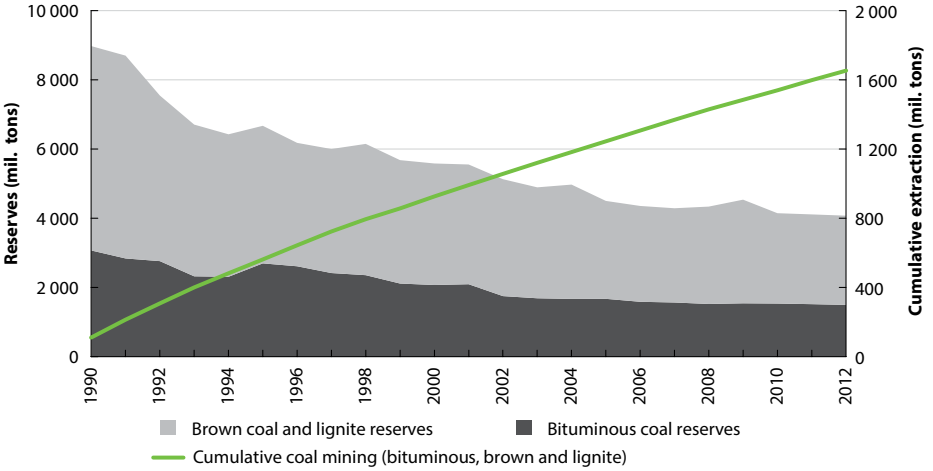
Human footprint on the environment, including mining, fishing or forestry, should stay within the productive capacity of the global as well as local environment. Furthermore, human activities should not lead to the depletion of natural asset base and degradation of ecosystems and biodiversity. Declining asset base constitutes a risk to future growth. Keeping a sufficient natural asset base provides an ecological insurance to human society. Depletion and degradation of the natural asset base brings additional economic costs to the human society. Indicators of the natural asset base are selected to monitor biophysical performance of natural assets, including land, ecosystems, freshwater, biodiversity and energy carriers.

3.1. Coal reserves and mining

Economic reserves are reserves suitable for mining under current technical and economic conditions. They are either "explored", which means that their existence is well proven, or "prospected", which means that their existence is based more on presumption thanks to sampling of the mineral deposit from outcrops and isolated mining works or from geological and geophysical data. Potential economic reserves are not suitable for mining under current technical and economic conditions, but might be usable in the future if these conditions change.

Explored economic coal reserves in the Czech Republic decreased by about 55% in 1990–2012 from 8 971 million tonnes to 4 074 million tonnes. As the cumulative mining of coal amounted to only 1 652 million tons over the whole period, the decrease in reserves was mostly a result of the re-classification of reserves from the category "explored economic reserves" to "potential economic reserves" and sometimes "prospected economic reserves".

Figure 18: Explored economic coal reserves and cumulative coal mining (mil. tons)



Source: Czech Geological Survey – Geofond

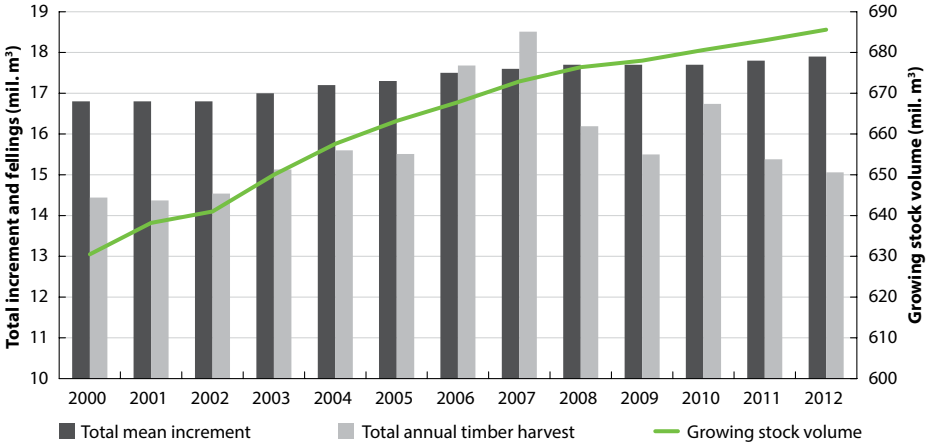
Although only about 0.4% of world coal reserves are located in the Czech Republic, the country's reserves of 4 074 million tonnes might seem quite large taking into account the fact that coal mining amounted to 55 million tonnes in 2012. It should be noted, however, that not all these reserves are currently accessible as they are either partly situated in protected areas or there are other cultural or legal restrictions prohibiting their extraction (e.g. the "ecological territorial limits for brown coal mining" in Northern Bohemia). Thus the life span of brown coal reserves in 2009 (based on mining in 2009, including losses from mining) was 45 years in total, but only 33 years when the territorial limits are taken into consideration.

