Valuing Nature in Rail Infrastructure: Applying the ECOV4R Framework in the UK and Spain

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Introduction

- Railways depend on ecosystem services for safe and resilient operations but also exert pressures on surrounding ecosystems.
- The value of ecosystem services is rarely considered in railway planning, where environmental assessments focus on compliance and economic appraisals prioritise financial efficiency.
- Existing ecosystem service assessment methods are seldom operationalised in transport infrastructure decision-making.
- The ECOV4R Framework provides a structured approach to assess and, where possible, monetise ecosystem service impacts, demonstrated through pilots in the UK and Spain.

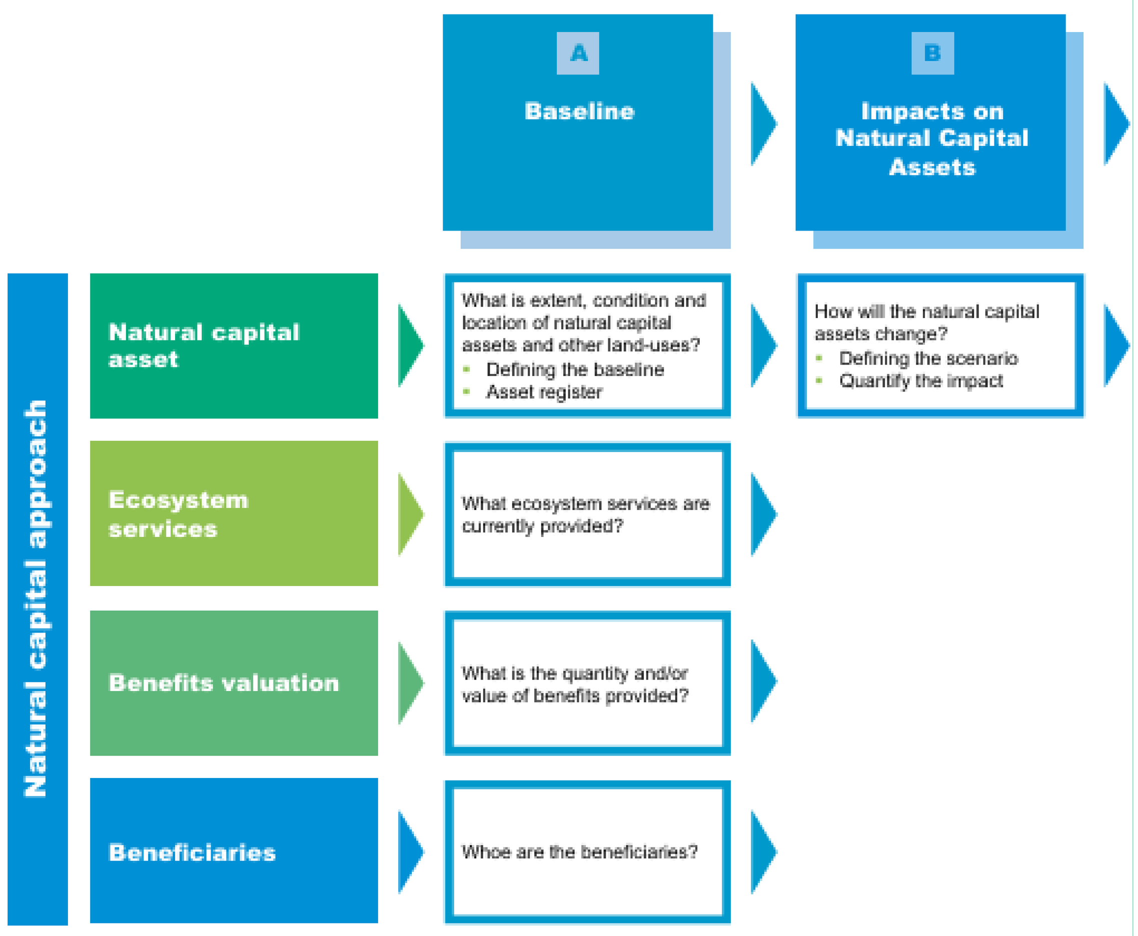

Figure 1(a): Ecosystem Services Assessment Steps A. and B.

Methods

The ECOV4R framework follows a **five-step process** for ecosystem services valuation, displayed in Figure 1, linked to the "Natural Capital Approach", shown in Figure 1(a) and 1(b):

A. Baseline – Define the state of natural capital assets within the study area, including extent, condition, and configuration.

