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Method description for the preparation of ecosystem accounts

Context and objectives

Ecosystems are a “dynamic complex of communities of plants, animals, and microorganisms, as well as their non-living environment, that interact as a functional unit.”¹ These include forest and agricultural landscapes, aquatic landscapes, alpine pastures, and mountain meadows, etc. – which are typically found in Austria.

Ecosystem accounts – a module of environmental accounts² – collect data on the extent and condition of existing ecosystems and the services they provide to society and the environment.

To make statements about the spatial extent of ecosystems, an ecosystem map is essential. Various geodata provide the basis for this. The ecosystem map can then be used to calculate the extent of ecosystems as well as the availability and use of ecosystem services.

Compilation of the ecosystem extent map

The methodological approach for creating the ecosystem map is based on international standards, in particular the United Nations' System of Environmental Economic Accounting Central Framework (SEEA CF³) and the SEEA ecosystem accounts (SEEA EA⁴). The approach follows the guidance note on ecosystem extent accounts⁵ and the EU ecosystem typology⁶, which were developed by Eurostat and the Ecosystem Accounting Task Force for the voluntary data collection in 2024. Furthermore, the ongoing discussions taking place within the Eurostat Ecosystem Accounting Task Force are taken into account⁷.

¹ According to the Convention on biological diversity. Rio de Janeiro, 5 June 1992.

² [Regulation \(EU\) No 691/2011 of the European Parliament and of the Council of 6 July 2011 on European environmental economic accounts](#)Text with EEA relevance

³ [System of Environmental-Economic Accounting Central Framework](#)

⁴ [System of Environmental-Economic Accounting Ecosystem Accounting](#)

⁵ [Guidance note on ecosystem extent accounts 2024](#)

⁶ [EU ecosystem typology 2024](#)

⁷ Further details on the methodological approach and the results analysis can be found in the final report of the Eurostat grant.

The ecosystem map is designed as a raster map with 10 x 10 meter grid cells. Various spatial geodatasets are intersected to create it. Each grid cell is assigned exactly one ecosystem type. To avoid duplicate assignments within a grid cell, a specific data hierarchy has been established, which dictates which dataset takes precedence in case of overlaps. To ensure that no grid cell remains empty, a base layer guarantees a fixed assignment. The land cover map from Statistics Austria (STATEo⁸) forms the base layer. The data layers are added in the following order and hierarchy level:

1. Basislayer **STATEo**
2. Settlements, bare rocks and debris, glaciers and sparsely vegetated areas from **the Digital cadastral map (DKM)**⁹
3. Land Parcel Identification System from the **Integrated Administration and Control System**¹⁰
4. Correction of alpine meadows for bare rocks and sparsely vegetated areas based on **CLC+ backbone**¹¹
5. **Tree species map** of the Austrian Research Centre for Forests¹²
6. Wetlands from Digital cadastral map
7. Waterbodies from Digital cadastral map and **Water Information System Austria**¹³
8. Traffic network and extraction sites, dump sites from Digital cadastral map
9. Correction of sealed surfaces in mountains based on CLC+ backbone

In the future, wetlands will be depicted in greater detail based on the updated peatland inventory of the Environment Agency Austria¹⁴. This inventory was not yet available at the time the ecosystem map was completed. Furthermore, the water bodies and transport network will be supplemented with spatial information from the digital landscape model of the Federal Office of Metrology and Surveying.

Ecosystem extent map 2021

The ecosystem map for 2021 (see below) was used to determine the areas of the ecosystem types. The results were thoroughly analysed and compared with results from the forest inventory, agricultural structure survey, CORINE land cover¹⁵, and LULUCF reporting¹⁶. Possible causes for persistent discrepancies between the results were identified. These are generally due to differing definitions or varying spatial resolutions in the datasets.

Nevertheless, some questions remain, which will be addressed step by step in the coming years. These include, among others, the lack of distinction between continuous and discontinuous settlement areas, the insufficient differentiation of inland wetlands, and the incomplete recording of ecologically valuable areas, such as extensive orchards or landscape features.

⁸ Statistik Austria 2021: [STATatlas - STAT-Landcover](#).

