

# Handling negative monetary values of economic flows depending upon ecosystem services in SEEA accounts.

## Reflections from the UK Natural Capital Accounts

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**26 May 2026**



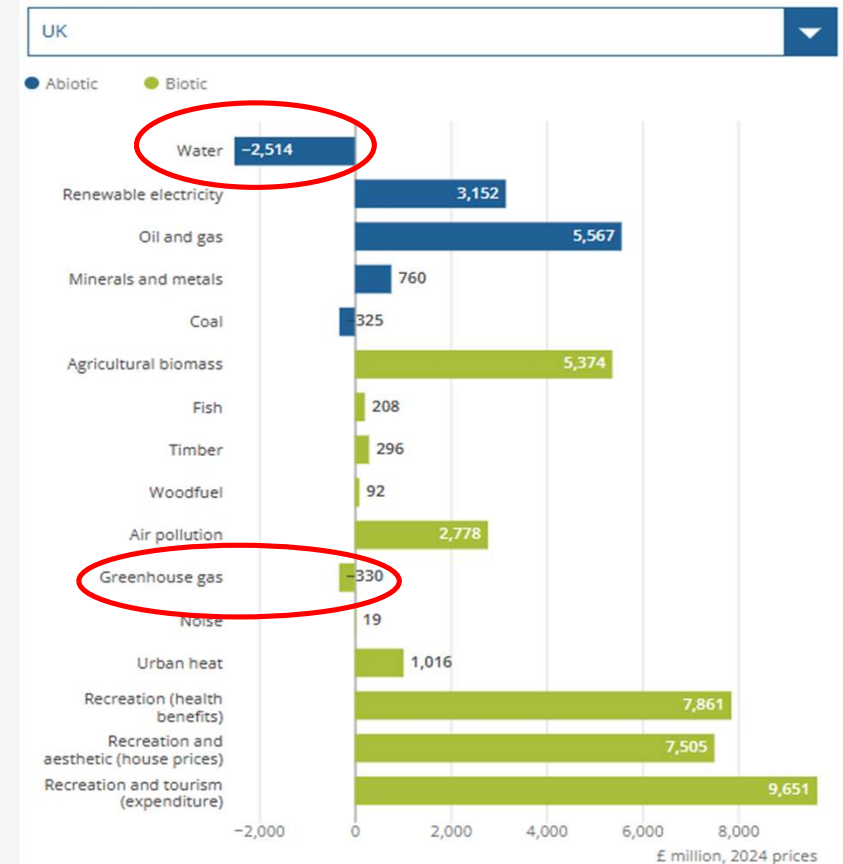
# The UK Natural Capital Accounts

- Include habitat extent, annual flows (physical and monetary values) and asset values, across 16 Ecosystem Services (ESs)
- Natural Capital Accounts (NCAs) aim to “allow us to better represent the importance of the value of nature in the wider economy”
- [Satellite/extended account](#) in ONS NAs – key policy lever for NCAs production
- Feeding into ONS [Inclusive Income and Wealth measures](#), which provide broader measure of economic welfare than core NA/GDP
- Aim to make ‘a value’ of nature visible in policy decisions

# Negative monetary values connected to ESs in UK NCA

- Provisioning services: water
- Regulating services: GHG regulation
- Different drivers, interpretation and communication of negative monetary values
- Reflections on
  - Suitability of RR
  - Use of alternative valuation methods
  - Treatment of negative physical flows

Annual value by biotic and abiotic ecosystem services, UK and constituent countries, 2023

