NATURAL CAPITAL CONSERVATION AMIDST DEVELOPMENT AND THE ROLE OF GOVERNANCE IN PLANNING CONSERVATION-FRIENDLY AND SUSTAINABLE TRANSPORTATION PROJECTS

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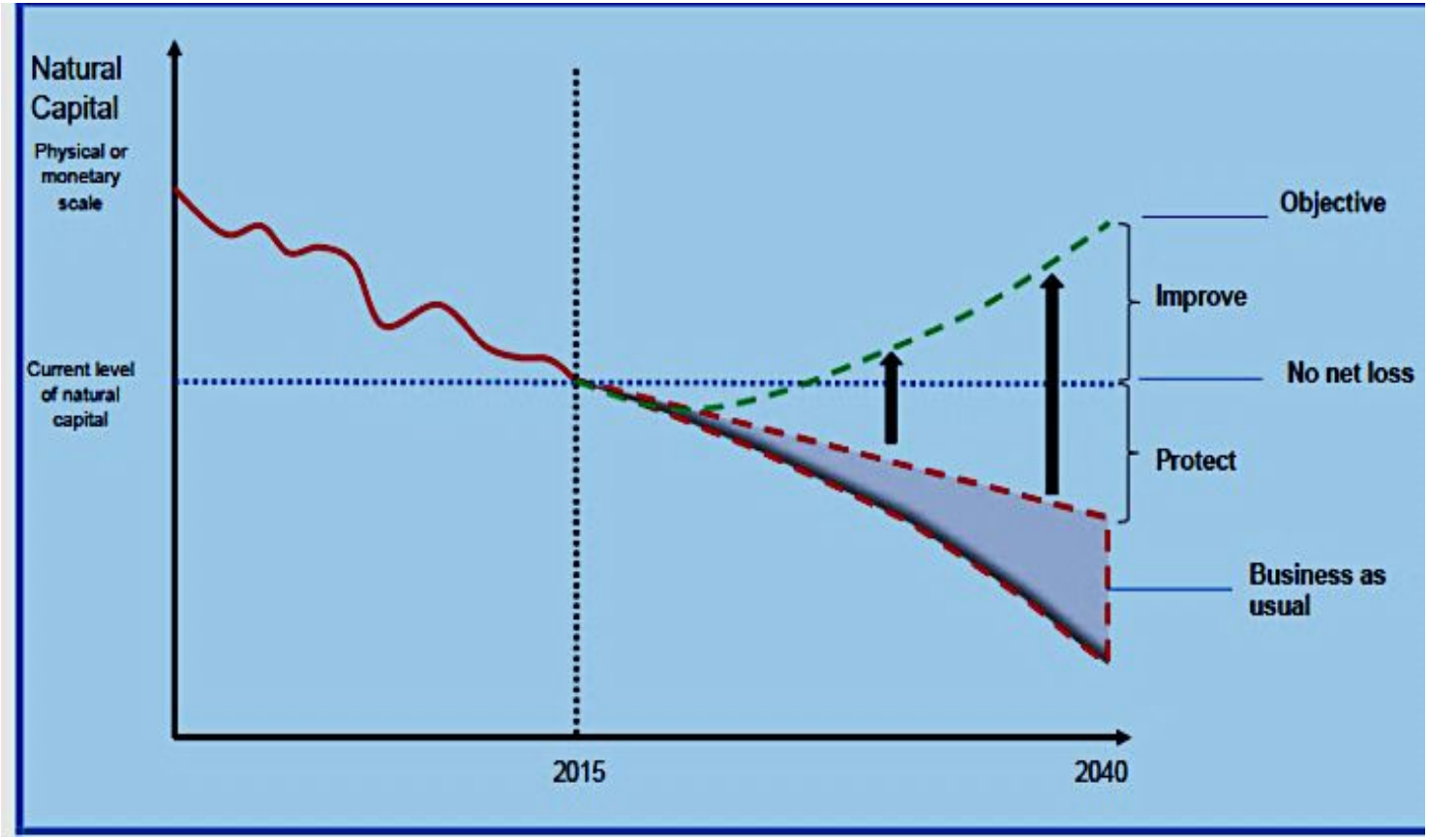
Founding thoughts

