Forest Ecosystem Services: Deep dive on Provisioning Services

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Agenda

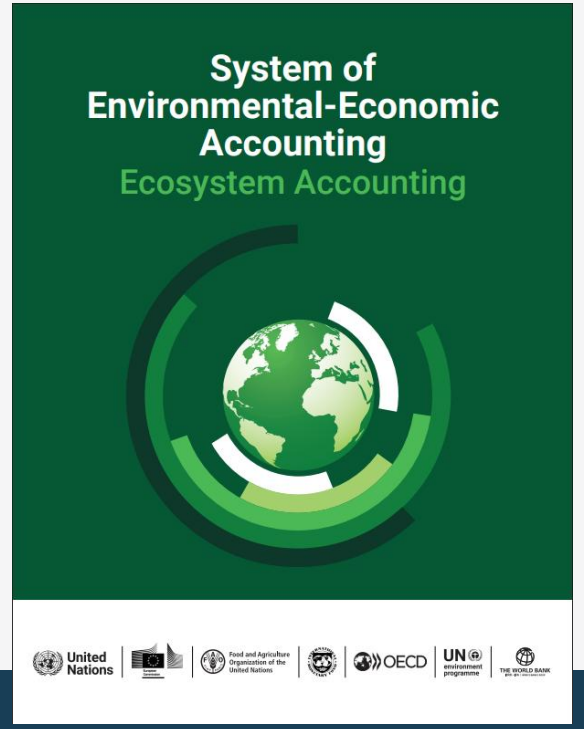
- What are provisioning services?
- Timber and Woodfuel Provisioning
- What data might you need?
- Timber provisioning in the UK data sources and methodology
- Advice + discussion

SEEA Guidance

System of Environmental Economic Accounting

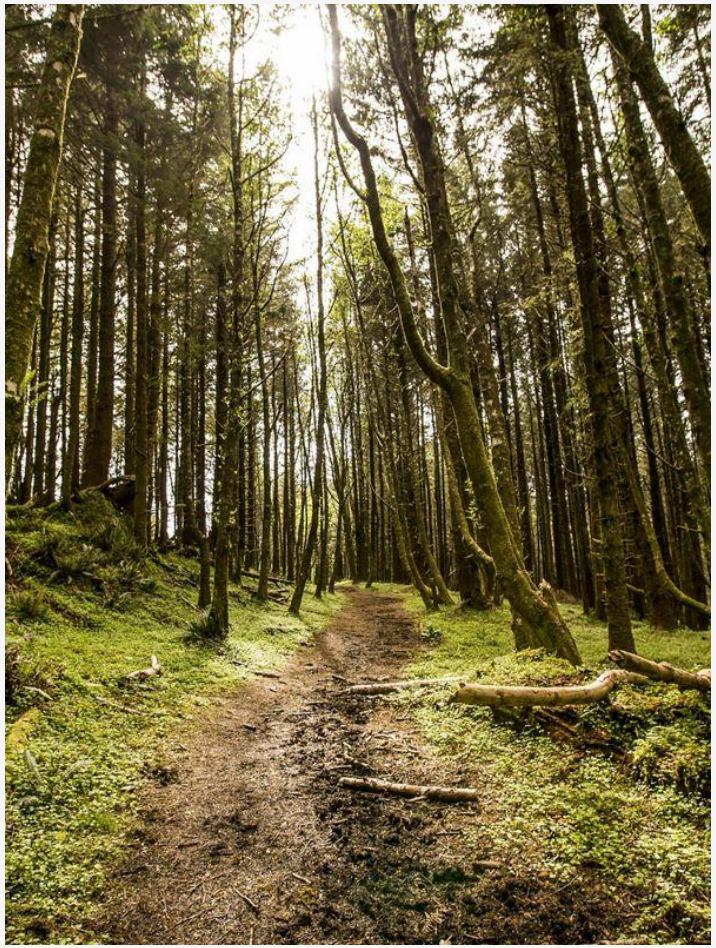
- Integrated spatial statistical framework for organising biophysical information about ecosystems
- Developed to make the contributions of nature to the economy and people more visible
- SEEA guidance suggests three main types of ecosystem services (section 6.51 in SEEA-EA):