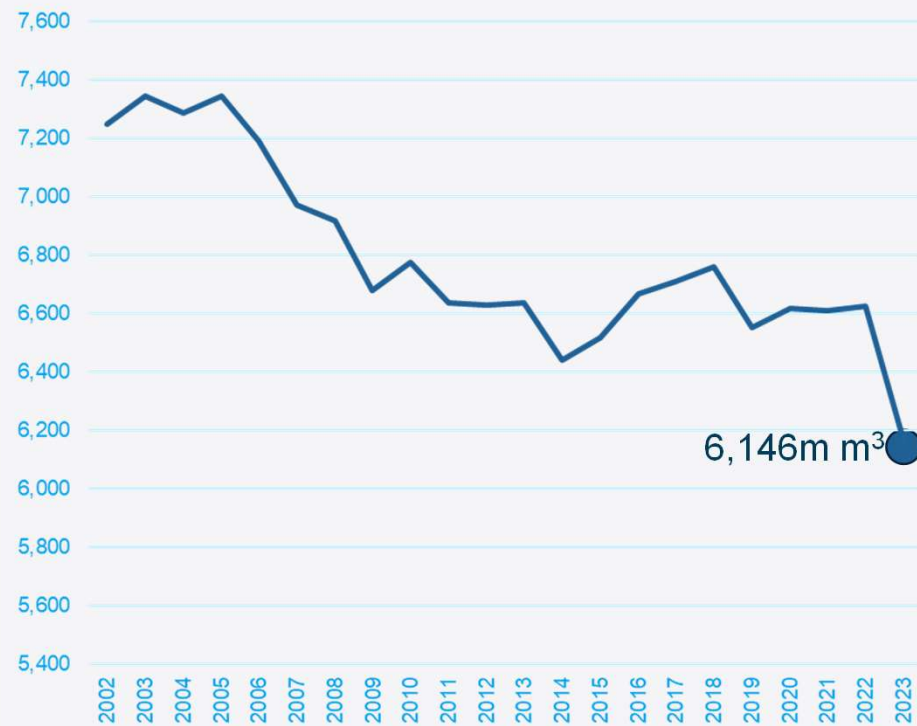


Source: UK natural capital accounts from the Office for National Statistics

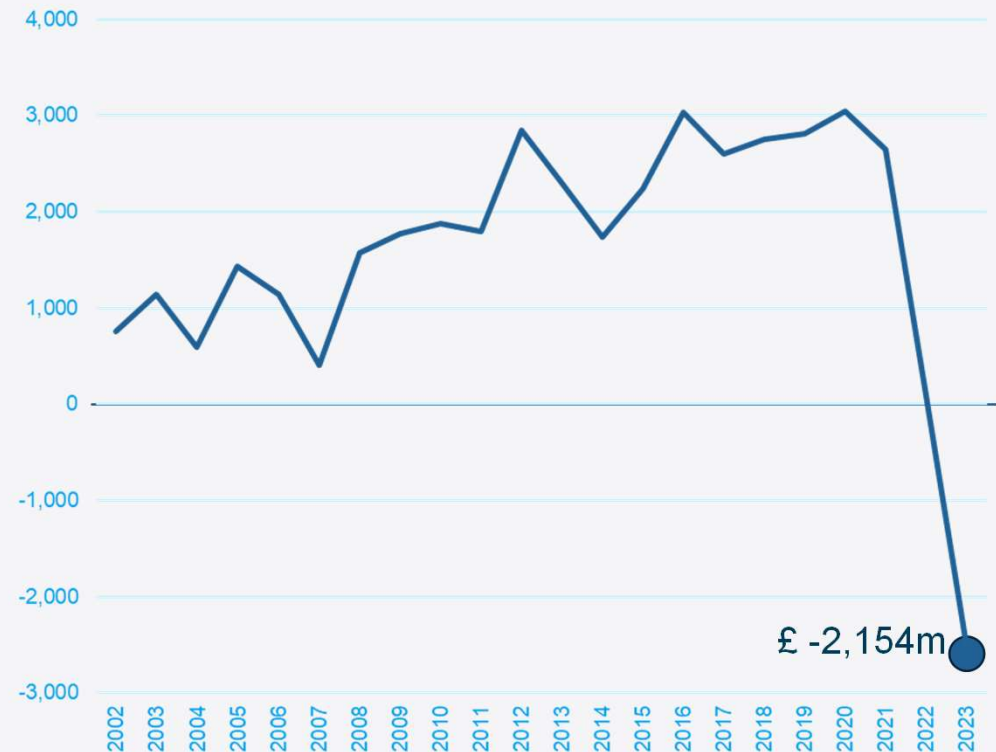
# Water provisioning

# Water provisioning ES in the UK NCA

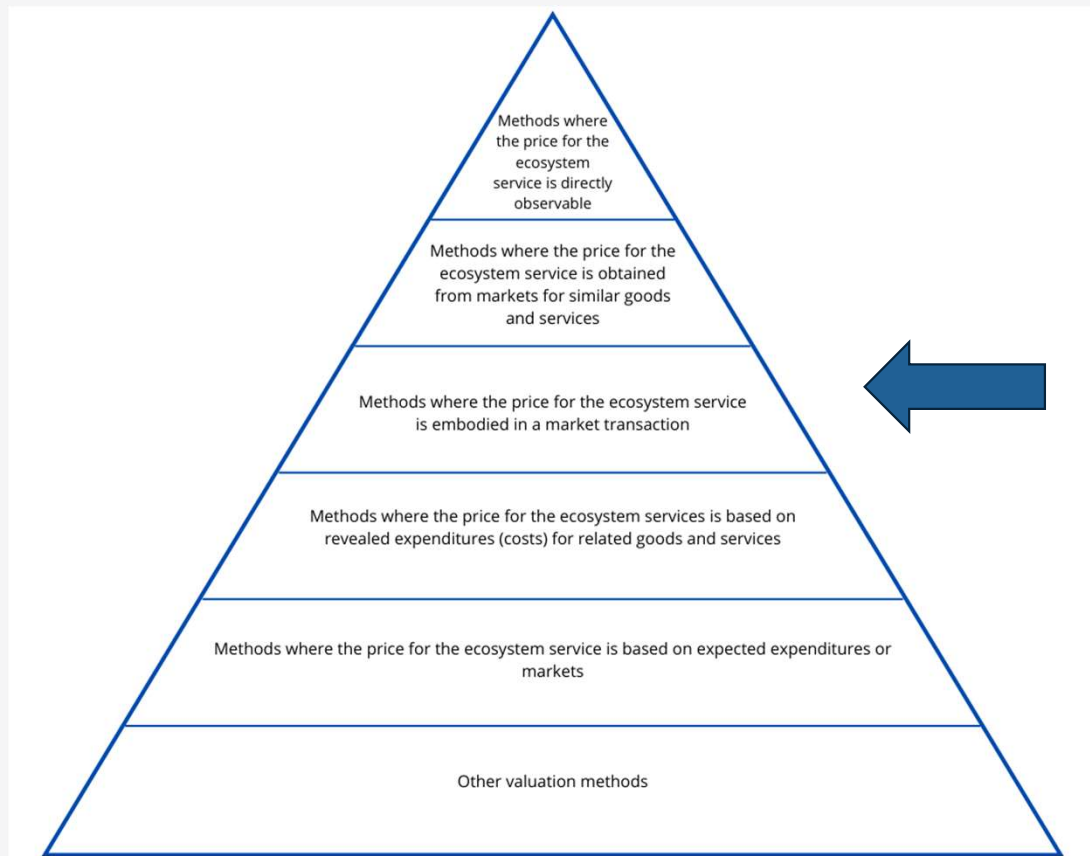
Physical flow, UK (million cubic metres)



Water provisioning (£ million, 2024 prices)



# RR: Theoretical background in SEEA-EA



**Resource rent** represents the **net return to environmental assets** after deducting all costs of production, including labour, intermediate consumption, taxes, and depreciation.