B. Impacts on Natural Capital Assets – Characterise and quantify how the proposed intervention or project alters these assets

C. Impacts on Ecosystem Services – Identify material changes in ecosystem services provision, both positive and negative.

D. Changes in Value – Quantify and, where feasible, monetise changes using appropriate methods

E. Using and Interpreting the Results – Communicate results in qualitative, quantitative, and monetary terms to inform decision-making, business cases, and sustainability reporting

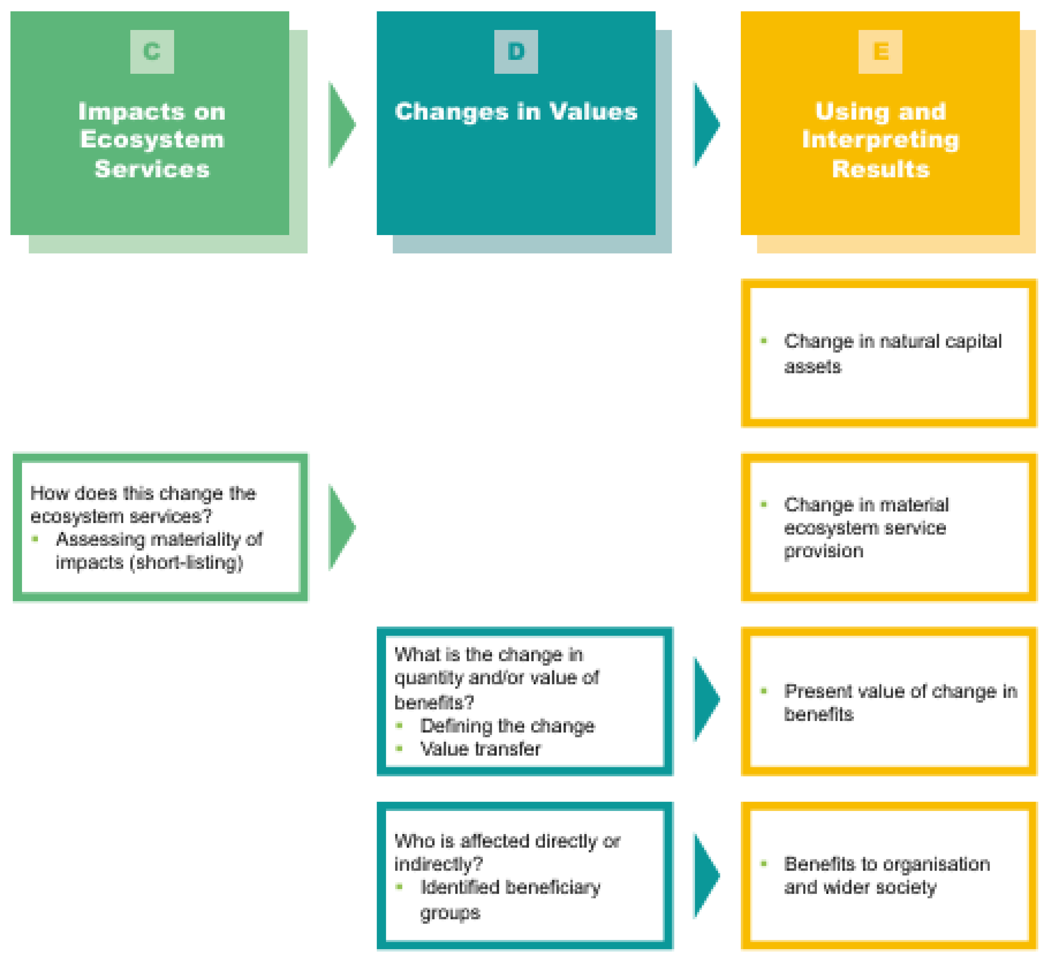

Figure 1(b): Ecosystem Services Assessment Steps C., D. and E.

Valuation Results

Cotswold Line, UK

- Net gain of ~5,000 biodiversity units
- Estimated £59 million net benefit over 100 years
- Largest benefits from carbon sequestration, recreation and water purification, further details in Figure 2(a).