- *Provisioning services are those ecosystem services representing the contributions to benefits that are extracted or harvested from ecosystems.*
- *Regulating and maintenance services are those ecosystem services resulting from the ability of ecosystems to regulate biological processes and to influence climate, hydrological and biochemical cycles and thereby maintain environmental conditions beneficial to individuals and society.*
- *Cultural services[72] are the experiential and intangible services related to the perceived or actual qualities of ecosystems whose existence and functioning contribute to a range of cultural benefits.*



What are provisioning services?

- Products extracted, harvested or derived from nature, such as food, water, energy and materials
- Overall, we have 8 provisioning services: *Agricultural biomass, Water, Oil & Gas, Coal, Renewable energy, Timber, Minerals & metals, and Fish – we include both abiotic and biotic ecosystem services.*
- The provisioning services included in the Forestry accounts are timber & woodfuel



SEEA Guidance

System of Environmental Economic Accounting

Table 6.3
Reference list of selected ecosystem services

ECOSYSTEM SERVICE		DESCRIPTION
Provisioning services		
Biomass provisioning services	Crop provisioning services*	Crop provisioning services are ecosystem contributions to the growth of cultivated plants that are harvested by economic units for various uses, including food and fibre production, fodder and energy. These are final ecosystem services.
	Grazed biomass provisioning services*	Grazed biomass provisioning services are ecosystem contributions to the growth of grazed biomass that is an input to the growth of cultivated livestock. These services exclude ecosystem contributions to the growth of crops used to produce fodder for livestock (e.g. hay, soybean meal). Those contributions are included under crop provisioning services. These are final ecosystem services but may be intermediate to livestock provisioning services.
	Livestock provisioning services*	Livestock provisioning services are ecosystem contributions to the growth of cultivated livestock and livestock products (e.g. meat, milk, eggs, wool, leather) that are used by economic units for various purposes, primarily food production. These are final ecosystem services. No distinct livestock provisioning services are to be recorded if grazed biomass provisioning services are recorded as a final ecosystem service.
	Aquaculture provisioning services	Aquaculture provisioning services are ecosystem contributions to the growth of animals and plants (e.g. fish, shellfish, seaweed) in aquaculture facilities that are harvested by economic units for various uses. These are final ecosystem services.
	Wood provisioning services	Wood provisioning services are ecosystem contributions to the growth of trees and other woody biomass both in cultivated (plantation) and in uncultivated production contexts that are harvested by economic units for various uses including timber production and energy. These services, which exclude contributions to non-wood forest products, are final ecosystem services.
	Wild fish and other natural aquatic biomass provisioning services	Wild fish and other natural aquatic biomass provisioning services are ecosystem contributions to the growth of fish and other aquatic biomass that are captured in uncultivated production contexts by economic units for various uses, primarily food production. These are final ecosystem services.
	Wild animals, plants and other biomass provisioning services	Wild animals, plants and other biomass provisioning services are ecosystem contributions to the growth of wild animals, plants and other biomass that are captured and harvested in uncultivated production contexts by economic units for various uses. The scope includes non-wood forest products (NWFP) and services related to hunting, trapping and bioprospecting activities; but it excludes wild fish and other natural aquatic biomass (included in the class directly above). These are final ecosystem services.
Genetic material services		Genetic material services are ecosystem contributions from all biota (including seed, spore or gamete production) that are used by economic units, for example, (a) to develop new animal and plant breeds; (b) in gene synthesis; or (c) in product development directly using genetic material. These are most commonly recorded as ecosystem services intermediate to biomass provisioning.
Water supply*		Water supply services reflect the combined ecosystem contributions of water flow regulation, water purification and other ecosystem services to the supply of water of appropriate quality to users for various purposes, including household consumption. These are final ecosystem services.
Other provisioning services		