Widely used and recognised, but with multiple limitations:

- Tend to zero or even negative in open-access contexts or heavily regulated markets
- Lacks granularity
- Disconnected from ecological conditions as based on industry-level data

# Negative values from applying the RR method

Main factors contributing to negative values in recent years:

- Increase in net capital stock and depreciation for water industry, accelerating from 2018
- Sharp rise in bond/gilts yields from latter half 2022

$$\begin{aligned} \text{"Annual Value"} &= \text{"Gross Operating Surplus"} + \text{"Taxes"} - \text{"Subsidies"} \\ &\quad - \text{"Depreciation"} \\ &\quad - \text{"Return to Produced Assets"} \end{aligned}$$

$$\text{Return to Produced Assets} = \text{Net Capital Stock} * \text{UK Gilt Yield}$$

$$\begin{aligned} \text{Annual value} &= 6,054 \text{ (G.O.S.)} + 440 \text{ (+Tax -Subs)} - 4,065 \text{ (Deprec)} - 4,846 \text{ (RtPA)} \\ &= -2,417 \rightarrow \mathbf{-2,514} \text{ (current price)} \end{aligned}$$

# Multiple values connected to water provisioning

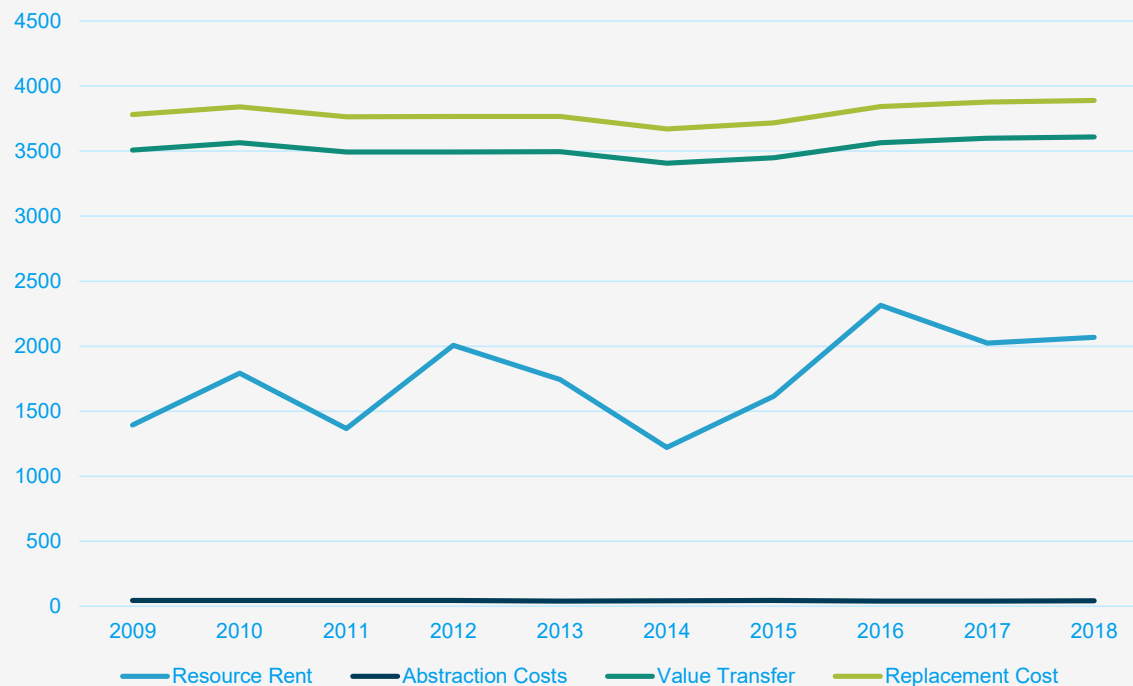
			ES in Scenario	
			ES exists	ES doesn't exist Hypothesis
Connected monetary value in scenario	Exists (scenario coincide with reality)	ESs are traded as private usage rights	<b>Abstraction prices</b>	
		ESs are potentially traded as private usage rights		
		ES is used for producing other goods or services	<b>Resource Rent – standard &amp; incremental</b>	
		Other (outside or inside of SEEA-EA, within SEEA CF, other satellite accounts or SNA)		
	"Would appear" (does not exist in reality, does in the scenario)	Economic activity that avoids the need for the ES		<b>Replacement costs</b> (desalination)
		ES restoration as economic activity		
		Marketisation of the ES (with or without perfect price discrimination)		
	"would disappear" (exists in reality, is lost in scenario)	Existing economic activities can no longer thrive, and/or assets are damaged («other negative changes in value») because of the lack of the ES		

