Land Ownership and Ecosystem Services in the Netherlands

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Co-funded by the European Union

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project number 2023-NL-CITY

15 December 2025

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1. Introduction

1.1 Land ownership in the Netherlands

Land ownership is a key characteristic that provides a direct link between land, its management and its economic use. The owner of land determines – within the set legal frameworks – how the land is organised, which economic activities take place and who may use the land, but is also responsible for the management and maintenance of the land. Consequently, land ownership is an important aspect of societal issues, including urbanization, agricultural intensification and extensification, deforestation and afforestation, land-use changes, nature conservation and the use of natural resources. Land ownership characteristics are therefore often linked to the progress in achieving sustainable development (Meyfroidt et al., 2022).

In the Netherlands, the transition to a circular economy, addressing of housing shortages, adaptation to climate change and the conservation of terrestrial and aquatic biodiversity all demand significant spatial interventions (PBL, 2021). Central and local governments, corporations, non-profit organizations and households – many of whom have different interests – all compete with each other for the same tracts of land. Statistics on land ownership are therefore highly relevant for spatial planning as well as for the management and use of (semi-) natural areas. Currently, statistics on land ownership are limited for the Netherlands. As mentioned, this new data can support the development, monitoring, and implementation of sustainable land policies at both national and sub-national levels. In addition, land ownership data can contribute to other key (European) statistical accounts, including the national accounts (institutional sector accounts), environmental accounts (land accounts), and particularly the ecosystem accounts.

1.2 Land ownership and ecosystem accounting

Ecosystem accounting constitutes a statistical framework for organizing (spatial) data, tracking changes in the extent and condition of ecosystems, measuring ecosystem services and linking this information to economic and human activity. By doing this, ecosystem accounts aim to illustrate how the society benefits from ecosystems and their services. Since 2015, Statistics Netherlands has developed ecosystem accounts for the Netherlands following the international System of Environmental-Economic Accounting for Ecosystem Accounting (SEEA EA) (UN, 2021). In addition, the EU legislation[1] on ecosystem accounts entered into force, requiring all member states to report on ecosystem extent, services and condition accounts to Eurostat from 2026 onwards.

The aspect of land ownership, which is important regarding the management of ecosystems (and the services that are provided), is currently not included in the Dutch ecosystem accounts. Although reporting on the ownership of ecosystems is not included in the EU regulation, integrating land ownership data into ecosystem accounts offers much added value. Analysing the economic and legal ownership of ecosystems and ecosystem services opens the possibility to better understand the links between ecosystems and the economic entities that manage and benefit from them. The SEEA EA (par. 11.50) highlights the importance of understanding the link between ecosystems and their ownership for effective ecosystem management policies. Incorporating ownership data into ecosystem accounts can provide valuable policy insights – for

[1] Annex IX of amended Regulation(EU) 691/2011 on the European environmental-economic accounts

example, by assessing the roles of the public and private sectors in managing ecosystem services. For some ecosystem services, ownership data may help to identify the users of the services. Moreover, aligning ecosystem accounts with institutional ownership enabled their integration with the national accounts, improving the coherence between environmental and economic statistics.

Furthermore, Atkinson & Ovando (2022) argue that including land ownership data into ecosystem accounts is essential to reveal how natural capital is distributed throughout societies , potentially uncovering social inequalities in the ownership of, and access to, ecosystem assets and services. They argue that if the value of natural capital is an essential part of the national wealth – as the SEEA EA framework suggests – then knowing how (un)equal this distributed throughout the society is highly relevant.

1.3 Research objectives

Despite the policy demand for land ownership statistics – in the context of sustainable development and ecosystem management – Statistics Netherlands currently does not produce such data. As part of the SMP-ESS-2023-Subnational-IBA Eurostat Grant, this research aims to explore and develop new methods to enable the preliminary production of sub-national land ownership statistics of the Netherlands.

This study has two main objectives:

1. Compile land ownership statistics for different regional scales;
2. Show the value added of land ownership in the context of ecosystem accounting.

This report is structured as follows. Chapter 2 describes the methodology used in this initial effort to produce land ownership statistics for the Netherlands. Chapter 3 presents the results and analysis across different regional levels of the Netherlands. Chapter 4 discusses the innovative approaches applied linking land ownership data with the Dutch ecosystem accounts. Finally, Chapter 5 provides the main conclusions of this study.

2. Methodology

This chapter outlines the methodology used to compile land ownership statistics for the Netherlands. Subsections 2.1 to 2.3 describe the approach taken to create a national land ownership dataset. Subsection 2.4 further explains how this dataset is used to analyse land ownership in the Netherlands (Chapter 3), as well as to explore the linkages between land ownership and ecosystem accounting (Chapter 4).

2.1 Legal and economic ownership

To produce land ownership statistics, it is essential to clearly define both the concepts of land ownership and landowners. Ownership refers to the legal or rightful possession and control of an asset, property, or resource by an entity. Following the System of National Accounts (SNA), ownership is attributed to institutional units: entities capable of engaging in the full range of economic transactions, owning assets and decision-making for all aspects of economic behaviour. Based on their principal economic objectives, functions and behaviour, institutional units can be grouped into mutually exclusive institutional sectors (e.g., non-financial corporations, governments or households). Using this approach, landowners are defined by their legal and institutional characteristics rather than by their main economic activities. For example, a private nature estate and a public national park are owned by different institutional units – a corporation and a government entity, respectively – that both engage in the same economic activity: i.e. nature conservation.

Landowners can have legal or economic ownership of land. The SNA defines a legal owner as ''*the institutional unit entitled in law and recognized under the law to claim the benefits associated with the entities*'' (2008 SNA, para. 10.5). These benefits include goods and services, financial assets and natural resources. In contrast, economic owners are defined as ''*the institutional unit to claim the benefits associated with the use of the entity in question in the course of an economic activity by virtue of accepting the associated risks*'' (2008 SNA, para. 10.5). In many cases, the legal and economic owner are the same. However, there are instances where the economic right to use or benefit from land is separated from its formal legal ownership – for example, in the case of leaseholds, tenancy, building rights, or usufruct. An example of this is a forest that is legally owned by a government entity (e.g., a municipality), but economic ownership is held by a private corporation (e.g., a timber company) under a lease or concession to use the land to extract timber or other natural resources.

These conceptual distinctions underpin the methodological approach to land ownership in this research. In line with the SNA, this research primarily aims to capture the 'real-world' distribution of benefits, responsibilities and risks associated with land and ecosystem management. Because of this, this study follows the perspective of economic ownership. Consequently, land ownership data can be more effectively integrated into ecosystem, environmental and economic accounts, thereby increasing their relevance for policymaking. Still, the perspective of legal ownership remains relevant in the context of ecosystem accounting. For example, a legal landowner who leases out land can impose specific conditions on its use, for example prohibiting the application of pesticides on cropland. Such legal rights and restrictions can significantly influence ecosystem management practices. This study, however, does solely adopt the economic ownership perspective.

2.2 Data sources

Different data sources are used to develop and compile land ownership statistics for the Netherlands, including cadastral parcel information, economic sector classifications and geospatial datasets. This subsection describes these data sources.

2.2.1 Cadastral register

The primary source of land ownership data is the Dutch cadastral register – the *Basisregistratie Kadaster* (BRK) – maintained by the Dutch Land Registry and Mapping Agency (Kadaster). The BRK contains detailed information on property boundaries, land ownership and property rights for every cadastral parcel in the European Netherlands. All information in the BRK can be mapped onto the *Digitale Kadastrale Kaart* (DKK) – the national cadastral map – using unique parcel identification codes.