- **"Natural capital"** implies an extension of the economic notion of capital (a factor of production) to include goods and services related to nature
- Pressures on natural capital are already and are likely to intensify
- The tendency to ignore the value of nature has resulted in our natural environment being mismanaged, over-exploited and under-invested in
- **Natural capital thinking is a priority in transportation sector**
- Policy support and mainstreaming framework is needed for planning sustainable transportation projects while enhancing benefits from nature

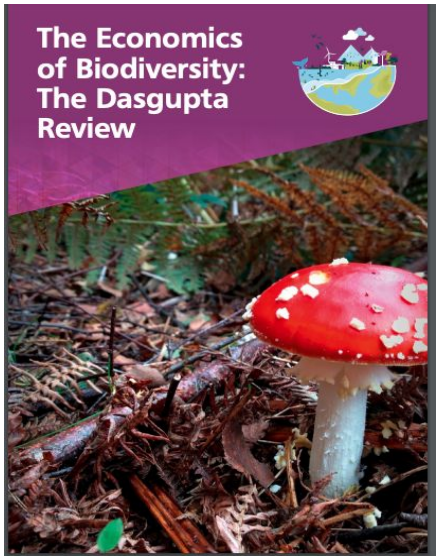
Significant improvements are possible with the right investments to deliver important benefits of natural capital for the economy and communities

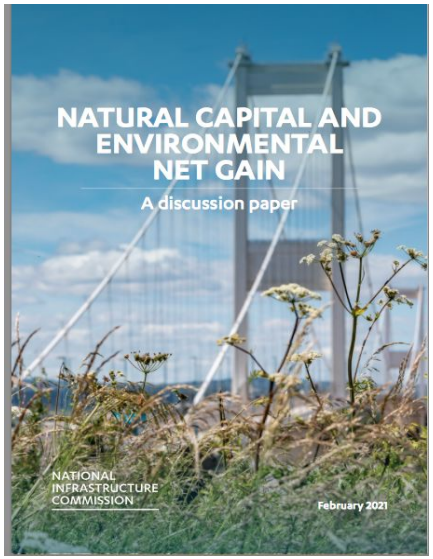


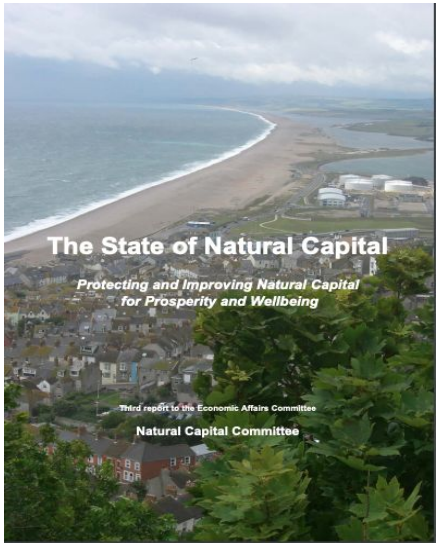
Protecting and improving natural capital over a generation – stylised interpretation (Source: NCC-state-natural-capital-third-report)

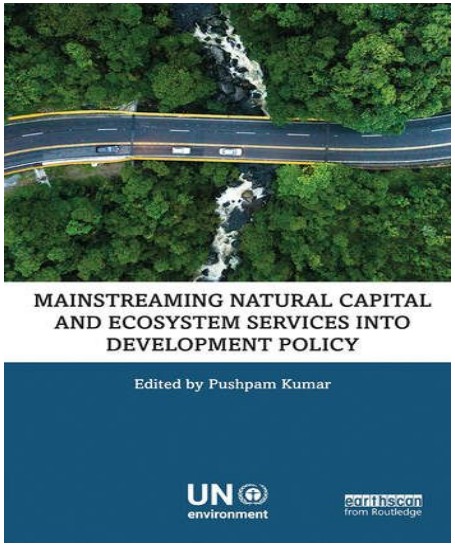
(https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachmentdata/file/516725/ncc-state-natural-capital-third-report.pdf)