Value transfer  
– lit. review



# Multiple values – Academic Research

Economic Value of Public Water Abstraction, England  
£ millions 2025 Price



- Resource Rent (standard approach)
- Abstraction costs
- Replacement cost – desalination
- Value transfer from systematic literature review

\* ONS calculations based on research by Silvia Ferrini and Alice Bartolini (UEA, UCL, EASCoE)



# RR with incremental Return to Produced Assets

Current approach treats fixed capital as a liquid financial asset.

Alternative “incremental approach” applies the bond rate only to new fixed capital to isolate the opportunity cost to what was genuinely foregone at the time of investment.

“Annual Value” = “G.O.S.”+ “Taxes” – “Subsidies”

– “Depreciation”

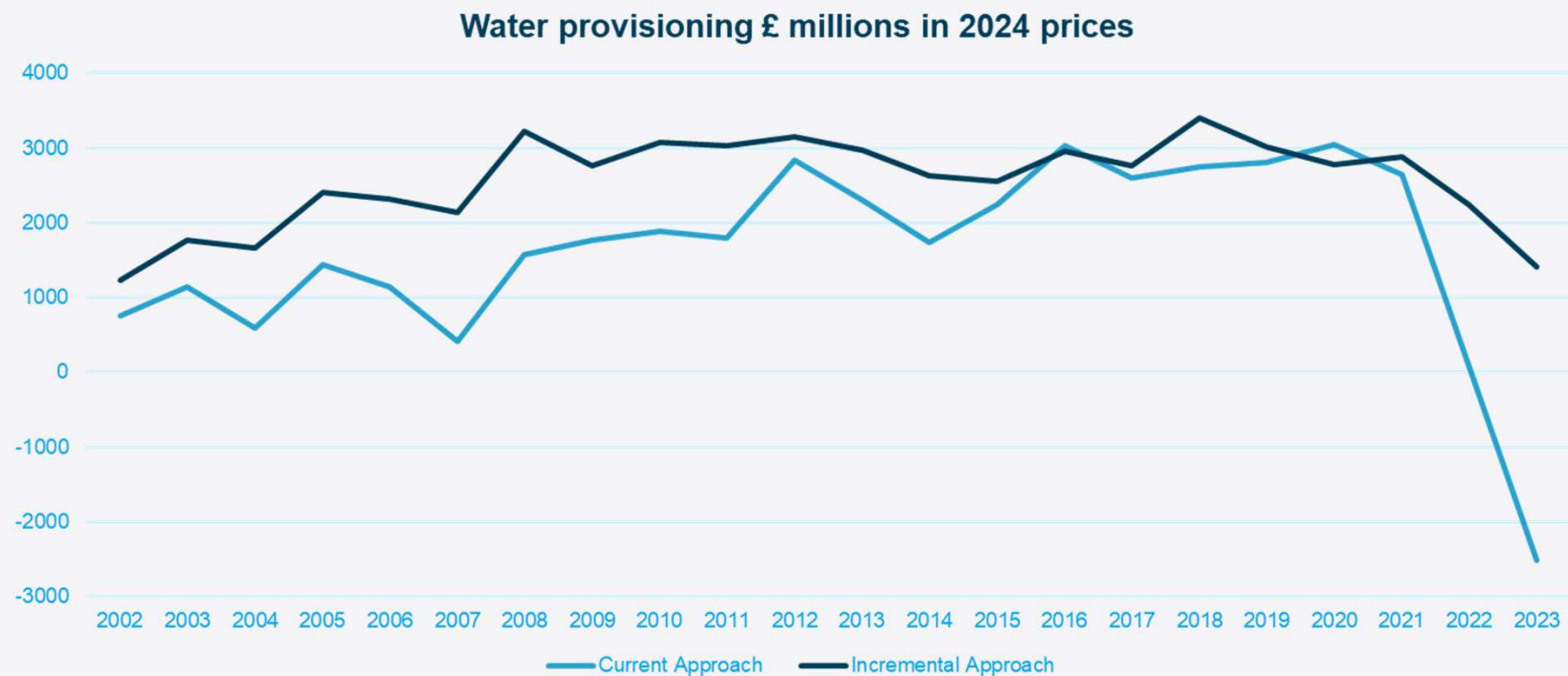
– “Return to Produced Assets”