For this research, Statistics Netherlands collaborated with Kadaster to develop a subset of the BRK containing detailed land ownership information for every cadastral parcel in the Netherlands for the reference year 2022. This dataset covers the entire land area of the (European) Netherlands, including inland water bodies (such as rivers, canals and lakes) and part of the North Sea. The territories of the Caribbean Netherlands are not included in this data.

For each parcel, the primary landowner was identified by Kadaster based on the principles of economic ownership. A single tract of land can have multiple rights holders, with entities owning varying shares of different types of land rights. Kadaster developed a stepwise approach to determine the primary owner in such cases. This methodology is described in subsection 2.3.3. For each parcel, the following information was obtained:

- Cadastral parcel identification number;
- Unique identifier of the primary landowner;
- Name of the landowner (for legal entities only);
- Legal entity type of primary landowner;
- Business registration number (*KVK-nummer*).

For privacy reasons, the names of rights holders who are natural persons have been removed from the dataset. Each parcel is assigned to a single primary rights holder. In addition, the dataset includes information on all other relevant rights holders per parcel, as identified by Kadaster[2]. This enables a broader analysis of partial and overlapping land ownership. For each of these additional rights holders, the dataset includes (in addition to the variables listed above):

- Type of land rights;
- Share of land right held.

This dataset forms the foundation of this research. Its dual structure enables both the compilation of land ownership statistics from a principal economic perspective and a more nuanced analysis of shared ownership among different types of land owners. In total, the dataset contains information of the (primary) landowners for more than 8.5 million cadastral parcels in the Netherlands for the year 2022.

[2] Kadaster has selected all records with the following land rights: ownership rights; rights of superficies; leaseholds; leaseholds and building rights; and rights of superficies, specifically intended for utilities.

2.2.2 Administrative data

For the regionalization of land ownership data, this research uses the *Gemeente-, Wijk- en Buurtkaart* (GWB), published by Statistics Netherlands (2024). The GWB contains the spatial geometries of all municipalities, districts, and neighbourhoods of the Netherlands. Each administrative unit is assigned a unique code, enabling further aggregation into sub-national classifications such as provinces (NUTS-2) and COROP regions (NUTS-3).

2.2.3 General business register

To classify legal entities from the BRK using an institutional ownership classification, the BRK is linked to the general business register (*Algemeen Bedrijvenregister*, ABR), maintained by Statistics Netherlands. The ABR contains the key characteristics of all businesses and institutions operating in the Netherlands, and distinguishes between three levels of statistical units: enterprise groups, business units, and local business units. For this research, information at the business unit level was used, particularly:

- SBI codes (*Standaard Bedrijfsindeling*), the Dutch classification of economic activities based on NACE Rev. 2, used to categorize businesses by their primary economic activity;
- Institutional sector codes (S), in line with the ESA 2010 framework.

The linkage between the BRK and ABR is established using the Dutch Chamber of Commerce number (*KvK-nummer*), which serves as a unique key shared by both registers. In this study, the classification of entities is applied at the business unit levels (BE).

2.3 Classification of landowners

2.3.1 Stepwise classification

As mentioned, the BRK dataset contains information on all relevant rights holders of each parcel, including those with primary ownership rights. To classify landowners into a usable typology, all rights holders are first consolidated into a single dataset, regardless of whether they hold primary or secondary rights, to ensure that all owners are classified. These records are linked with the ABR, DKK and GWB-datasets using the unique identifiers to enrich the BRK dataset with information on institutional sector classification, administrative units, and parcel area.

Based on this integrated dataset, a stepwise classification framework was developed to derive a typology of landowners aligned with institutional categorizations. This framework was made to be as consistent as possible with the institutional sector classification of the SNA, allowing for comparability with other macroeconomic statistics. This resulting two-tier classification typology is presented in section 2.3.2. The classification is implemented in the following steps:

1. *Identification of private individuals (households)*. All natural persons are identified and grouped as households. Due to privacy considerations, these individuals are not further subdivided in this study. This category includes the businesses of self-employed persons (one-man business).
2. *Classification of matched legal entities based on sector codes*. Where possible, the remaining legal entities are classified using sector codes from the linked ABR dataset.

3. *Classification on unmatched legal entities*. Not all legal entities can be linked to the ABR. In total, approximately 57% of legal entities in the BRK lack a registered KvK number, making linkage to other business registers impossible (Statistics Netherlands, 2023). For these cases, the classification is based on other available BRK information, particularly the legal form (e.g., foundations, private or public companies) or name.
4. *Classification of remaining entities*. Any remaining entities that cannot be reliably classified using the above methods are placed into a residual 'other' category. This group includes ambiguous legal forms such as partnerships, foreign entities, and entities with missing or unclear ownership information.

In cases where information from the BRK and ABR conflicted – for instance, when an entity classified as a non-financial corporation in the ABR but as a non-profit organization in the BRK – priority is given to the ABR information to maintain consistency with other macroeconomic statistics of Statistics Netherlands. Finally, additional validation checks were conducted on the landowners with the largest total land area. Where necessary, manual corrections were implemented to rectify inaccuracies in the source registries.

2.3.2 Landowner typology

Table 2.1 presents the two-tier landowner typology used in this research. The level 2 classification provides more detailed insights into the various types of landowners in the Netherlands.

Table 2.1 – Typology of landowners

Level 1	Level 2	Description
Households	-	Includes all individual private landowners, including self-employed entrepreneurs.
Government	Central: State	Encompasses all ministries and departments with national jurisdiction.
	Central: Other	Encompasses all national government agencies, excluding ministries and departments.
	Decentral: Provinces	Includes all administrative departments and agencies operating at the provincial level.
	Decentral: Water bodies	Includes all water boards (*waterschappen*) managing water systems at the sub-national level.
	Decentral: Municipalities and other	Includes all administrative departments and agencies functioning at the municipal level, as well as other decentralized public entities such as intermunicipal cooperatives, publicly funded education institutions, and recreation boards.
Non-profit organisations	Nature and culture	Non-profit organisations primarily engaged in the management and conservation of natural areas, or the preservation and promotion of cultural heritage.
	Religious organisations	Includes religious non-profit institutions such as churches, parishes, mosques, and their associated properties.
	Other	Covers all other non-profit organizations not included in the above subcategories.
Non-financial corporations	Private owned	Includes all privately owned non-financial corporations whose primary activity is the production of goods or non-financial services for the market
	Government owned	Includes publicly owned or partially government-owned enterprise, such as the Dutch Railways, water supply companies or energy companies.
Financial corporations	-	Includes the institutional units whose primary activity is the production of financial services. This includes the central bank, deposit-taking corporation, money market funds, insurance corporations and pension funds.
Other	-	A residual category capturing all entities that do not fit into the above classifications, including foreign entities and undefined ownership types.

2.3.3 Obtaining the primary landowner

As previously noted, a single cadastral parcel can be associated with multiple rights holders and (shares of) varying land rights. To compile consistent land ownership statistics without the double-counting of land, it is essential to assign one exclusive rights holder – or owner - per parcel. For this purpose, the Kadaster has developed a standardized, stepwise approach to identify the primary landowner for each cadastral parcel. This methodology follows a hierarchical set of criteria to determine the primary landowner:

1. *Type of land rights*. Priority is given to full ownership, followed by leasehold, building rights, and subsequently other land rights.
2. *Share of land rights*. If multiple right holders possess the same type of right, priority is assigned to the holder with the largest share.
3. *Natural or non-natural entity*. In cases where shares are equal, natural persons are prioritized over non-natural entities. If multiple non-natural entities hold equal rights, one is selected at random as primary rights holder.
4. *Residential address*. Among natural persons with equal shares, priority is given to the individual whose residential address matches the address associated with the parcel.
5. *Living status*. If residential addresses are identical, living individuals take precedence over deceased ones.
6. *Age*. If multiple living persons meet all previous criteria, the eldest individual is selected.
7. *Random selection*. If all preceding conditions are still identical for multiple individuals, the selection of the primary rights holder is made at random.