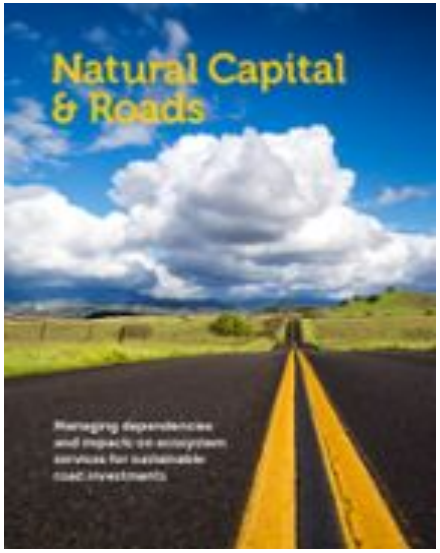
Increasing recognition of natural capital in development policies and decisions in all key sectors

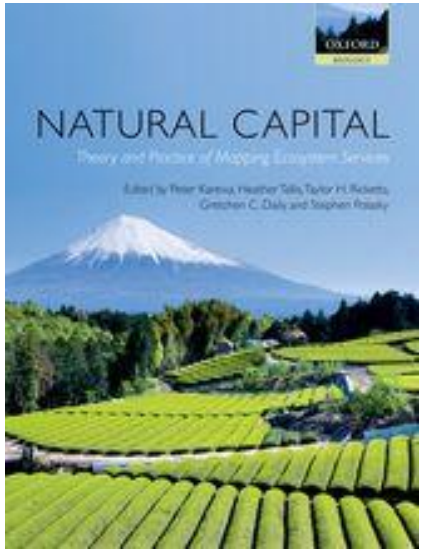


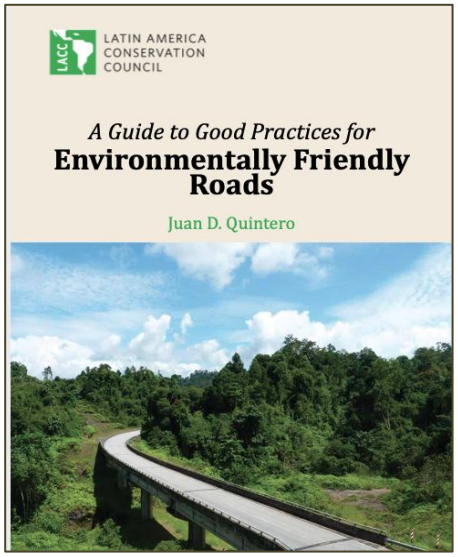


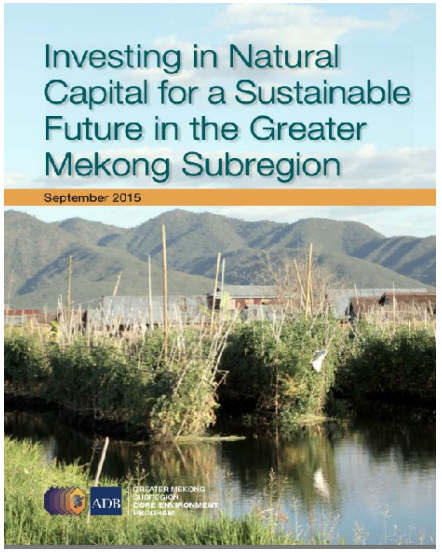






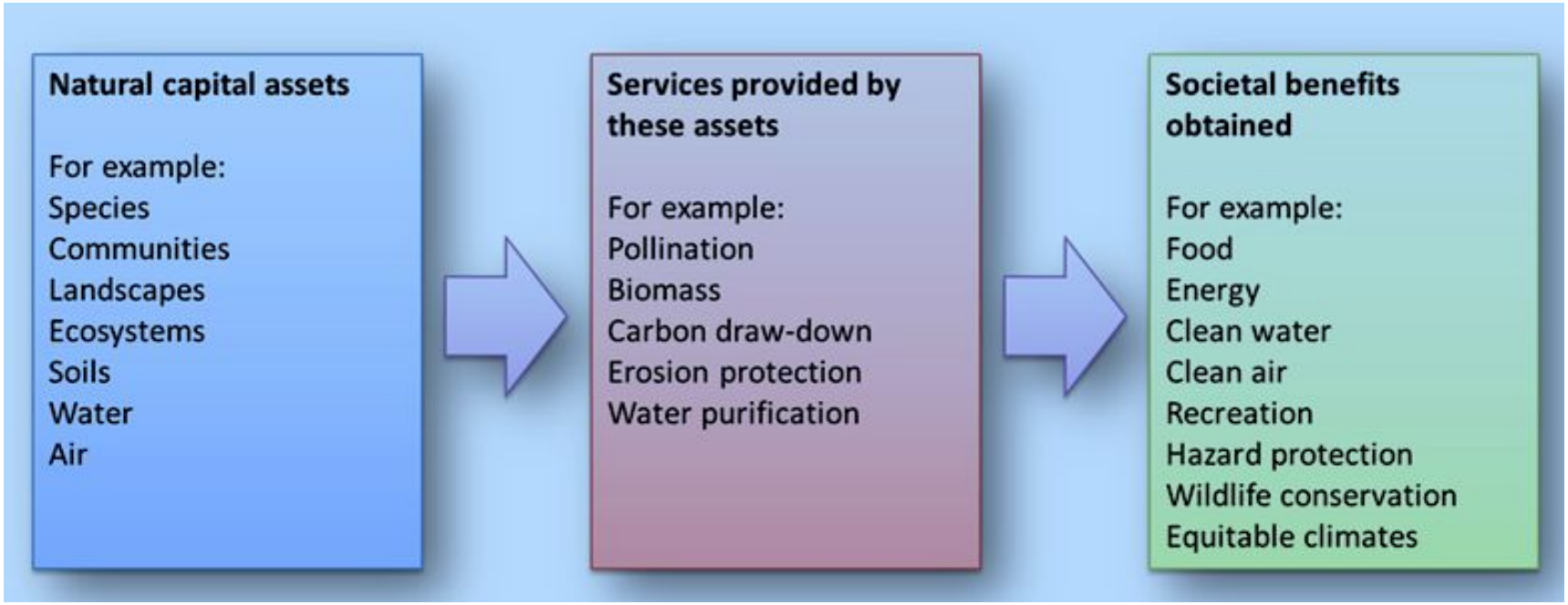






Natural capital approach

Evaluation of impacts and dependencies on natural resources to ensure that natural capital stocks are maintained to provide sustainable flows of ecosystem goods and services for societal benefits.



Source:https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment data/file/957503/ncc-natural-capital-workbook.pdf

Roads both depend on and impact ecosystem services

Ecosystem services relevant to roads

Flood Regulation

Restoring vegetation in upstream sections of roadways can reduce flood risk to roads

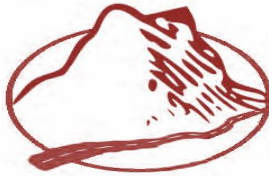
Coastal Storm Protection

Protecting marshes, mangroves, sea grass beds, and reefs reduce coastal erosion and buffer the road's exposure to storm surge

Soil Erosion

Restoration of vegetation upstream of roadways reduces sediment scour to roads and bridges

Landslide Prevention



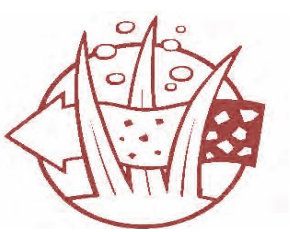
Protecting and restoring vegetation uphill of roads can reduce the risk of a landslide impacting a road

Source: Natural Capital & Roads: Managing dependencies and impacts on ecosystem services for sustainable road investments. https://publications.iadb.org/en/publication/17173/natural-capital-and-roads-managing-dependencies-and-impacts-ecosystem-services

More….

