

Water Accounting in the UK: Methods and Initial Results

Vittoria Reas^{1,4}, Silvia Ferrini^{2,4}, Alice Bartolini^{2,4},
Paul Ekins^{2,4}, Joe Grice^{3,4}

¹University of Siena, Italy

²University College London, United Kingdom

³King's College London, United Kingdom

⁴Economic Statistics Centre of Excellence (ESCoE), United Kingdom

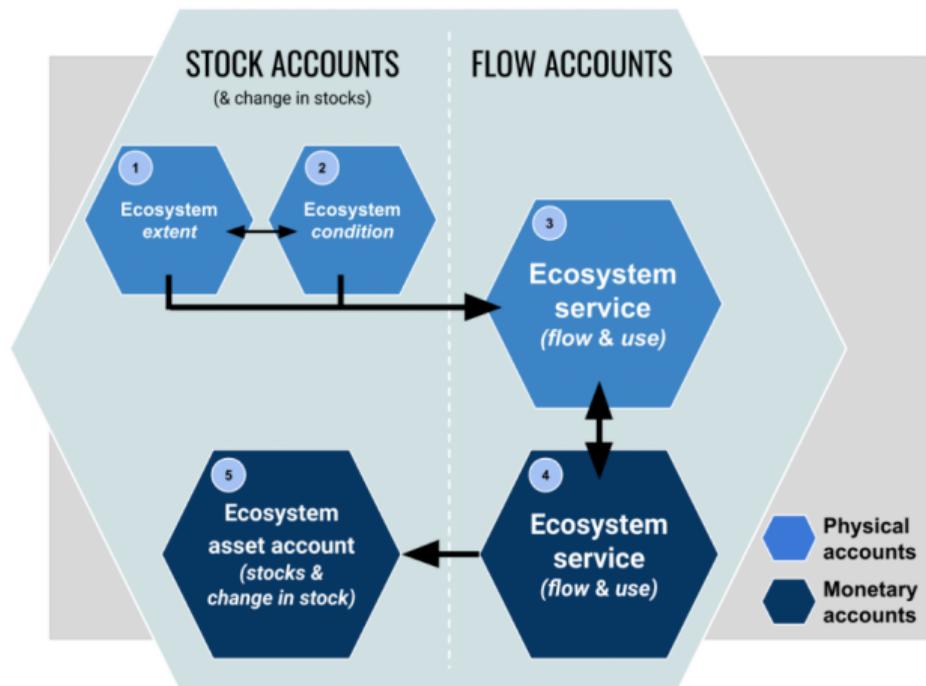
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Why Water Accounting?

- Although water is a fundamental economic input, its role is often invisible in macroeconomic indicators such as GDP.
- To support sustainable development, ecosystem assets such as water resources must be integrated into macroeconomic indicators and policy frameworks.
- The UN System of Environmental Economic Accounting - Ecosystem Accounting (SEEA EA) framework complements the System of National Accounts (SNA) by integrating spatially explicit environmental data with economic systems.
- Capturing this value enables macroeconomic modeling (e.g., CGE) to support climate adaptation and assess future water demand, including from emerging sectors such as AI.

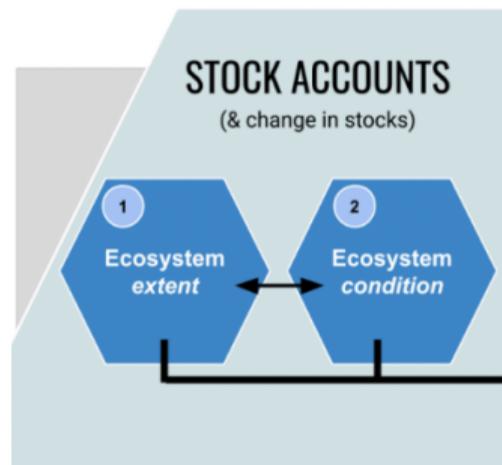
Framework and Objectives

Objective: To implement the SEEA - Ecosystem Accounting framework for measuring and valuing Water-related Ecosystem Services (WES) in the UK.