This approach ensures that each parcel is counted only once in the land ownership statistics. It is based on the assumption that the primary rights holder serves as the best available proxy for the main economic landowner of the land. While this may result in a simplification of complex ownership arrangements, it enables the development of coherent statistics that are suitable for integration with economic and ecosystem accounting frameworks.

2.4 Compilation of land ownership statistics

The steps described above result in a harmonized dataset containing the classified primary and additional rights holders with relevant attributes per cadastral parcel. To produce land ownership statistics, this dataset was geospatially linked to the national cadastral map (DKK) using GIS. Through a Union operation in GIS, each parcel was assigned a unique neighbourhood code from the GWB dataset. By doing this, also water(bodies) are included in this analysis, if these aquatic areas are incorporated by a municipality. This georeferenced dataset forms the basis for addressing the two main objectives of this research, as described in the following subsections.

2.4.1 Compiling regional land ownership statistics

To produce regional land ownership statistics, the total area of cadastral parcels was aggregated by landowner, landowner classification, and administrative unit. Neighbourhood codes were grouped into higher regional levels using a standardized look-up table. Using this, land ownership was aggregated at the national, NUTS-2 (provinces) and NUTS-3 (COROP-regions) levels. At each level, the total land area was calculated and grouped according to the landowner typology. The resulting statistics are presented in Chapter 3.

2.4.2 Link with ecosystem accounts

In addition to compiling sub-national statistics, the land ownership data are linked to the Dutch ecosystem accounts to analyse how different types of landowners are associated with ecosystem types and the provision of ecosystem services. These ecosystem accounts have been developed by Statistics Netherlands since 2015 and contain information of the extent, condition, and supply of ecosystem services by all ecosystem types in the Netherlands.

This study focuses on two components of the ecosystem accounts:

1. The *ecosystem extent account*, which presents the total area of all urban, agricultural, semi-natural and natural, and aquatic ecosystems; and
2. The *monetary ecosystem services account*, which captures the flow of benefits that ecosystems provide to the economy and society (ecosystem services), expressed in monetary terms.

The disaggregation of the extent account allows for analysis of how much area of each ecosystem type is held by different types of landowners. Similarly, the monetary ecosystem services account is linked to land ownership to examine which landowners are associated with the provision of different ecosystem services.

By expressing ecosystem services in a common unit – euros – the account enables comparison and aggregation across ecosystem services, landowners, and regions. The monetary values in the Dutch ecosystem accounts reflect exchange values: the prices at which ecosystem services are or would be exchanges between willing buyers and sellers, if such markets existed. These values represent the socio-economic use of nature, reflecting the contribution of ecosystems to human well-being and the economy. However, it is important to note that these values do not indicate the ecological condition of ecosystems, nor do they imply whether the current use of ecosystems is sustainable. Moreover, they do not represent the intrinsic value of nature. These limitations should be kept in mind when interpreting the results.

Ecosystem accounting maps are available for the ecosystem extent and the different ecosystem services. A detailed methodological explanations, including how the ecosystem type map and monetary values were produced, is provided in the technical report on the Dutch ecosystem accounts[3]. To enable spatial overlay between the ecosystem accounting maps and the georeferenced parcel-level land ownership map, the latter was rasterized at a 10-meter by 10-meter resolution. Each raster cell was assigned a parcel identification number, creating a simplified spatial representation of land ownership suitable for pixel-based spatial analysis. Subsequently, zonal statistics were calculated using GIS-software to summarize values from the ecosystem accounting maps per parcel. These statistics were linked to the land ownership dataset by parcel identification, enabling aggregation by landowner type.

For each parcel, the following information was derived by the spatial analysis:

- The total area of each ecosystem type (based on the ecosystem extent map);
- The total monetary value of ecosystem services provided on the parcel.

[3] The technical report of the Dutch ecosystem accounts can be found here: https://www.cbs.nl/nl-nl/maatschappij/natuur-en-milieu/natuurlijk-kapitaal/technische-toelichting

The ecosystem accounting maps cover the entire administrative territory of the Netherlands, including all terrestrial ecosystems as well as lakes, rivers and marine ecosystems. This study does not apply any selection based on ecosystem type. Consequently, references to 'ownership' encompass not only the ownership of land (or terrestrial ecosystems), but also the ownership of inland water and marine ecosystems. Additionally, the ecosystem services generated by these aquatic ecosystems are also included in the analysis.

The Dutch ecosystem accounts include a range of provisioning, regulating, and cultural ecosystem services. Table 2.2 lists which of these services were included in this study. The resulting statistics are presented in Chapter 4.

Table 2.2 – Ecosystem services in the Dutch ecosystem accounts

Group	Ecosystem service	Year included
Provisioning services	Crop provisioning	2022
	Fodder provisioning	2022
	Wood provisioning	2022
Regulating services	Air filtration	2022
	Carbon sequestration	2022
	Pollination	2021
	Waterflow regulation	2022
	Coastal protection	2022
Cultural services	Nature-based recreation (hiking)	2022
	Nature-based recreation (other)	2022
	Nature-based tourism	2022
	Amenity services	2022

3. Land ownership in the Netherlands

This chapter presents the results for the regional land ownership statistics of the Netherlands. Section 3.1 provides an overview of land ownership by province. Section 3.2 discusses spatial patterns of land ownership at the municipality and neighbourhood level. Section 3.3 presents the statistics of the more detailed landowner subclasses.

3.1 Regional land ownership statistics

Regional land ownership statistics were compiled for the municipality, COROP (NUTS-3), province (NUTS-2) and national level in the Netherlands for reference year 2022. At each level, the total land area was allocated to the primary rights holder of each cadastral parcel, following the methodology described in Chapter 2. This ensures that each parcel is counted once, avoiding double counting from shared or overlapping rights. All sub-national statistics are presented in Appendix 1.

In 2022, households owned the largest share of the total area of the Netherlands (17,917 km^2; 43.1%), followed by government entities (15,551 km^2; 37.4%) (Tables 3.1 and 3.2). Together, these two ownership categories account for nearly 80% of the national territory. Non-financial corporations held 10.4% (4,322 km^2), while non-profit organisations owned 8.2% (3,415 km^2). Land ownership by financial corporations and the residual 'other' category was marginal, together representing less than 1% of the total area.

Regional differences are visible when comparing provinces (Tables 3.1 and 3.2). Household ownership exceeds 50% of the total area in the northern provinces Overijssel (60.4%), Drenthe (57.6%) and Groningen (51.5%). Similar patterns are found in other rural provinces such as Gelderland and Noord-Brabant, where household ownership is above the national average. By contrast, non-financial corporations own relatively more land in urbanised provinces such as Zuid-Holland (15.7%) and Utrecht (13.7%). Government ownership is particularly high in Flevoland (65,0%), Noord-Holland (53.2%) and Fryslân (50.3%), reflecting the presence of lakes (IJsselmeer) and marine waters that are predominantly state-owned. Finally, non-profit organisations hold relatively large shares in Gelderland (11.1%) and Limburg (10.2%).