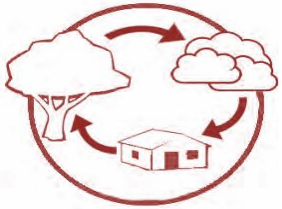
Ecosystem services relevant to roads

Water Quality Regulation



Vegetation and soils help to maintain clean water by filtering pollutants.

Air Quality Regulation



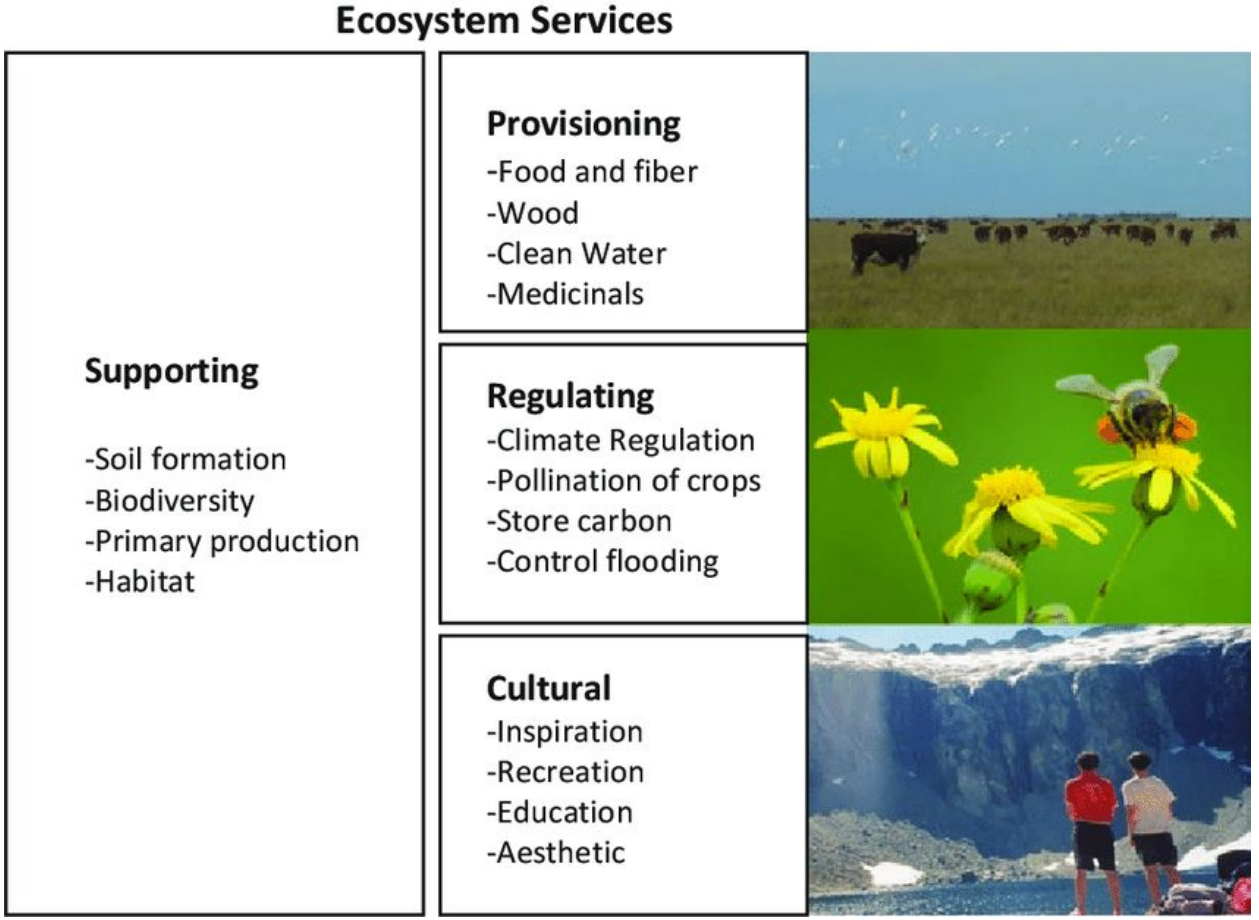
Vegetation helps mitigate impacts on air quality by trapping and filtering pollutants