Table 6.3

Reference list of selected ecosystem services

Timber & woodfuel overview

- Timber removals is a provisioning service that covers wood production (also referred to as removals), which is the harvesting of roundwood (trunks and branches) from coniferous (softwood) and broadleaved (hardwood) trees. It includes both private and public removals.
- Woodfuel is a form of fuel such as firewood, charcoal, chips, sheets, pellets, and sawdust
- Timber removal is measured in thousand cubic metres overbark standing.
- Asset lifetime is 100 years

Timber & woodfuel overview

- In the UK accounts, timber flows run from 1976 to 2023 whilst woodfuel runs from 1994 to 2023
- We assign estimates for timber and woodfuel provisioning to the woodland habitat.
- Estimates can be broken down by hardwood and softwood
- Can also be broken down by country.

What data is needed?

Physical flow data needs

- **Wood production** - Total of softwood and hardwood production:
- The total quantity of wood removed from forests in a specific time period.
- Covering both public and private sector
- Do you want to separate out woodfuel or anything other uses for wood? could this be in the wood production or elsewhere?

Physical flow

Wood production (roundwood removals) - Total of softwood and hardwood production

- Time series produced by Forest Research
  - Includes public and private sector
    a. ***Public****: Source is Forestry England, Forestry and Land Scotland, Natural Resource Wales, Forest Service Northern Ireland*
    b. ***Private****: All other woodland, including other publicly owned woodland*
    - This data is provided in thousand green tonnes
    - The timber data contain all uses of timber including woodfuel
    - Updated annually

Physical flow

Roundwood deliveries- Deliveries of hardwood and softwood are needed to apportion timber and woodfuel.

- Time series produced by Forest Research
- Woodfuel from the softwood and hardwood deliveries is derived from stemwood. It includes estimates of roundwood use for biomass energy
- To separate out woodfuel provisioning, roundwood deliveries data is deducted from the timber value, to ensure no double counting occurs.
- Data for woodfuel are only available from 1994, so prior to this date, timber estimates include some woodfuel provisioning
- Updated annually

Annual value

Stumpage Price- Price paid per standing tree, including the bark and before felling, from a given land area.

- Time series produced by Forest Research
- Data is taken from the Coniferous Standing Sales Price Index (CSSPI)
- CSSPI is an index of average prices per cubic metre overbark standing achieved for standing sales of conifers
- Source has the average prices in pound sterling (£) per cubic metre overbark
- Average prices in nominal terms is taken for UK NCA
- Updated annually
- This is an observed exchange price
  - SEEA-EA preferred valuation technique

Asset Value

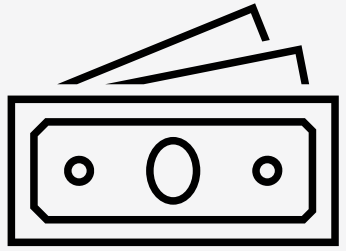
Forecast of timber availability- A forecast of softwood & hardwood availability

- Forecasts are produced by Forest Research
- Asset valuations use these forecasts to estimate the pattern of expected future flows of the service over the asset lifetime
- 100-year forecast; average annual volumes within periods
- The forecast are in periods in this dataset:
  e.g. *2022-26, 2027-31, 2032-36*
- Projections don’t need to be updated annually

Essential data for starting from scratch

- Wood production data
- Wood deliveries data
- Projected timber supply
- Price information- Value of timber standing on the stump, paid to the landowner + this provides the exchange price

What data does your country already have?



Data sources used to produce the statistics

Wood production & deliveries data

Figures on UK wood production (or removals) are compiled from a variety of sources:

- Administrative records of removals from the public sector; Forestry England, Forestry and Land Scotland, Natural Resources Wales and Forest Service Northern Ireland woodlands;
- The Private Sector Softwood Removals Survey for softwood removals from private sector woodlands
- Deliveries of hardwood to wood processing industries for total hardwood removals.

Example question from questionnaire

1. Please provide the quantity of softwood roundwood your company harvested from Private Sector estates during 2023 and 2024.

These figures should include only roundwood harvested from the **private sector** – i.e. estates other than Forestry England, Forestry and Land Scotland, Natural Resources Wales, or (in Northern Ireland) the Forest Service. Please include only timber felled by your own company and sub-contractors. Do not include timber you have sold standing to another party.