Ecosystem Stock Accounts

- Ecosystem assets: rivers, canals, lakes and groundwater.
- Opening and closing stock estimates to monitor net changes in ecosystem assets over time.
- Ecosystem characteristics: extent (hectares), volume (m³), quality indices.
- Biophysical data collection and processing (UKCEH, Defra, Environment Agency).
- A major challenge lies in spatial inconsistencies and the harmonization of data, particularly for time series.
- These ecosystems are conceptualized as environmental production units (i.e., sectors) delivering services to society and the economy.

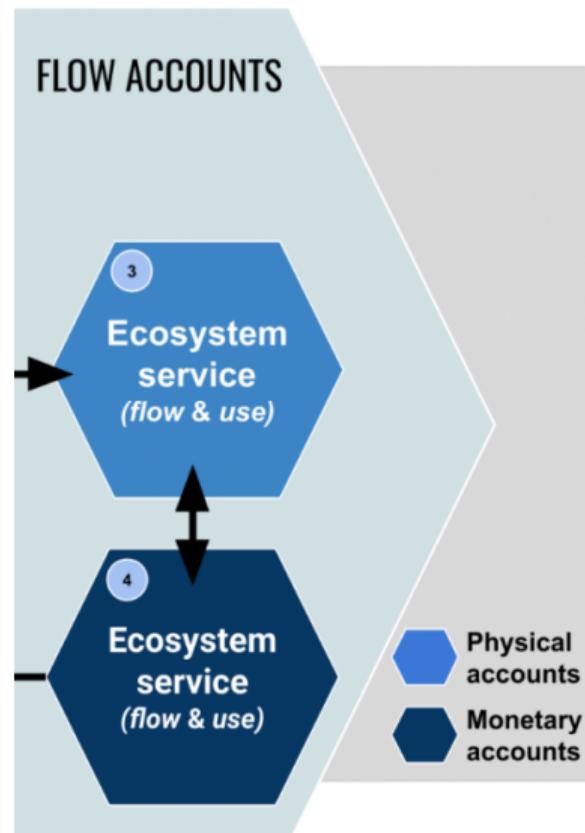


Ecosystem Service Flow Accounts

- These services are quantified by annual flow accounts, both in physical and monetary terms.

| ECOSYSTEM SERVICE CATEGORY | TYPE OF WATER ECOSYSTEM SERVICE |
|----------------------------|---|
| Provisioning services | <ul style="list-style-type: none">• Water provisioning ←(or water supply) |
| Regulating services | <ul style="list-style-type: none">• Water purification ←• Water flow regulation• Flood control |
| Cultural services | <ul style="list-style-type: none">• Recreation-related ←services• Education, scientific and research services• Visual amenity services |

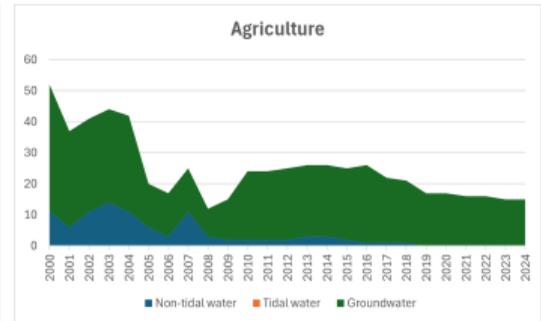
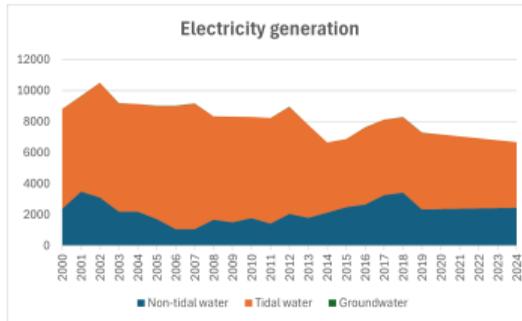
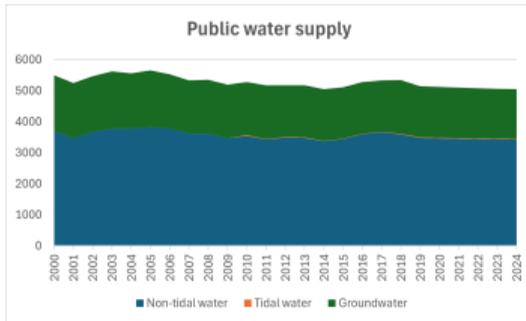
Selected Water-related Ecosystem Services identified in the SEEA EA framework (2021)