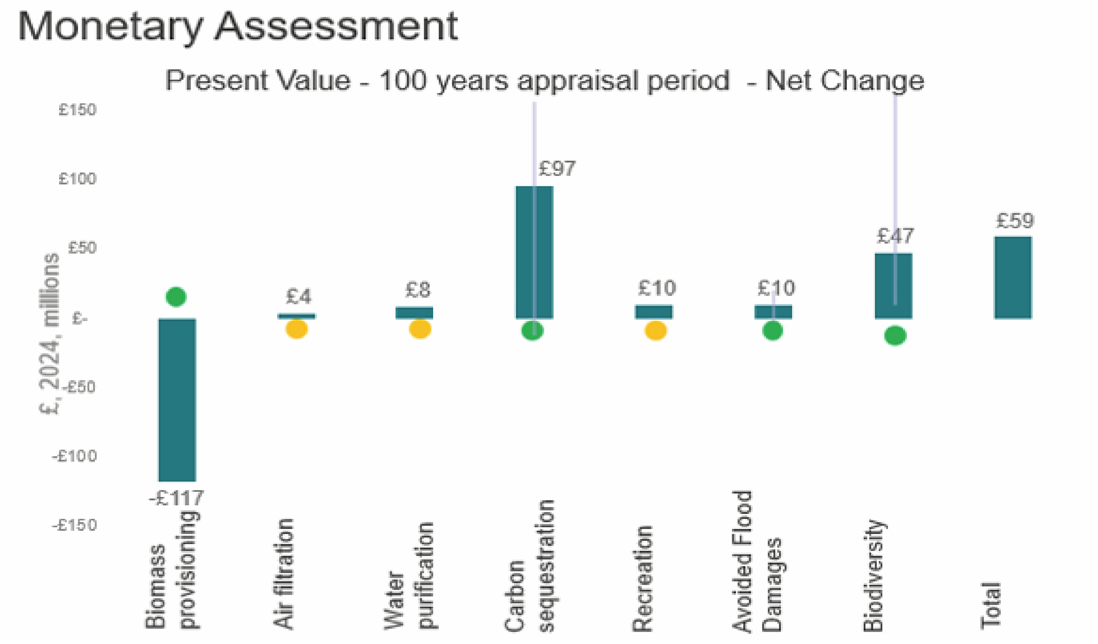

Figure 2(a): UK Pilot Site ES Monetary Assessment in £;

Palencia – León, Spain

- Net sequestration of 423 tCO_2e per year
- Average annual net benefit of approximately €117,690
- Carbon sequestration is the largest contributor to total value, further details in Figure 2(b).

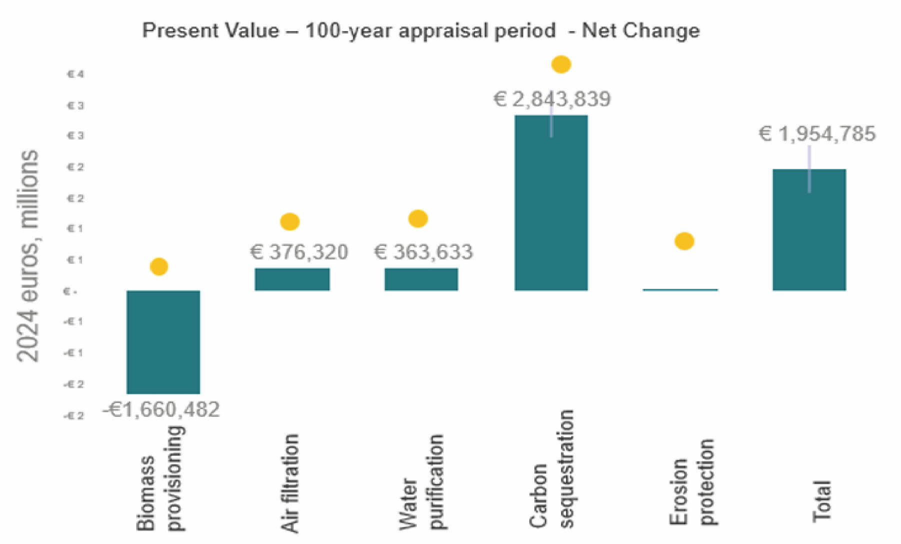

Figure 2(b): Spain Pilot Site ES Monetary Assessment in €

Pilot Case Study: Cotswold Line, UK

Study Overview

- ECOV4R application to Natural Flood Management in the Evenlode catchment , see Figure 3(a)
- Assessment area of 3,900 ha dominated by arable land and grassland
- Objective: evaluate railway resilience and ecosystem service benefits