“Return to Produced Assets” =  $\sum^{(Y^0 - 9)} ((\text{Net Capital stock})^{Y^0} - (\text{Net Capital stock})^{Y-1}) * \text{UK Gilt Yield}$

It doesn’t address the limitations implicit in the RR method, but:

- Reduces volatility driven purely by financial market fluctuations (Bond/Gilt yield rate)
- Better reflects the nature of fixed capital

# Values dependent on water provisioning – Incremental Approach to RR



# Considerations

- SEEA-EA attribution of negative values to externalities/ecosystem disservices does not fit with this case study
- How should we treat negative values within a 'values connected to ecosystem' perspective?
- The ONS has made a decision to publish the negative values, while actively engaging with stakeholders on how to interpret them
- Research on methods is ongoing

# Greenhouse gas regulation

## GHG regulating service in the UK NCA

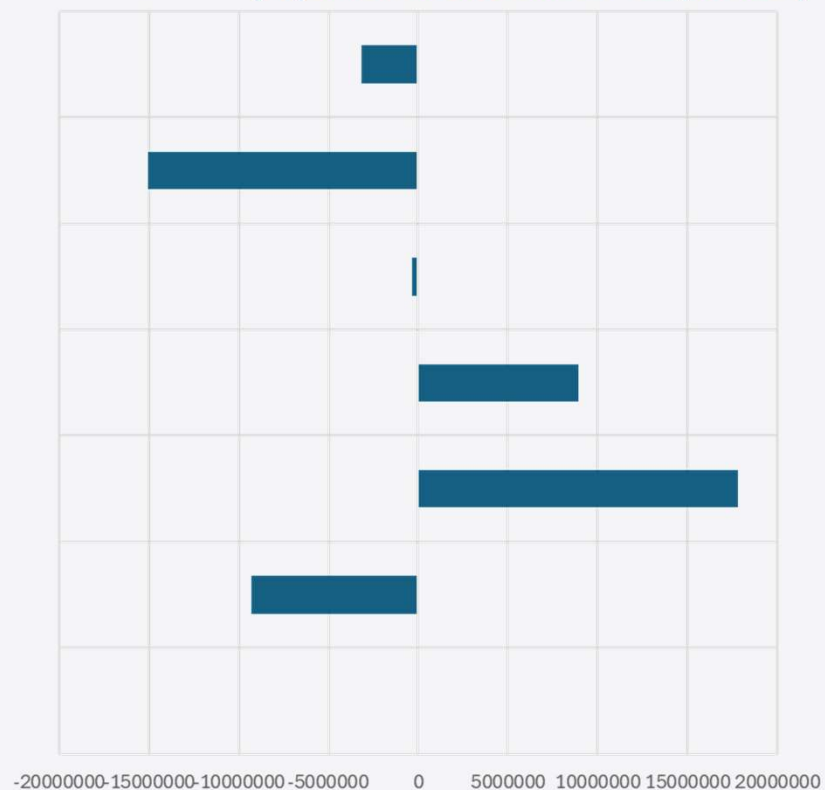
- One service - CO<sub>2</sub> 'sequestration' (removal + storage)
- Physical flows from LULUCF annual inventory reported as net emissions/removals
- Associated monetary values based on projected non-traded price of carbon (based on Marginal Abatement Cost to meet legally binding emission reduction targets)
- When emissions exceed sequestration, **we record negative physical and monetary flows**