Table 3.1 – Land ownership of the Netherlands (2022), by area (km^2)

Region	Households	Government	Non-profit institutions	Non-financial corporations	Financial corporations	Other	Total area
Groningen	1,521	965	149	299	19	2	2,955
Fryslân	2,085	2,896	489	261	0	3	5,753
Drenthe	1,543	660	218	246	8	7	2,680
Overijssel	2,066	704	322	297	28	4	3,421
Flevoland	538	1,568	152	146	6	2	2,412
Gelderland	2,541	1,369	572	624	21	9	5,136
Utrecht	766	410	152	214	16	3	1,560
Noord-Holland	1,123	2,177	325	435	23	9	4,092
Zuid-Holland	1,215	1,314	225	521	23	10	3,308
Zeeland	1,071	1,445	169	203	35	11	2,933
Noord-Brabant	2,420	1,476	416	705	54	11	5,082
Limburg	1,028	570	226	371	10	6	2,210
Netherlands	17,917	15,551	3,415	4,322	262	77	41,543

Table 3.2 – Land ownership of the Netherlands (2022), by percentage of area

Region	Households	Government	Non-profit institutions	Non-financial corporations	Financial corporations	Other	Total area
Groningen	51.5%	32.6%	5.0%	10.1%	0.6%	0.1%	100%
Fryslân	36.2%	50.3%	8.5%	4.5%	0.0%	0.0%	100%
Drenthe	57.6%	24.6%	8.1%	9.2%	0.3%	0.2%	100%
Overijssel	60.4%	20.6%	9.4%	8.7%	0.8%	0.1%	100%
Flevoland	22.3%	65.0%	6.3%	6.0%	0.2%	0.1%	100%
Gelderland	49.5%	26.6%	11.1%	12.2%	0.4%	0.2%	100%
Utrecht	49.1%	26.2%	9.7%	13.7%	1.0%	0.2%	100%
Noord-Holland	27.4%	53.2%	7.9%	10.6%	0.6%	0.2%	100%
Zuid-Holland	36.7%	39.7%	6.8%	15.7%	0.7%	0.3%	100%
Zeeland	36.5%	49.2%	5.8%	6.9%	1.2%	0.4%	100%
Noord-Brabant	47.6%	29.0%	8.2%	13.9%	1.1%	0.2%	100%
Limburg	46.5%	25.8%	10.2%	16.8%	0.4%	0.3%	100%
Netherlands	43.1%	37.4%	8.2%	10.4%	0.6%	0.2%	100%

3.2 Spatial patterns in land ownership

Spatial variation in land ownership in the Netherlands become more evident at the sub-provincial level. Statistics at the COROP and municipality level are provided in Appendix 1. Figure 3.1 illustrates the percentage of land area owned per municipality by the four largest landowner groups: households, governments, non-profit organisations and non-financial corporations. Financial corporations and the residual category were excluded from this analysis due to their negligible shares.

Household ownership dominates in large parts of rural provinces, including Friesland, Groningen, Drenthe, Overijssel and Gelderland. High household land ownership is also relevant in eastern Noord-Brabant and in the 'Groene Hart', the rural landscape in the western Netherlands surrounded by the urban centres of Amsterdam, Rotterdam, The Hague and Utrecht. The high share of household ownership in these areas reflect that a substantial share of agricultural land is registered under natural persons (i.e., the farmers themselves), rather than under the corporate entity of an agricultural business. As a result, household ownership is particularly prominent in regions with extensive agricultural land.

Figure 3.1 also highlights that government ownership is concentrated in coastal areas, as well as in large natural areas such as the Veluwe and the Utrechtse Heuvelrug. Non-profit organisations also own significant shares in these areas, reflecting their role in nature conservation. Ownership by non-financial corporations is more evenly distributed across the Netherlands, but stands out in municipalities with major industrial or harbour areas, such as Rotterdam and Velsen.

Analysis at the neighbourhood level (Figure 3.2) further highlights these spatial patterns. Households are the dominant landowners in 6,440 out of 14,411 neighbourhoods (44.7%), mainly found in the rural areas of the Netherlands. Government entities dominate in 6,651 neighbourhoods (46.2%), primarily in urban areas and coastal and natural landscapes. Although the number of government-dominated neighbourhoods is slightly higher, the total area of household-dominated neighbourhoods is greater, as urban neighbourhoods tend to be smaller in size. Neighbourhoods where non-financial corporations (6.9%) or non-profit organisations (2.2%) are the dominant landowners are less common. The latter are mostly concentrated in areas with protected nature areas. Financial corporations and the residual 'other' category are not the largest landowner type in any neighbourhood in the Netherlands in 2022.

Figure 3.1 – Share of ecosystem ownership (including water), by landowner type per municipality (2022)