Ecosystem Services Impacts

- Conversion of arable land to woodland, wetlands and grasslands
- Reduced biomass provisioning but gains in regulating services
- Increased carbon sequestration and improved water flow regulation

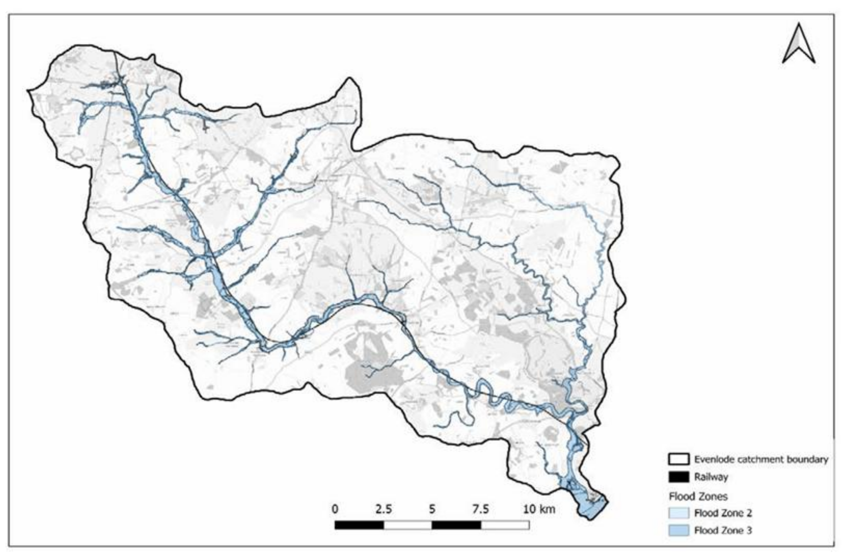

Figure 3(a): Evenlode Catchment Photos & Map.
Credits: AtkinsRéalis

Pilot Case Study: Palencia-León, Spain

Study Overview

- Retrospective ECOV4R application to a 16 km high-speed rail section (ADIF), see Figure 3(b)
- Assessment area of 339.2 ha dominated by arable land
- Evaluation of ecosystem services from implemented mitigation measures

Ecosystem Services Impacts

- Conversion of cropland to wetlands, woodland and grassland
- Reduced biomass provisioning from loss of agricultural land
- Increased carbon sequestration and improvements in regulating services

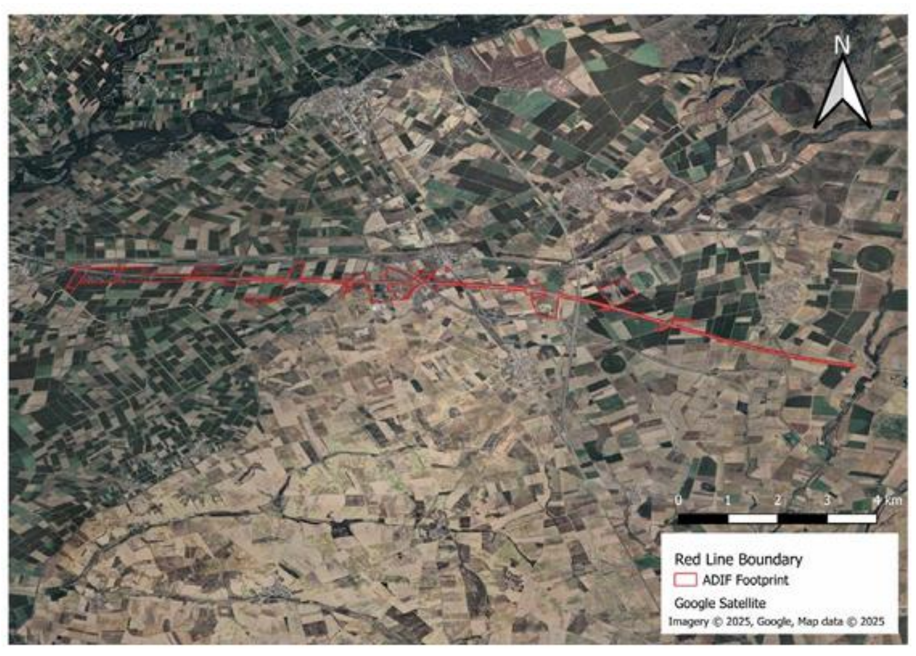

Figure 3(b): ADIF Wetlands , Embankments & Map o

Do you want to know more?

ECOV4R
ECOSYSTEM VALUATION FOR RAILWAYS

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