- Spatial and temporal analysis of water abstracted by source and by sector.
- Integration with ONS data on public water supply intermediate consumption by the economy.
- Identification of latent dependencies on different water assets across industries.
- These physical flows need to be monetized with SNA-compliant valuation methods to highlight the role of water in the economy.
- Application of the resource rent method (ONS, 2024) → residual value after deducting the cost of all other inputs - including labour, produced assets and intermediate inputs - from the gross output value.

Water Provisioning ES: Findings

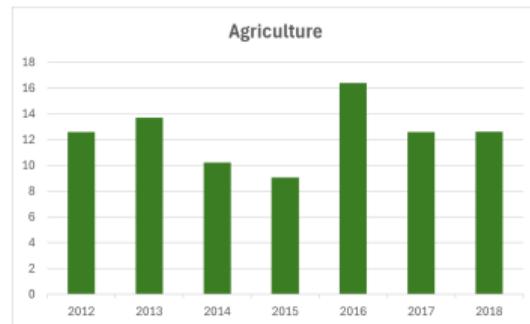
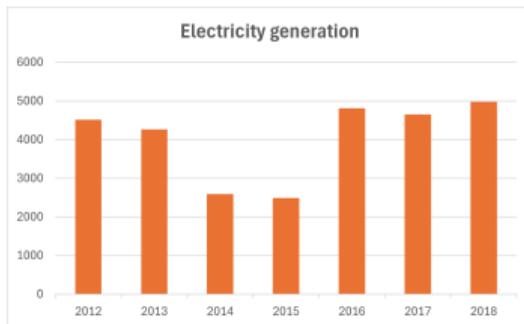
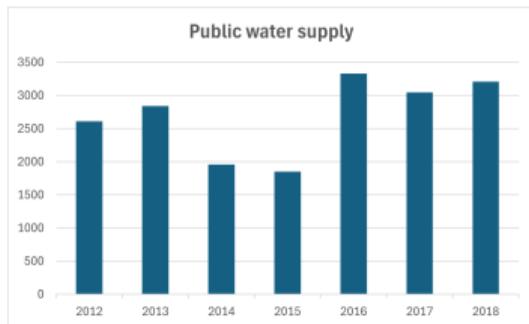
- Strong sector-specific dependencies on different water sources.
- The public water supply is predominantly dependent on non-tidal surface water, while energy generation relies mainly on tidal water. Groundwater is the primary water source for agriculture.



Trends in water provisioning physical flows by different water sources in England between 2000 and 2024 (mcm).

- **Policy Implication:** Effective investment and conservation strategies must consider sectoral dependencies on ecosystems and evolving technologies and demands, but require a consistent reporting framework.