(*2023 data can be left blank if there is no change from the figures submitted last year*).

Harvested from:	2023 Quantities	2024 Quantities	
England			green tonnes
Scotland			green tonnes
Wales			green tonnes
Northern Ireland			green tonnes
United Kingdom			green tonnes

2024 collection:

- Issued to 34 harvesting companies
- 20 responded, 59% response rate
- Respondents account for 91% of all the softwood harvested by companies covered by the survey

Would you get enough respondents for a questionnaire?

Price information

- The Coniferous Standing Sales Price Index is based on sales of softwood by Forestry England (FE), Forestry and Land Scotland (FLS) and Natural Resources Wales (NRW); they do not include any private sector data.
- They only cover roundwood from woodland; they do not cover sawmill products or other end products.
- The Coniferous Standing Sales Price Index is based on administrative data for standing sales of conifers (softwood) by FE/FLS/ NRW.

Projected timber supply

Forecasts of softwood availability are derived by assessing:

- Woodland area;
- Woodland characteristics (e.g. age, species and stocking) within this area;
- How quickly the trees are growing (yield class);
- When the trees will be harvested.

Methodology

Physical Flow

- Roundwood removals are converted from green tonnes to cubic metres (m3) over bark standing

- The data sourced from UK roundwood deliveries are also converted to cubic metres over bark standing

- This is deducted from the timber value, to ensure that no double counting occurs, and give the final physical flow values for timber.

Annual Value (flow)

Average price in nominal terms, taken from Forest Research's Timber Price Indices, is deflated using the GDP deflators to give an adjusted stumpage price.

We generate annual flow values by multiplying the adjusted stumpage price and the physical amount of timber removed.

This is in line with SEEA-EA which recommends:

- Using the annual flow of timber harvested
- Using the price at the forest gate (stumpage price) as the basis for valuation
- Expressing values in constant prices

Annual value (flow)

Formula:

$$adjusted\ stumpage\ price$$

$$= Confierous\ standing\ sales:\ Average\ price(nominal)\ \ X\ \ (\frac{100}{Deflator})$$

$$\text{annual value} = \text{Adjusted stumpage price}\ \ \text{X}\ \ \text{physical flow (removals)}$$

Asset Value (stock)

- Natural capital assets measure the stock, or the stream of services of that natural resource in terms of future expected supply and use over a reasonably predictable time horizon
- The net present value (NPV) approach is recommended by SEEA
- The approach estimates the stream of services that are expected to be generated over the life of the asset.
- These values are then discounted back to the present accounting period.

Asset Value (stock)

There are three main aspects of the NPV method, which are:

- Pattern of expected future flows of services
- Asset life
- Choice of discount rate

When calculating the asset value we remove the current year, in line with SEEA guidance

Asset Value (stock)

- Asset values use Forest Research forecasts of timber availability to estimate the pattern of expected future flows of the service over the asset lifetime.
- The resource rent is defined as the 5-year adjusted stumpage price
  - Using the adjusted stumpage prices, we take the 5-year average of the stumpage price
- We then combine the actual production data with projections

Advice

Advice & Suggestions

- Begin with physical flows before moving to monetary valuation

Consider what is being included in your timber values.

- Are you including woodfuel?
- Ensure no double counting occurs in the timber data

- Using the resource rent approach captures the economic value net of costs, aligning with SEEA best practice.

- Forestry agencies hold critical data- Engage with these agencies early

Advice

- Using the resource rent approach captures the economic value net of costs, aligning with SEEA best practice.
- Forestry agencies hold critical data

Stay in line with SEEA guidance

- Use the price at the forest gate (stumpage price) as the basis for valuation
- Use the annual flow of timber harvested
- Express values in constant prices
- Use the five-year average stumpage price, rather than the stumpage price for a single year
- Measure using m^3 over bark standing

Future Workshops

Thursday 5th February 2026:

- *Deep dive into greenhouse gas regulating services*

Thursday 12th February 2026:

- *Valuation of ecosystem services*

Any Questions?

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