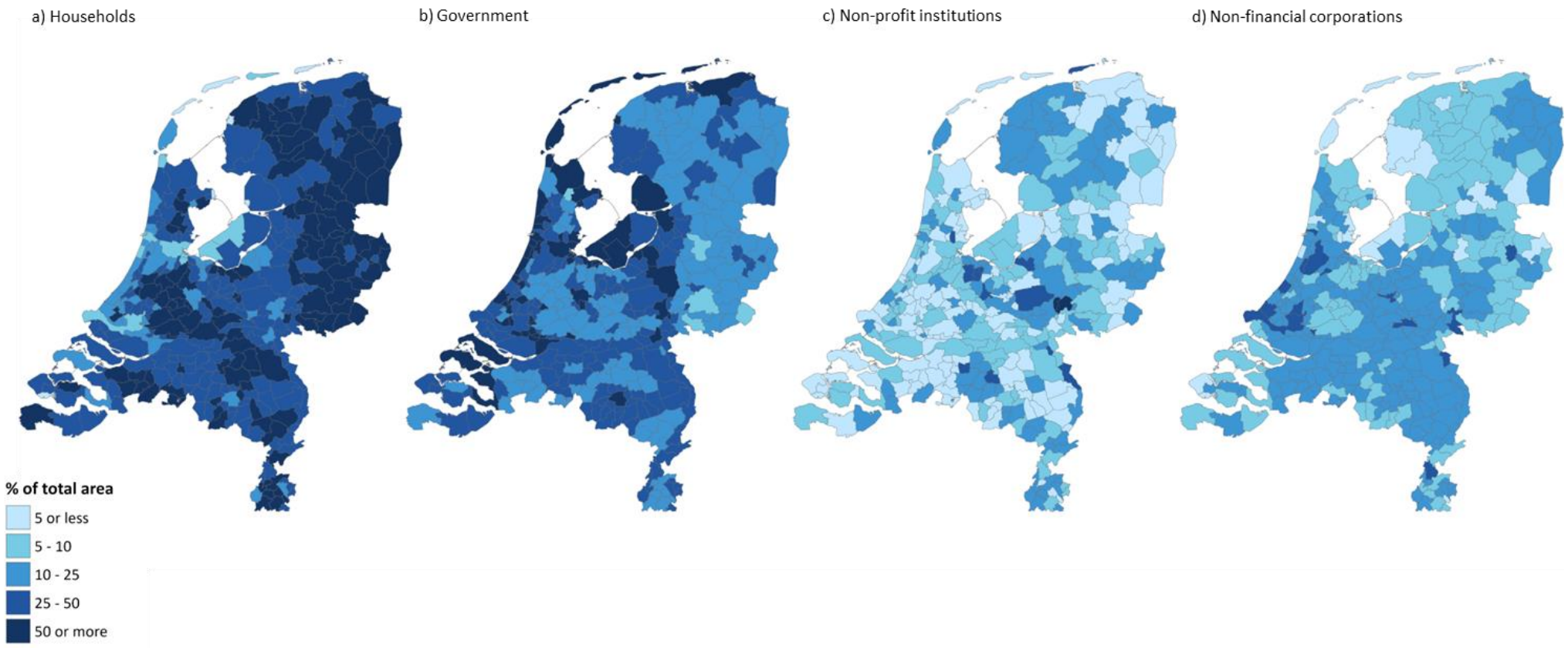
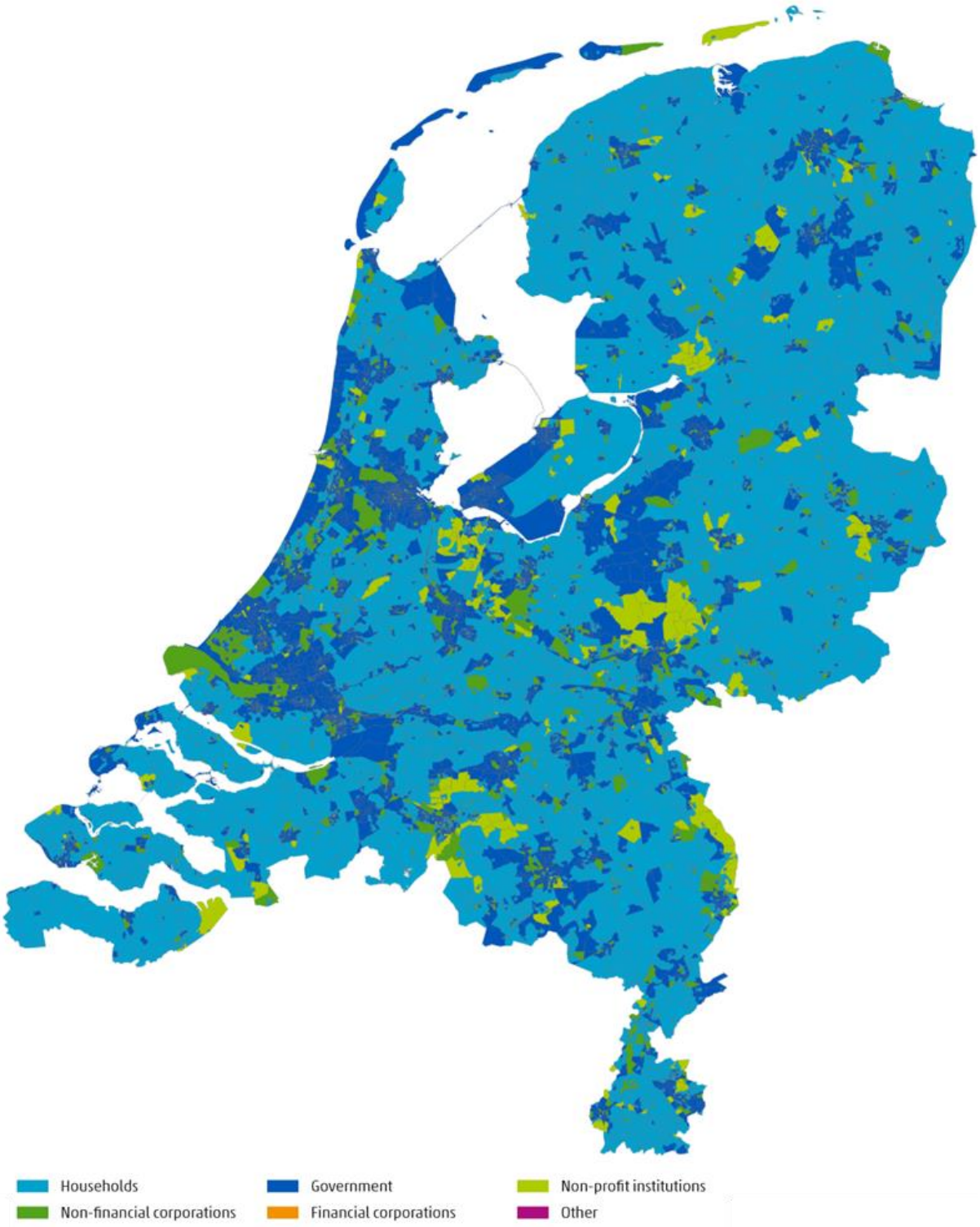


Figure 3.2 – Largest landowner type by neighbourhood



3.3 Sub-classes of ownership type

Land ownership can also be broken down into more detailed subclasses (Level 2 of the typology, see Table 2.1). These results are shown in Table 3.3. Within the government sector, central state entities (e.g., ministries) account for the largest share (18.2% of the total land area). Other central organisations add another 5.7%. This includes the land owned by the State Forestry Service and state-owned infrastructure companies. Decentralised authorities together hold 13.5% of land, of which and related entities own 9.4%, water boards 2.3% and provinces 1.8%.

Among non-profit organisations, entities active in nature and culture dominate the land ownership (5.8% of the total area of the Netherlands, or 70.5% of the total area owned by non-profits), while religious organisations and other non-profit organisations hold much smaller shares. Within non-financial corporations, private-owned corporations account for the majority of land (8.8%), while government-owned corporations represent 1.6% of the total area in the Netherlands in 2022.

Table 3.3 – Land ownership, by sub-classes

Level 1	Level 2	Total area	Percentage
Households	-	**17,917**	**43.1**
Government	Central: State	7,570	18.2
	Central: Other	2,387	5.7
	Decentral: Provinces	730	1.8
	Decentral: Waterbodies	945	2.3
	Decentral: Municipalities and other	3.920	9.4
	Total Government	**15,551**	**37.4**
Non-profit organisations	Nature and culture	2.407	5.8
	Religious organisations	300	0.7
	Other	708	1.7
	Total Non-profit organisations	**3,415**	**8.2**
Non-financial corporations	Private owned	3.638	8.8
	Government owned	684	1.6
	Total Non-financial corporations	**4,322**	**10.4**
Financial corporations	-	**262**	**0.6**
Other	-	**77**	**0.2**
Total	-	**41,543**	**100**

4. Land ownership and ecosystem accounting

This chapter presents the results of linking land ownership data with ecosystem accounting. Subsection 4.1 presents the extents of ecosystems disaggregated by land ownership. Subsection 4.2 shows the distribution of monetary ecosystem service values across the different landowner types. Subsection 4.3 provides a more detailed analysis on the ecosystem characteristics of the land held by governments. Finally, subsection 4.4 examines the degree of overlapping land ownership in the context of ecosystem accounting.

4.1 Ecosystem extent

The ecosystem extent account presents the total area of different urban, agricultural, (semi-) natural and aquatic ecosystems in the Netherlands[4]. Here, the 2022 extent data are disaggregated by landowner type. Due to methodological differences between vector-based cadastral data and raster-based ecosystem maps, as well as rounding differences, the total may slightly deviate from the statistics presented in Chapter 3.

Figure 4.1 shows that croplands (10,630 km^2) and grasslands (10,347 km^2) are the most prevalent ecosystems in the Netherlands. Households are the dominant primary landowners in both ecosystems, holding 74.1% of croplands and 61.5% of grasslands, respectively (Figure 4.2). As explained n Chapter 3.2, a significant portion of the land owned by farmers is registered as private (household) ownership rather than as ownership of a non-financial corporation. This explains the high share of household ownership observed for these two, predominantly agricultural, ecosystems.