## Why diverging from SEEA-EA

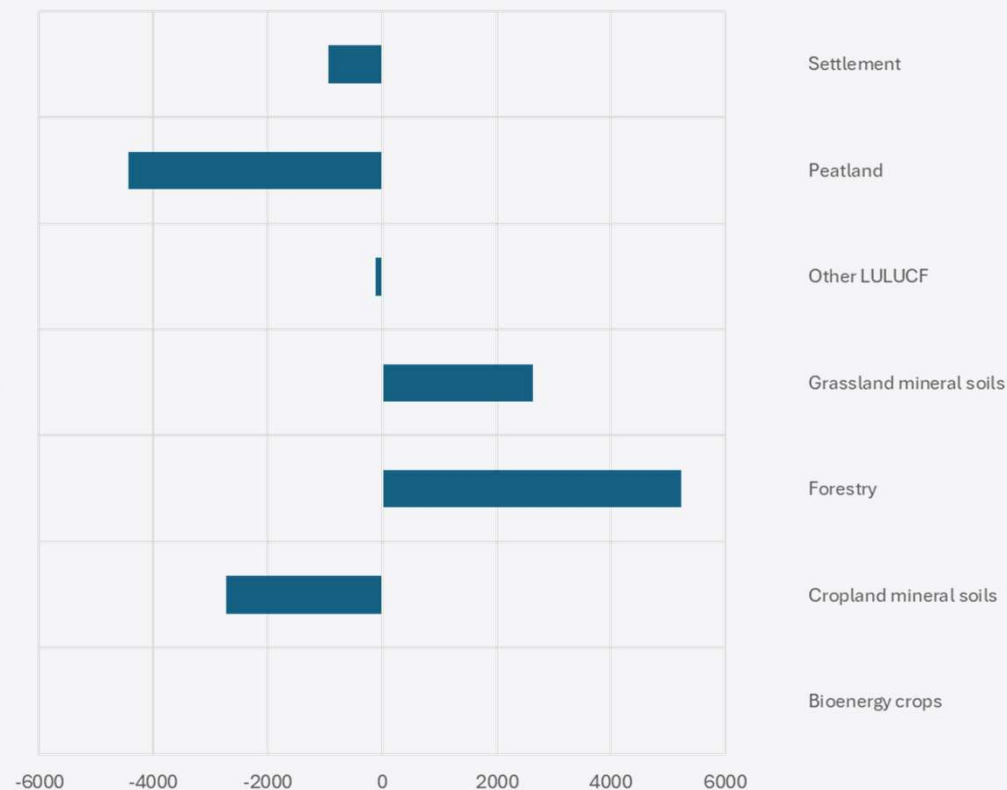
- Monetary values connected to ESs reflect the physical trends, driven by the habitat condition
- Arbitrary principle that only positive exchanges are recorded as transactions
- Aligns with broad [Dasgupta Review](#) recommendation to net off damage to the environment from gross measures of the economy

# GHG regulating service in the UK NCA

Territorial net emissions/removal by habitat UK in 2023  
(Physical flows in tonnes CO2 equivalent)



Annual Value by habitat UK in 2023 (£ million)





# Values connected to GHG regulation

			ES in Scenario	
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Connected monetary value in scenario	Exists (scenario coincide with reality)	ESs are traded as private usage rights		
		ESs are potentially traded as private usage rights		
		ES is used for producing other goods or services		
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	"Would appear" (does not exist in reality, does in the scenario)	Economic activity that avoids the need for the ES		Projected non-traded price of carbon - based on (MAC)
		ES restoration as economic activity		
		Marketisation of the ES (with or without perfect price discrimination)		
	"would disappear" (exists in reality, is lost in scenario)	Existing economic actives can no longer thrive, and/or assets are damaged («other negative changes in value») because of the lack of the ES		

# Conclusions

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- If ecosystem accounting aim to make nature count in decision making, then what drives monetary values matters and so does how we explain it
- Negative values highlight the importance of strengthening logical and narrative connection between physical and monetary flows
- In a “values connected to ecosystems” perspective, is more research needed on the treatment and communication of negative values?