Water Provisioning ES: Findings

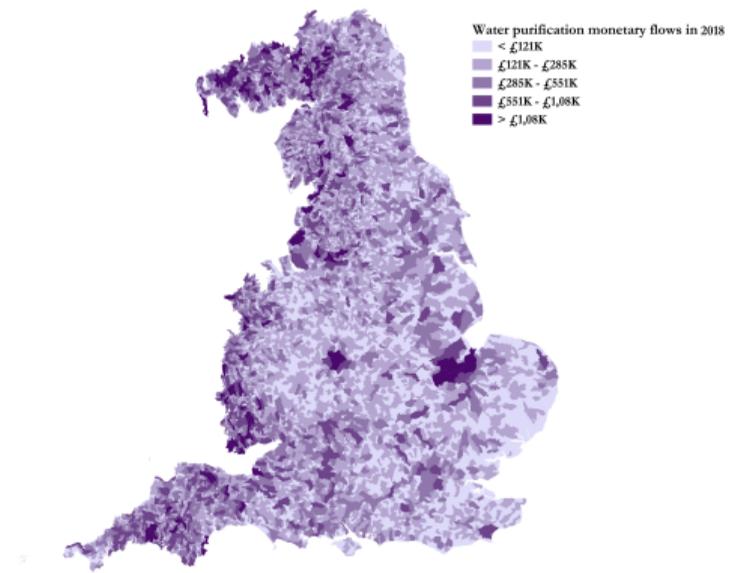
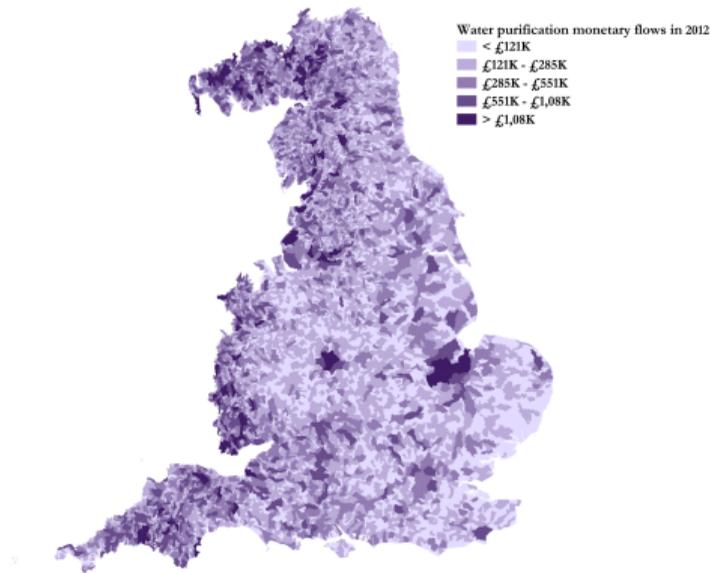


Trends in water provisioning monetary flows between 2012 and 2018 (£ million, 2025 prices)

- Between 2012 and 2018, the value of water provisioning increased by 23% in the public water supply sector, 10% in the energy generation sector, and remained stable in agriculture.

- Rivers' filtration of nutrients (e.g., nitrogen) provides significant economic value embedded in GDP, yet its contribution remains unaccounted for.
- Nitrogen removal flows estimated using the GREEN biophysical model and used as the proxy of the ES (JRC, 2020).
- Monetary values derived through the replacement cost method, based on the engineered construction costs of artificial wetlands which deliver equivalent purification.
- Spatially explicit flows data enabling annual monitoring and temporal comparisons.

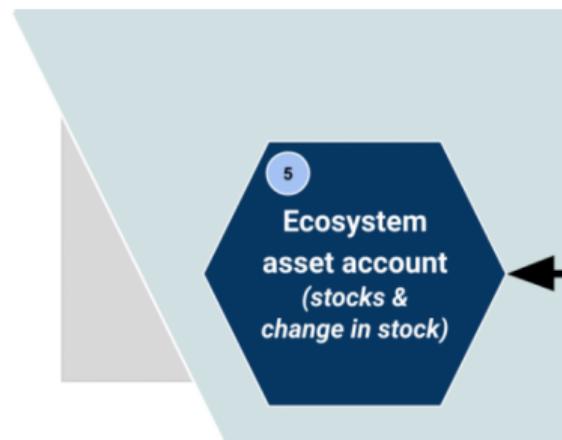
Water Purification ES: Findings



- The economic value of the purification service has remained relatively stable between 2012 and 2018 (approximately £12 billion).
- **Policy Implication:** The quantification of annual flows enables the identification of areas at risk of service loss, guiding both targeted environmental conservation efforts and policy interventions (e.g., nitrate policies to mitigate non-point source pollution).

Monetary Valuation of Ecosystem Assets

- The economic value of the ecosystem asset will be derived by summing the ES monetary flows.
- An appropriate discount rate will be applied to determine the present value of the ecosystem asset.
- Strong link between the stock accounts (i.e., extent and condition) and the final asset account.
- The result is a figure that can easily be integrated with national wealth accounts (i.e., genuine saving) and long-term planning.



- These findings offer valuable insights for shaping environmental policies and guiding investment decisions.
- The SEEA-EA framework enables the coherent incorporation of ecosystem contributions within the SNA.
- Water accounting reveals overlooked ecological dependencies in economic activity.
- Integrating this information into economic frameworks enhances understanding of the ecosystem-economy interplay, supporting sustainable development.

Thank you!

For any further questions, feel free to contact me:

vittoria.reas@student.unisi.it