Governments own the majority of natural and semi-natural ecosystems, including forest and woodland (48.0%), heathland and drift sand areas (58.5%), inland wetlands (55.7%), and coastal beaches, dunes and wetlands (64.8%). Government ownership is even more prominent in aquatic ecosystems, accounting for 86.1% of rivers and lakes and 94.6% of marine and transitional waters. Urban ecosystems display a more mixed ownership structure. In settlements and other artificial areas, households (39.6%) and governments (34.7%) own the largest shares, while non-financial corporations also hold 21.2% of this ecosystem. In urban greenspace and recreation sites, governments are the largest landowner (47.3%), but households (17.1%), non-financial corporations (23.1%) and non-profit institutions (11.5%) also play a substantial role. Financial corporations and the residual 'other' group have negligible shares across all ecosystems.

Although compared to households and government entities non-profit institutions are primary rights holder of a relatively small share of total land (Chapter 3), these entities play a substantial role in the ownership of natural and semi-natural ecosystems. Besides governments, non-profit institutions are the second-largest landowner type for natural and semi-natural ecosystems. For forest and woodland (22.1%), heathland and drift sand areas (31.7%), inland wetlands (36.5%) and coastal beaches, dunes and wetlands (27.6%), non-profit institutions own more area than households of other landowner types (Figure 4.1 and Figure 4.2).

[4] More data on CBS StatLine: https://opendata.cbs.nl/#/CBS/en/dataset/86242ENG/table

Figure 4.1 – Ecosystem extent by landowner type, km²

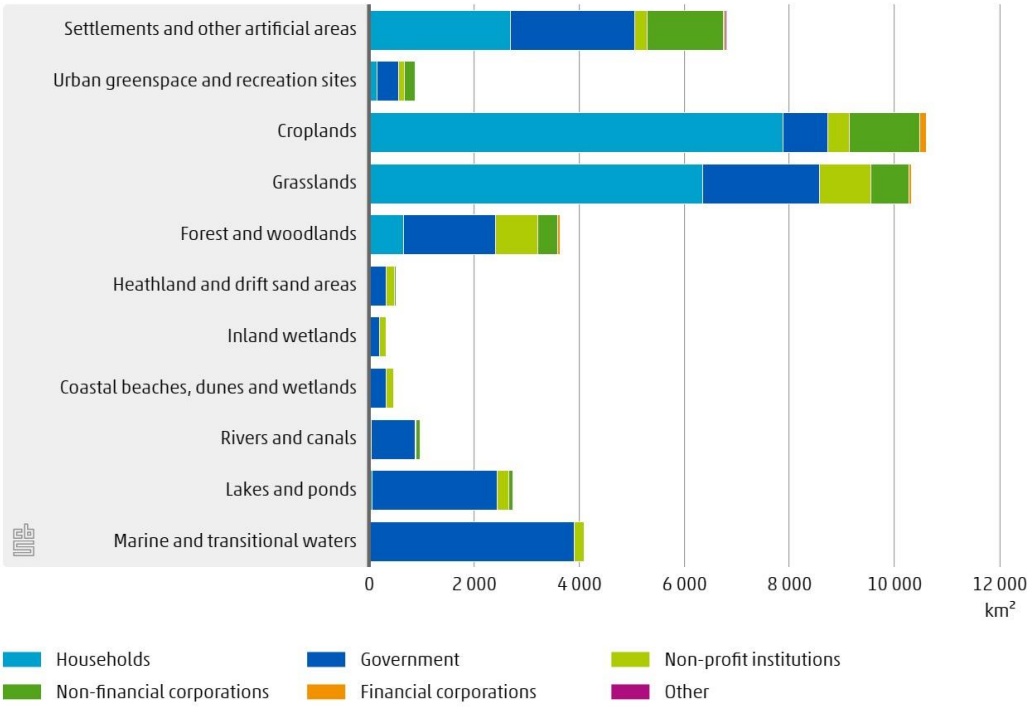
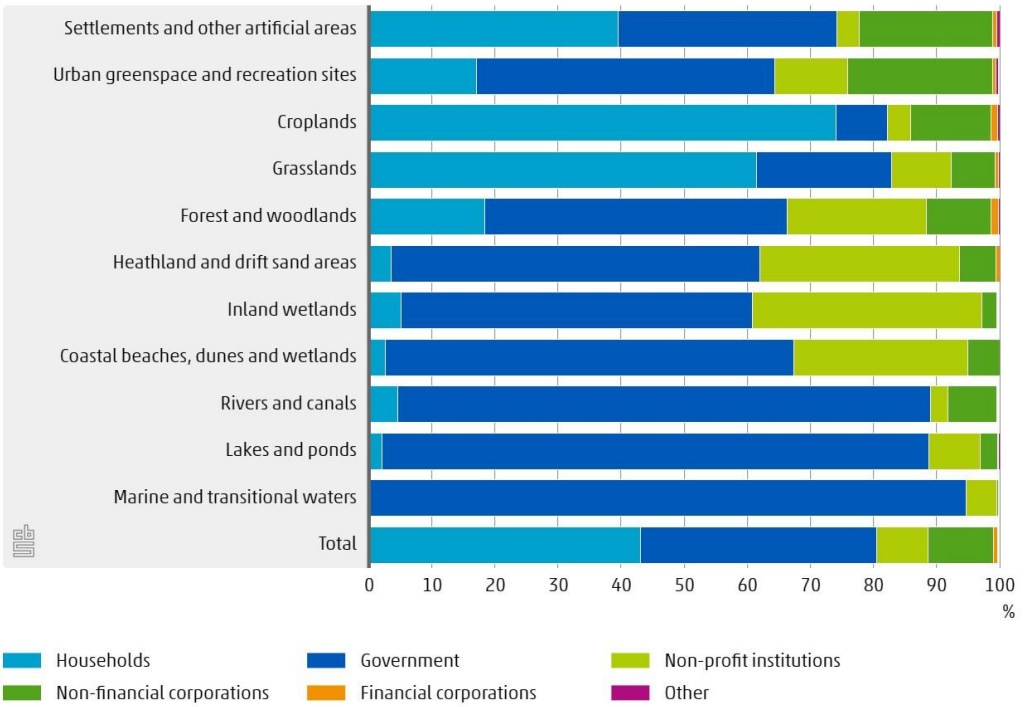


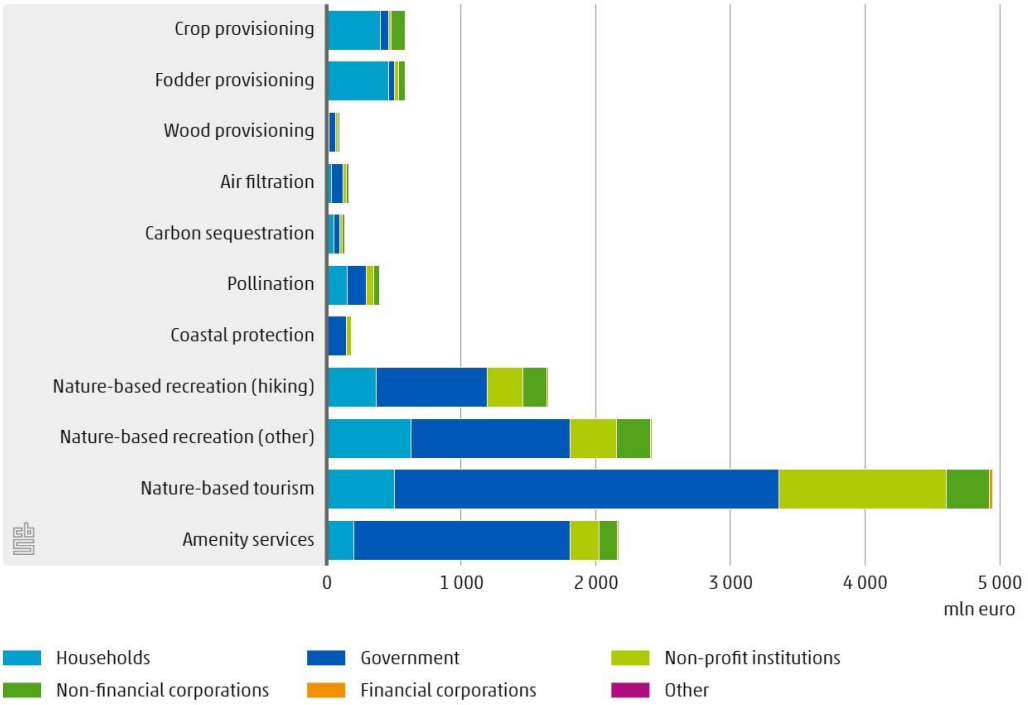
Figure 4.2 – Ecosystem extent by landowner type, percentage