3.2. Forest growing stock

Forest growing stock is the basic indicator of the sustainable use of forest ecosystems. The total mean increment reflects the production capacity of forest stands, which is based on total growing stock. The balance between increment and harvest indicates the sustainability of timber production over time.

Forest ecosystems cover one third of the area of the Czech Republic. Therefore, forests are a precious natural asset. Growing stocks and increments are related not only to timber production but also to other forest functions and services, such as carbon storage, water retention, biodiversity or recreation. Total mean increment, as well as balance of increments and harvest, are key indicators of forest production sustainability.

Figure 19: Forest growing stock, mean annual increment and the total volume of timber harvest (mil. m³)



Source: Forest Management Institute, Czech Statistical Office

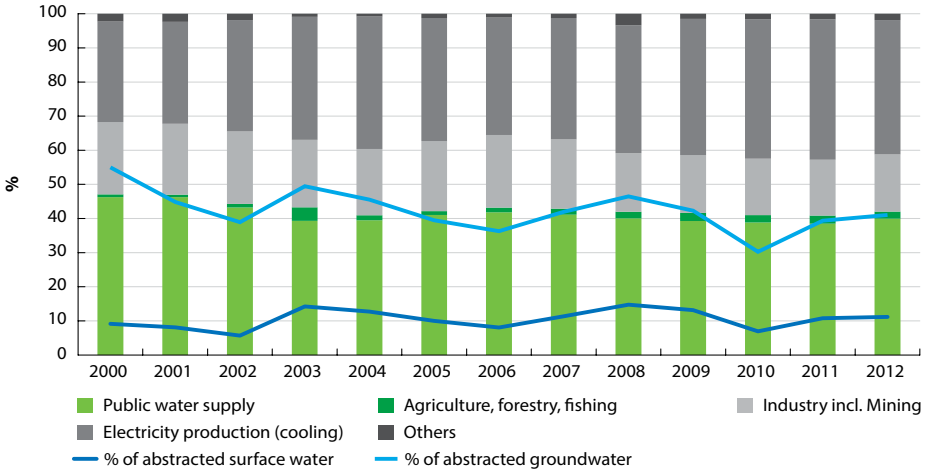
Forest growing stock is steadily increasing in the Czech Republic, and it expanded by 8% during the last decade. Since 1930, the total growing stock has almost doubled. Average growing stock has reached around 264 m^3 per hectare of total forest land. The growing stock increase is caused mainly by thte increasing share of old-growth forests and increasing increments. However, total annual increments have been stagnating in Europe over the last few years. The total annual timber harvest decreased slightly over the last few years and is well within the limits of mean annual increments. In 2007 and 2008, timber fellings exceeded mean annual increments due to Kyrill storm damage. The timber harvest decreased from 6.3 $m^3.ha^{-1}$ in 2010 to 5.66 $m^3.ha^{-1}$ of forest land in 2012. The Czech Republic is among the OECD countries with the highest forest growing stocks, which reflects the country's natural conditions as well as forest management traditions. The timber harvest in national parks is limited. However, in comparison with other European countries, Czech forests are used relatively intensively, with the ratio of timber harvest to increments reaching a level of 0.85–0.9, although harvest intensity has been declining over the last few years.

3.3. Water abstraction

This indicator shows water abstraction (groundwater and surface water) per year as a percentage of renewable available freshwater resources, and the amount of surface water and groundwater use by sector. Only water abstraction exceeding 6 000 m³ annually or 500 m³ per month are included in the statistics.

Water abstractions have been more or less stable over time. The relative decrease in the share of abstractions from total freshwater resources in 2002, 2006 and 2010 was driven by higher volumes of rainfall in a given year, as shown in the chart. Surface water abstractions increased from 1 300 mil. m³ per year at the beginning of the period to 1 500 mil. m³ by the end of the period, while the consumption of ground water decreased from 550 mil. m³ to 380 mil. m³ per year. Of the total water drawn in the period 2000–2012, 47% was appropriated for the cooling of steam turbines for electricity production, 28% was abstracted by public water supply systems, 22% was used by industry and less than 2% of water was consumed by agriculture. Most groundwater was used by public water supply systems (84%) and by industry (9%).

Figure 20: Groundwater and surface water abstractions by sector and as a proportion of available freshwater resources (%).