⁹ Federal Office of Metrology and Surveying (2021): Digital cadastral map. Cut-off date: 1 October

¹⁰ Agrarmarkt Austria 2021: IACS

¹¹ Copernicus Land Monitoring Service 2021: CLC+ Backbone

¹² Austrian Research Centre for Forests (BFW) 2021: Tree species map, [waldinventur](#)

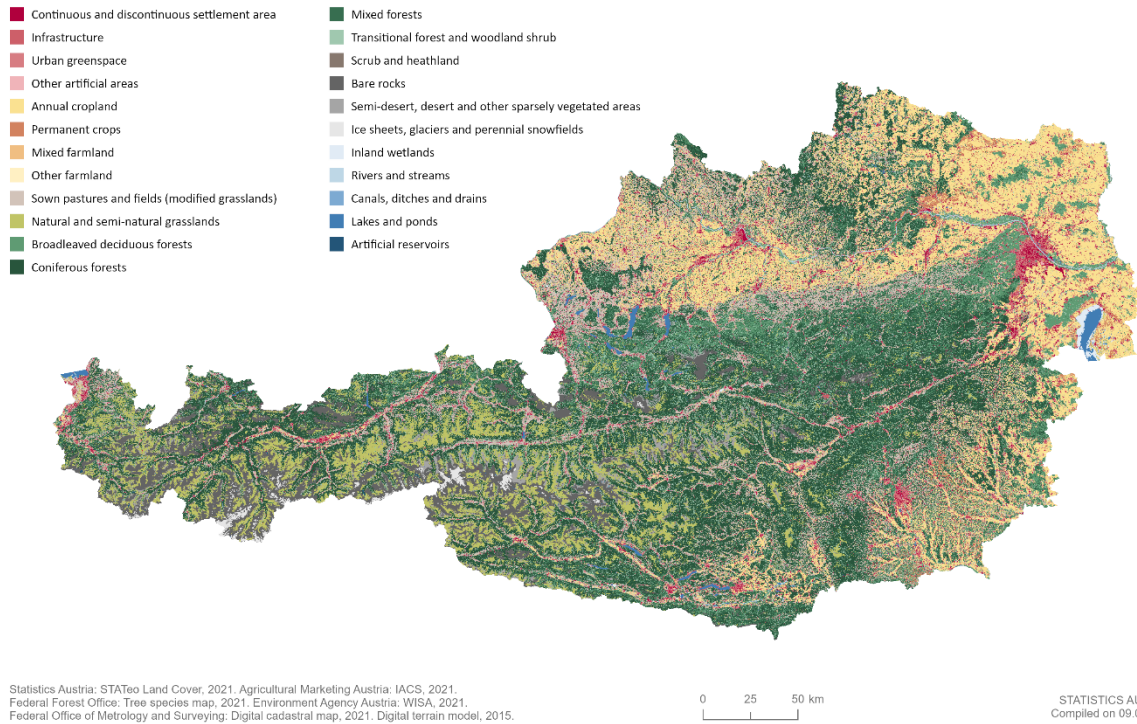
¹³ Environment Agency Austria: Water Information System Austria 2021

¹⁴ Environment Agency Austria: Peatland inventory 2025

¹⁵ Copernicus Land Monitoring Service: CORINE Landcover, [CORINE Land Cover — Copernicus Land Monitoring Service](#)

¹⁶ Umweltbundesamt: LULUCF, [Landnutzung, Landnutzungsänderung und Wald | Treibhausgas-Emissionen](#)

Ecosystem Extent Map 2021 Raster



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Compilation of ecosystem service accounts

Ecosystem services refer to the benefits ecosystems provide for economic and other human activities. Ecosystem services arise from complex ecological processes and diverse interactions between ecosystems and human land use. It is not feasible to capture a complete picture of all the ecosystem services provided by an ecosystem. The ecosystem accounts therefore show a limited selection of the diverse services provided by nature.

Ecosystem services are measured in different physical units and are based on geospatial modelling. A monetary valuation is also planned at a later stage within the framework of the ecosystem accounts. **The individual ecosystem services cannot be added together and should not be interpreted as a comprehensive total value of nature.**

The following ecosystem services must be reported as part of European environmental economic accounts¹⁷:

- **Provisioning services:** crop provision, pollination and wood provision
- **Regulating and maintenance services:** air filtration, global climate regulation and local climate regulation
- **Cultural services:** nature-based tourism related services

The compilation of the accounts follows the methodology recommended by Eurostat, which is described in the guidelines on ecosystem service accounting¹⁸. The INCA tool¹⁹ provided by Eurostat is used to model certain ecosystem services. This is a GIS-based tool that is based on EU-wide data sets and allows for national adjustments. The tool supports spatially explicit modelling and assessment of ecosystem services.