4.2 Ecosystem services

The ecosystems presented in Chapter 4.1 provide a wide range of ecosystem services to society. This section presents the results of the monetary ecosystem services account, disaggregated by landowner type. In this study, the monetary values of 11 ecosystem services are analysed in relation to land ownership. In total, the flow of these ecosystem services is estimated at 13,376 million euros in 2022 (Appendix 1).[5] The majority of this value stems from cultural ecosystem services (11,214 million euros), including nature-based recreation (4,082 million euros), nature-based tourism (4,959 million euros), and amenity services (2,173 million euros). These cultural services outweigh both provisioning services (1,276 million euros) and regulating services (886 million euros).

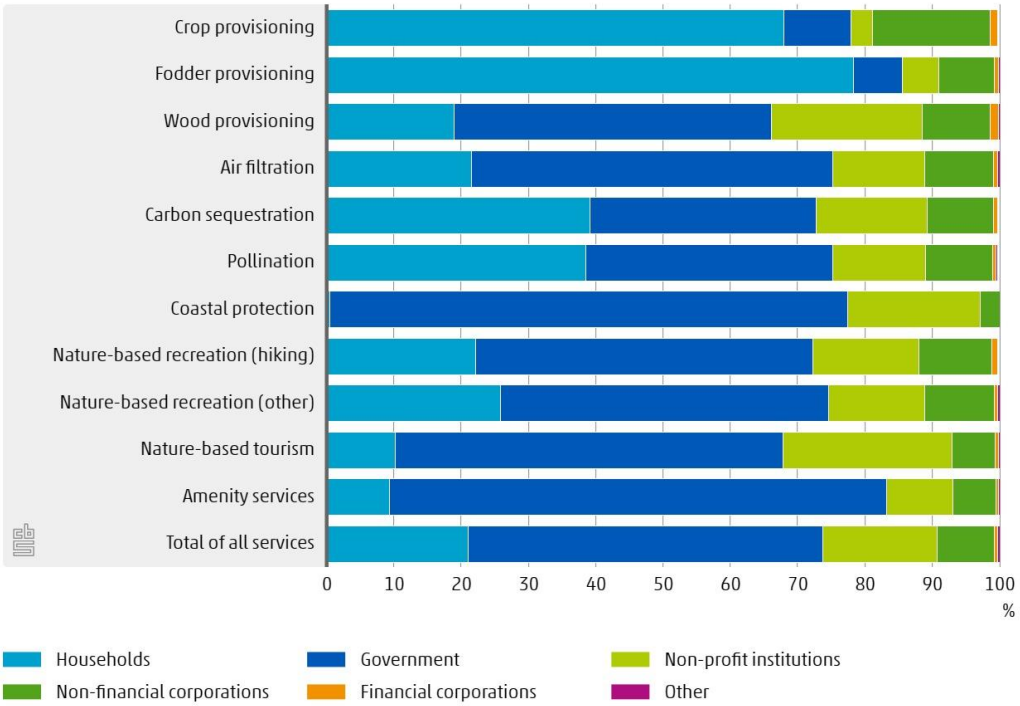
Figure 4.3 – Ecosystem services by landowner type, mln euros



Provisioning services are strongly associated with land owned by households (Figure 4.3 and 4.4). Both crop provisioning (68.0%) and fodder provisioning services (78.3%) are largely generated by household-owned land. This coincides with the findings that household also own the majority of predominantly agricultural ecosystems, such as cropland and grassland. Wood provisioning services show a different pattern. Here, government entities (47.1%) and non-profit institutions (22.4%) play a prominent role, reflecting their ownership of forested areas.

[5] Since the completion of this analysis, Statistics Netherlands has published revised figures for the supply of ecosystem services. The total monetary value for 2022 is now estimated at 10.8 billion euros. These revised data were not available during this study and could therefore not be incorporated into the analysis. The most recent data on the supply of ecosystem services can be found on CBS StatLine: https://opendata.cbs.nl/#/CBS/nl/dataset/86235NED/table

Figure 4.4 – Ecosystem services by landowners type, percentage



The regulating ecosystem services are more evenly distributed across landowner types. Households are the largest landowners contributing to carbon sequestration (39.7%) and pollination services (38.6%), while government entities hold land that is generating the majority of the air filtration (53.7%) and coastal protection services (77.0%). Notably, non-profit institutions also play a disproportionate role: although they own only 8.2% of total land, they account for 15.5% of the regulating services, particularly for pollination and coastal protection (Figures 4.3 and 4.4).

Cultural ecosystem services constitute the largest share of the total monetary value of ecosystem services in the Netherlands. These services are predominantly generated on government-owned land, with a total value of 6,481 million euros (57.8% of all cultural services). This amount exceeds the combined value of all provisioning, regulating and cultural services generated by all other landowner types together (Appendix 2). Non-profit institutions are also significant contributors, particularly in nature-based tourism and nature-based recreation, with a total of 2,063 million euros (18.5%). Households and non-financial corporations contribute to cultural services as well, but to a lesser extent relative to their land holdings.

Naturally, the monetary value of ecosystem services is correlated with the amount of land owned by each group. In general, more land generated more ecosystem service value. However, when the value is expressed in euro per hectare, differences between landowner types become more apparent. Non-profit institutions hold the most 'valuable land' with an average of 6,659 euros per hectare (compared with the national average of 3,221 euro/ha). Government entities also yield relatively high values (4,536 euro/ha). By contrast, land owned by households contributes less to the monetary value of ecosystem services (1,575 euros/ha), despite households being the largest landowner group (43.1% of land).

5. Conclusions and recommendations

5.1 Conclusions

This study set out to achieve two aims: to compile land ownership statistics for the Netherlands at multiple regional scales and integrate these statistics with ecosystem accounting. To achieve this, a parcel-level land ownership dataset for 2022 was created classifying six main landowner types. This dataset was used to compile land ownership statistics from municipality to COROP (NUTS-3), provinces (NUTS-2) and the national level. By rasterizing and spatially linking this ownership dataset to the Dutch ecosystem accounts, we were able to attribute the ecosystem extent and monetary values of ecosystem services to land ownership.

The results demonstrate that households and government entities together own nearly 80% of the total area of the Netherlands. Household ownership is dominant in agricultural ecosystems, such as croplands and grasslands, whereas government ownership is predominant in (semi-)natural and aquatic ecosystems. Linking ownership with ecosystem accounts further unravelled that household-owned areas generates the majority of the monetary value of provisioning ecosystem services (879 million euros out of 1,276 million euros), while government-owned land contribute to the majority of regulating (426 out of 886 million euros) and cultural ecosystem services (6,481 out of 11,214 million euros). Although non-profit institutions own a relatively small share of the total area, they manage land with the highest-per-hectare ecosystem service values (6,659 euros per ha). These areas largely consist of high-value natural areas owned by nature conservation organisations.