Source: Czech Hydrometeorological Institute, Ministry of Agriculture, T. G. Masaryk Water Research Institute, Czech Statistical Office

In Europe, the Czech Republic is among those countries with sustainable water use and low water stress, due to its favourable geomorphological and climatic conditions. On average, two fifths of water is used for the energy sector in Europe, a quarter for agriculture, one fifth for public water supplies and 10% for industry. In southern European countries, the proportion of water used for irrigation is about 60%, while in the Czech Republic irrigation is negligible (2%). The countries with the highest rates of water abstraction with regard to total available freshwater resources are Greece, Cyprus, Denmark and Belgium.

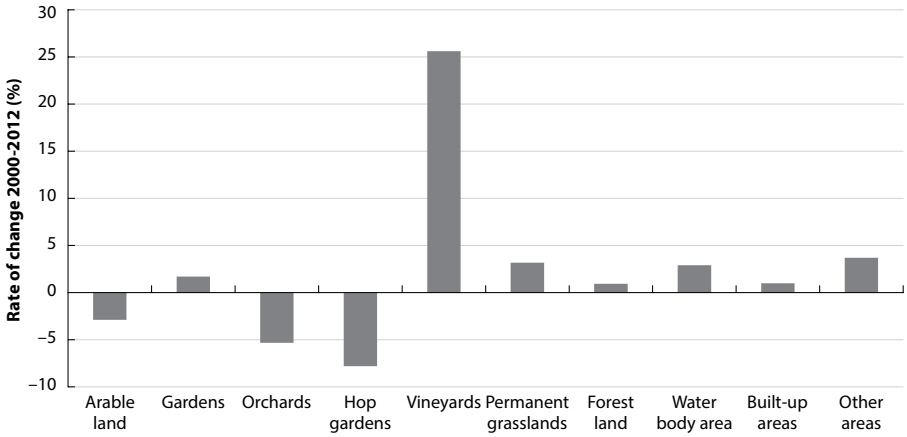
3.4. Land use change

Land use describes the spatial aspects of human socioeconomic activities associated with the land, and with the way in which land cover is transformed to serve human needs. The land use indicator tracks changes in the structure of land use. Land use change is assessed as the rate of change of land use categories.

The structure of land use reflects the economic activities of human society. The prevailing trend over the whole monitored period is that of a steady decrease in the proportion of arable land, from 39% in 2000 to 37.9% in 2012. Arable land has been transformed especially into pastures and permanent grasslands. However, a considerable amount of agricultural land, including grasslands, is still being consumed by the development of urbanized areas, especially by the sprawl of economic sites and infrastructure. The intensity of land take almost doubled to 0.4% per year.

The area of vineyards located predominantly in the Moravian region increased by 25.6% from 2000 to 2012, with an annual increase by nearly 2%, reaching 19 562 ha in 2012. However, this explosion has been partly balanced by a decline in other permanent cultures, such as orchards and hop gardens, which declined by 0.45% per year. What has been quite alarming is the steady loss of semi-natural and natural areas, such as semi-natural grasslands important for biodiversity.

Figure 21: Rate of land use change (%).



Source: Czech Office for Surveying, Mapping and Cadastre, Czech Statistical Office

The total turnover of land use change decreased in comparison with previous decades. However, dominant trends in the structure of land use change have been sustained, albeit with decreasing intensity, with the exception of land take. The majority of OECD countries have experienced similar declines in agricultural lands. Trends of land take by urbanization and the loss of semi-natural habitats are consistent with trends in the EU.

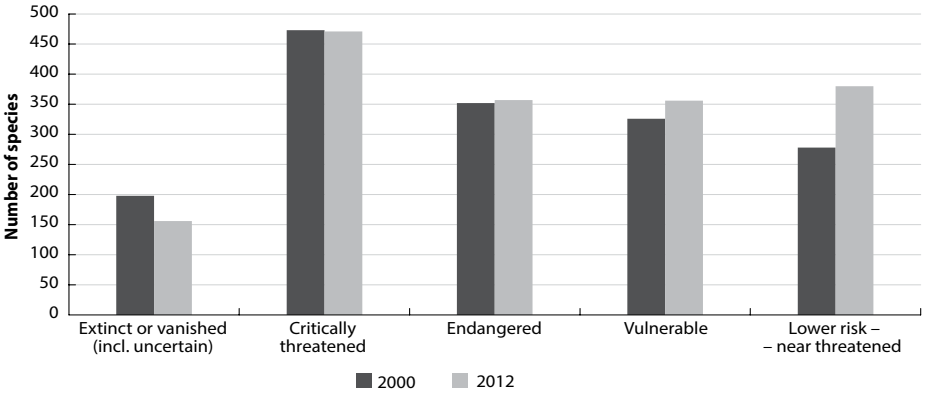
3.5. Biodiversity threats

Biodiversity threats are assessed as a change in the proportion of endangered plant species. Species are arranged in categories of threat according to the standardized criteria of the IUCN Red List. Threats to biodiversity from land use change, overexploitation, pollution, habitat fragmentation, climate change and other factors undermine the value of ecological assets.