The calculations of ecosystem services for Austria are currently under development. For the time being, results for three ecosystem services are being published: the provision of cultivated plants, global climate regulation and nature-based tourism-related services.

Crop Provision

Crop provision refers to the contribution of ecosystems to plant growth. It is approximated by the quantity of cultivated plants harvested for various purposes. These include the production of food and fibres, the production of fodder and energy, and the provision of grazed biomass.

Data on crop provision comes from the material flow account (MFA)²⁰, which in turn is based on crop production statistics²¹. However, for use in the MFA, this basic data is adjusted in accordance with the methodology of the economy-wide material flow accounts²², for example by correcting the moisture content of silage maize or by estimating the amount of grazed biomass.

For the supply table, crop yields are allocated to the corresponding ecosystem types. Field crops, crop residues and parts of fodder crops originate mainly from cropland. Permanent greenhouses belong to the ecosystem type 'settlements and other artificial areas', which is why their products are also allocated to this ecosystem type. Parts of fodder crops and grazed biomass are assigned to grassland.

For the use table, the total corresponding ecosystem service is recorded as intermediate consumption by industry; this also includes area A01 (agriculture, hunting and related activities).

¹⁷ The first transmission of data to Eurostat shall take place by the end of December 2026 and it relates to the reference year 2024.

¹⁸ [Guidance note on ecosystem services accounts 2024](#)

¹⁹ [INCA Tool | INCA Platform](#) (INCA: Integrated system for the Natural Capital Accounting)

²⁰ [Material flow accounts - STATISTICS AUSTRIA - The Information Manager](#)

²¹ [Crop production and farming - STATISTICS AUSTRIA - The Information Manager](#)

²² [Economy-wide material flow accounts \(EW-MFA\), Handbook 2018 edition](#)

Global climate regulation

Global climate regulation refers to the contribution of ecosystems to reducing greenhouse gas concentrations in the atmosphere. This is achieved by removing carbon from the atmosphere (net sequestration) and storing carbon in ecosystems. The contributions are reported in tonnes of net carbon sequestration and in tonnes of organic carbon stored in terrestrial ecosystems, both in above ground and below ground biomass.

Data from LULUCF greenhouse gas reporting²³ is used for the calculation. The net sequestration figures correspond one-to-one with the values in the national greenhouse gas inventory²⁴.

The storage values are based on Austria specific carbon stocks and areas in the base year 2020. For subsequent years, the stocks per ecosystem type are updated in accordance with the Eurostat guideline by adding the annual change in carbon stocks from LULUCF reporting to the baseline.

To create the supply table, the values are then assigned to the respective ecosystem types using the LULUCF typology. In the use table, the total ecosystem service is reported as government consumption.

Nature-based tourism-related services

Nature-based tourism-related services refer to the contribution of ecosystems, in particular through their biophysical characteristics and properties, which enable people to use and enjoy the environment through direct, local, physical and experiential interactions with it. These contributions are measured by the number of overnight stays in commercial and private accommodation attributable to visits to ecosystems.

The calculation follows four basic steps:

1. **Collection of tourism statistics:** The basis is provided by tourism statistics on overnight stays²⁵ at municipal level, separated into summer and winter seasons.
2. **Isolation of the ecosystem contribution:** Using the national Recreation Potential Map²⁶, an estimate of the proportion of overnight stays attributable to nature-based leisure and recreation opportunities is made. To avoid overestimates, adjustments are made for cities²⁷ (10% contribution for Vienna, 20% for other cities).
3. **Attribution of overnight stays to ecosystem types:** For the supply table, the ecosystem-related overnight stays are then assigned to ecosystem types. This is done in the INCA tool at the level of districts using the area shares of the ecosystem types and attractiveness factors based on the presence of recreational facilities (e.g. hiking trails, ski resorts, cycle paths, viewpoints, huts) and, in the summer season, bathing lakes. Areas with such facilities are given higher weightings.
4. **Allocation of use:** In the use table, overnight stays in nature-based tourism are broken down into private households (domestic tourism) and exports (foreign tourism).

²³ [Landnutzung, Landnutzungsänderung und Wald | Treibhausgas-Emissionen](#)

²⁴ [Emissionsinventur | Klima | Umweltbundesamt | Österreich](#)

²⁵ [Arrivals & overnight stays - STATISTICS AUSTRIA - The Information Manager](#)

²⁶ Further details on the methodological approach and the results analysis can be found in the [final report of the Eurostat grant](#).

²⁷ According to the [degree of urbanisation by Eurostat](#).

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