Overall, the compilation of land ownership statistics and their integration with ecosystem accounting provide new, policy-relevant insights into the distribution of ecosystem ownership and the institutional sectors that own the ecosystems delivering key services to society. This information strengthens the evidence base for sustainable land-use policies and ecosystem management.

5.2 Limitations and recommendations

While this study represents an important step forward, several limitations point to opportunities for improvement. First, the current analysis is limited to a single reference year (2022). Consequently, it only offers a single snapshot of land ownership and its relation to ecosystems and ecosystem services. Compiling a time series of land ownership statistics is essential to analyse trends and temporal dynamics in land ownership, and to understand how changes in land ownership affect ecosystems and the provision of ecosystem services over time. Such time series could be analysed at different intervals depending on the policy needs and data availability. Suitable intervals would include annual compilation, a three-year cycle (consistent with the reporting requirements of the European ecosystem accounts), or a six-year cycle (aligned with the reporting cycle of the Birds and Habitats Directives).

Second, the linkage between cadastral records and statistical registers should be strengthened to improve accuracy and consistency. Currently, around 57% of legal entities in the BRK-dataset lack a registered business number, which restricts the ability to classify these entities consistently and to link them reliably to other statistical registers. Although many of these entities can still be categorised based on BRK attributes, this approach is less robust and resulted in the creation of

an residual ‘Other’ main category, or residual subcategories within government entities, for example. This reduces the precision and interpretability of the ecosystem ownership classifications and limits the analytical insights that can be derived from the data. In addition, cadastral records sometimes assign multiple identifiers to the same entity, leading to fragmentation (for example, the same municipality appearing under several ID’s). Future research should aim to harmonise entity identifiers so that each entity is represented by a single, matchable ID. Achieving this requires closer collaboration with the Kadaster and would greatly enhance the reliability of the dataset, enabling analyses not only at aggregate levels but also at the level of individual entities.

Moreover, improved linkage between cadastral records and statistical registers could help strengthen the connection between land ownership statistics and the national accounts. Furthermore, it would support a better understanding of how different types of landowners use and manage their land, for example through further disaggregation of landowner types using SBI business classifications.

Third, the current treatment of ownership rights is simplified. By assigning each parcel to a single primary owner, or by treating all additional rightsholders equally, this analysis does not reflect the variety in ownership shares of different entities that exist in practice. Ownership structures often involve unequal shares of different types of ownership rights. Future research should incorporate the proportional shares of rights to provide a more accurate reflection of land ownership. Similarly, the analysis of secondary ownership only included inter-group arrangements where cadastral parcels are owned by different institutional categories. This approach excludes intra-group ownership, such as the joint ownership by multiple household(s)(members). This likely underestimates the overall role of secondary ownership in land and ecosystems.

Fourth, the current classification does not allow for the disaggregation of private (household) ownership by gender or other socio-economic characteristics. Ecosystem ownership is connected to gender and other socio-economic inequalities regarding the access to economic resources. This importance is recognized under Sustainable Development Goal (SDG) Target 5.a, which aims to give women equal rights to economic resources, including (agricultural) land. Including gender-disaggregated ownership data, future research could therefore support the reporting of SDG-indicator 5.a.1. Beyond gender, further disaggregation of household ownership would be valuable. For example, distinguishing farmers from other types of household ownership would improve analytical precision, as farmers typically hold substantially larger areas of land than other households.

Fifth, the current scope of the study covered all terrestrial and aquatic ecosystems within the administrative boundaries of the European part of the Netherlands. This study also found that the ownership of aquatic ecosystems is overwhelmingly concentrated within government entities. Almost all water area in the Netherlands is government-owned. This finding may distort the overall analysis of ownership patterns, when looking at the total area owned by specific landowner types, for example. For future work, it would be useful to focus specifically on terrestrial ecosystems only. This would provide a more accurate representation of land ownership in the Netherlands.

Finally, the integration of land ownership data into ecosystem accounting can improve not only the interpretation of accounts but also their compilation. Ownership is closely related to management regimes, institutional arrangements and public accessibility, which in turn influence ecosystem use and ecosystem service flows. Incorporating ownership data could, for example, support the modelling of ecosystem services including nature-based recreation and provisioning services. Further research should, therefore, also examine how cadastral ownership data can be used as an input for ecosystem service modelling, rather than solely as a dataset for improving the analysis and disaggregation of existing ecosystem accounts.

In conclusion, this research has compiled the first sub-national land ownership statistics for the Netherlands and demonstrated the added value of linking ownership data to ecosystem accounts. In doing this, this study has laid the foundation for the further development of the Dutch ecosystem accounts. With further methodological improvements, land ownership statistics can become a great added value to support evidence-based policy on sustainable land and ecosystem management and the access to natural capital.

6. Bibliography

Atkinson, G., Ovando, P. (2022). Distributional Issues in Natural Capital Accounting: An Application to Land Ownership and Ecosystem Services in Scotland. *Environmental and Resource Economics 81*: 215-241. https://doi.org/10.1007/s10640-021-00613-6

Meyfroidt, P., de Bremond, A., Ryan, C. & Ermgassen, E. (2022). Ten facts about land systems for sustainability. *PNAS 119*(7): e2109217118.

PBL (2021). *Grote opgaven in een beperkte ruimte*. Ruimtelijke keuzes voor een toekomstbestendige leefomgeving. Den Haag: Planbureau voor de Leefomgeving.

Statistics Netherlands (2024). Wijk- en buurtkaart 2024. https://www.cbs.nl/nl-nl/dossier/nederland-regionaal/geografische-data/wijk-en-buurtkaart-2024

United Nations et al. (2009). System of National Accounts 2008. United Nations: New York. https://unstats.un.org/unsd/nationalaccount/sna2008.asp

United Nations et al. (2021). System of Environmental-Economic Accounting – Ecosystem Accounting (SEEA EA). Available at https://seea.un.org/ecosystem-accounting

Appendix 1.

Excel file: Sub-national land ownership statistics of the Netherlands (2022).

Appendix 2.

Overview of the monetary value of ecosystem services (2022), per landowner type

Ecosystem service (mln euro)	Total	Households	Government	Non-profit institutions	Non-financial corporations	Financial corporations	Other
Crop provisioning	590	401	59	20	102	7	1
Fodder provisioning	587	459	43	32	49	4	1
Wood provisioning	99	19	47	22	10	1	0
Air filtration	167	36	90	23	17	1	0
Carbon sequestration	134	53	45	22	13	1	0
Pollination	396	153	145	55	40	2	1
Coastal protection	190	1	146	37	5	0	0
Nature-based recreation (hiking)	1656	367	830	260	181	15	2
Nature-based recreation (other)	2426	628	1183	347	251	14	4
Nature-based tourism	4959	504	2859	1243	319	24	10
Amenity services	2173	202	1609	213	138	9	1
Total of all services	13376	2823	7054	2274	1126	77	22
Provisioning services	1276	879	148	74	161	12	2
Regulating services	886	242	426	137	75	4	2
Cultural services	11214	1701	6481	2063	889	62	18
Contribution to services (%)	100	21,1	52,7	17,0	8,4	0,6	0,2
Land ownership (%)	100	43,1	37,5	8,2	10,4	0,6	0,2
Total of all services (euro/ha)	€ 3.221	€ 1.575	€ 4.536	€ 6.659	€ 2.605	€ 3.201	€ 2.828