Biodiversity is one of the bases for productive natural assets. Diversity of genes, species, functional groups and habitats support economic production as well as regulation and cultural ecosystem services. The leading indicator of a biodiversity threat is risk to species. Endangered species are assessed according to IUCN Red List criteria and categories. The compilation of Red Lists has been completed in a majority of countries and enables an international comparison of numbers of endangered species and major causes of threats.

The most recent Red List which permits the monitoring of changes over time has been compiled for plants. In total, 1 720 taxa have been included in the Red List assessment, which is more than half of the flora of the Czech Republic (59.2 %). From 2000 to 2012, there was an increase in the total number of species listed from 1 627 to 1 720. The number of species included in the category of globally or regionally extinct species decreased simply due to a reduction in the number of indeterminate cases; otherwise, the number of globally or regionally extinct species has increased by 7.2%. There was also a significant increase in numbers of endangered species in the categories 'vulnerable' and 'near threatened'. Critically endangered species still account for 27.4% of all Red-Listed species.

Figure 22: Change in the number of threatened species of plants between 2000 and 2012



Source: Grulich 2012[1]

The main reason for the increasing risk to biodiversity is increasing human pressure on natural and semi-natural habitats. The increase of the number of species in the lower risk categories of endangerment could pose a potential threat for the future state of biodiversity in an era of increasing human pressure and climate change.

[1] Grulich, V. (2012). *Red List of vascular plants of the Czech Republic: 3rd edition.* Preslia 84: 631–645.

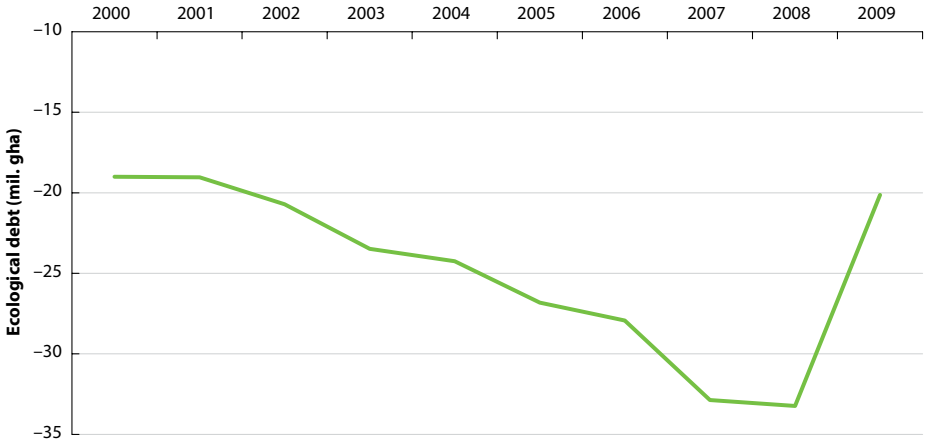
3.6. Ecological debt

The ecological debt is derived from national ecological footprint accounting. It measures the divergence between available biocapacity and the human demand on regenerative ecosystem resources. A majority of high income countries has an extensive ecological debt resulting not only from greenhouse gas emissions, but from the displacement of ecological demand to other countries also.

The ecological debt indicator is based on the most recent National Footprint Accounts 2012, which capture the year 2009. The Ecological Footprint measures the appropriation of ecosystem products and services in terms of the amount of bioproductive land and sea area needed to supply these products and services. The available productive area (supply) is denoted as biocapacity. The demand side is called the footprint. The ecological debt is the difference between available biocapacity and total demand (footprint).

The ecological debt has been steadily declining during the last decade. However, the last National Footprint Accounts assessment detected an improvement mainly due to a decrease in the total footprint from 5.85 global hectares (gha) per capita to 4.85 gha per capita. The current deficit is 20 mil. gha; while available biocapacity reached 29.5 mil. gha, it is not sufficient to cover the consumption footprint of the Czech population, which exceeds biocapacity by a factor of 1.7 (49.5 mil. gha in absolute numbers).

Figure 23: Ecological debt (mil. gha)



Source: Global Footprint Network, Charles University Environment Center

The Czech Republic is a net importer of global biocapacity. Net biocapacity imports are 2.5 mil. gha. A majority of OECD and EU countries also has a negative balance (ecological debt) in the areas of carbon footprint, fishing grounds and cropland, while some of them also have a deficit in forest areas and grazing land. Ecological debt enables an analysis of dependence on global biocapacity displaced by countries.