Carbon Sequestration

Restoration of vegetation can offset carbon emissions associated with road building, traffic and land conversion.

Road relevant services represent one of the established ES categories

Millennium Ecosystem Assessment (MA 2005)

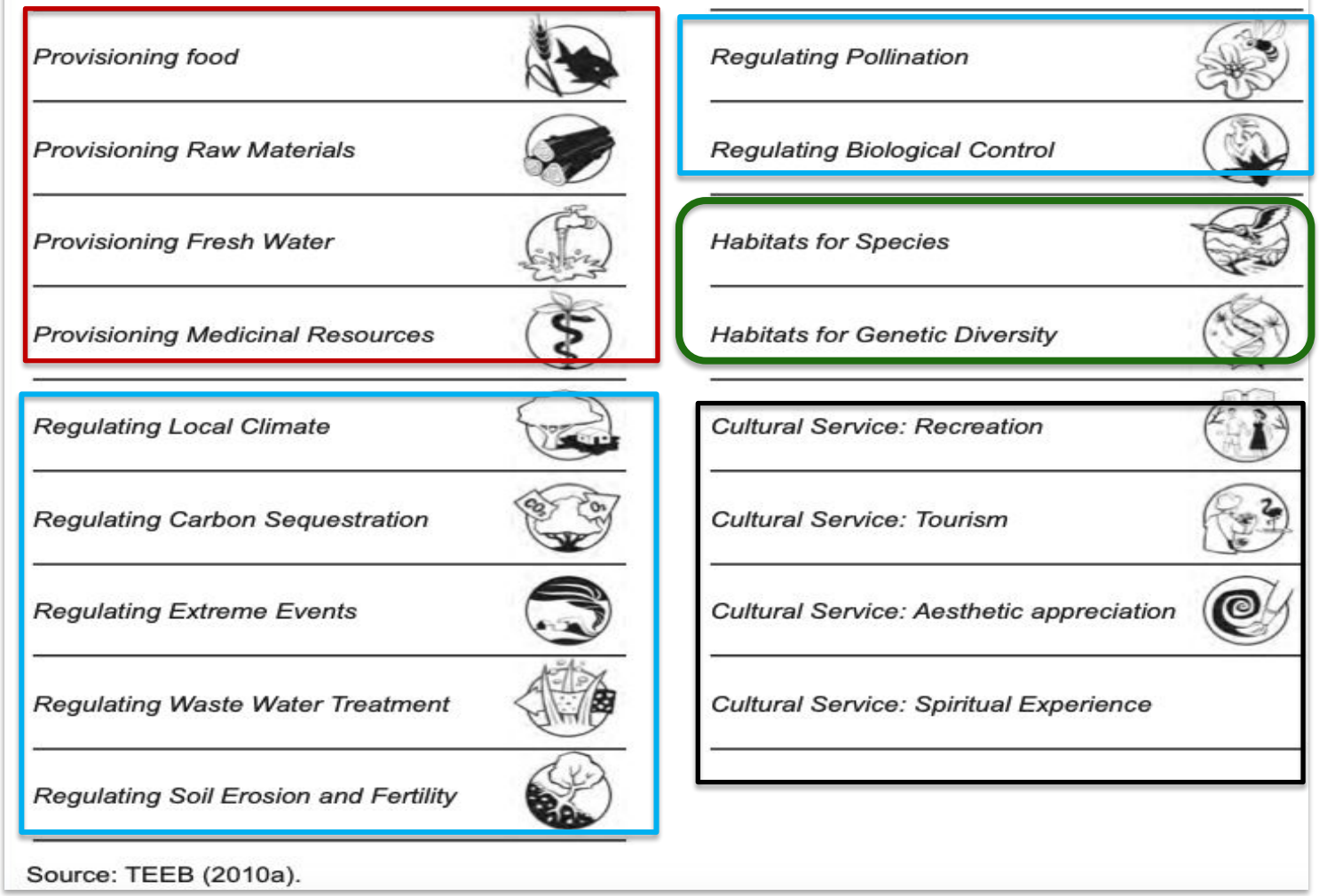


IPBES: 'nature's ability to supply benefits (i.e. habitats for fisheries, contribution of soil biodiversity to sustenance of long-term yields, biodiversity for societal benefits'

Emerging notion of Habitat Services

"Habitat services represent the critical role habitat plays in species interactions and the regulation of population dynamics. These services are not well represented in the marketplace." (TEEB 2010)

Figure 1.2: What Are Ecosystem Services?



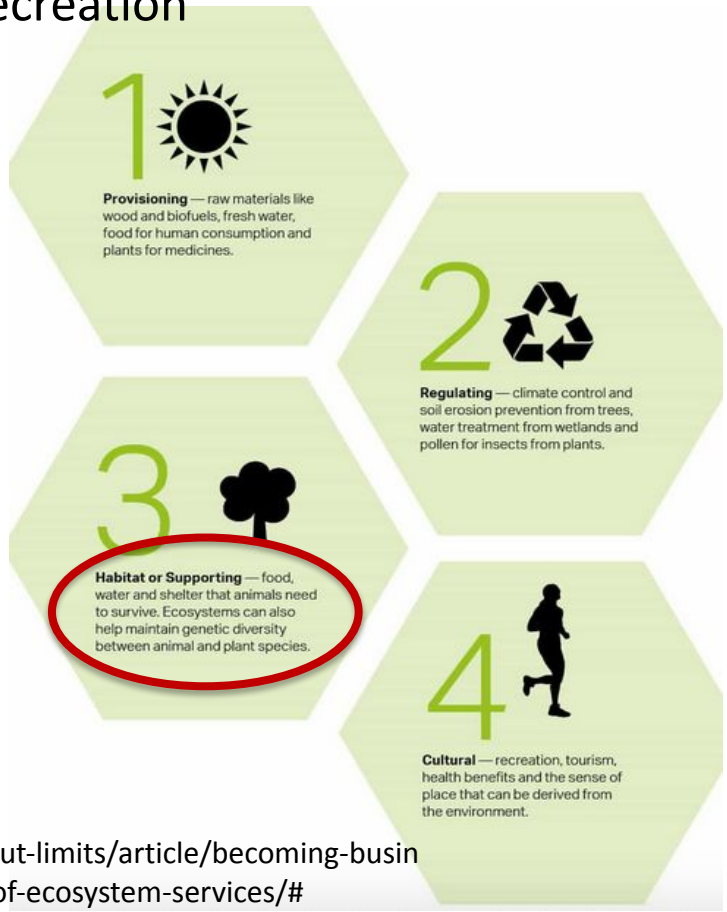
Source: TEEB (2010a).

Coutts and Hahn (2015) categorise Ecosystem services (ES) as:

1. Regulation functions, such as water and soil regulation;
2. **Habitat functions, such as living spaces for animals and plants**
3. Production functions, such as providing food and raw materials; and
4. Information functions, such as aesthetics and recreation

Provisioning	Commercial, recreational and subsistence fisheries Aquaculture Fertilizer and building materials (lime) Jewelry and other decoration (shells)
Regulating	Water quality maintenance Protection of coastlines from storm surges and waves Reduction of marsh shoreline erosion Stabilization of submerged land by trapping sedi-ments
Habitat	Cycling of nutrients Nursery habitats
Cultural	Tourism and recreation Symbolic of coastal heritage

https://www.pacshell.org/ecosystem-services.asp



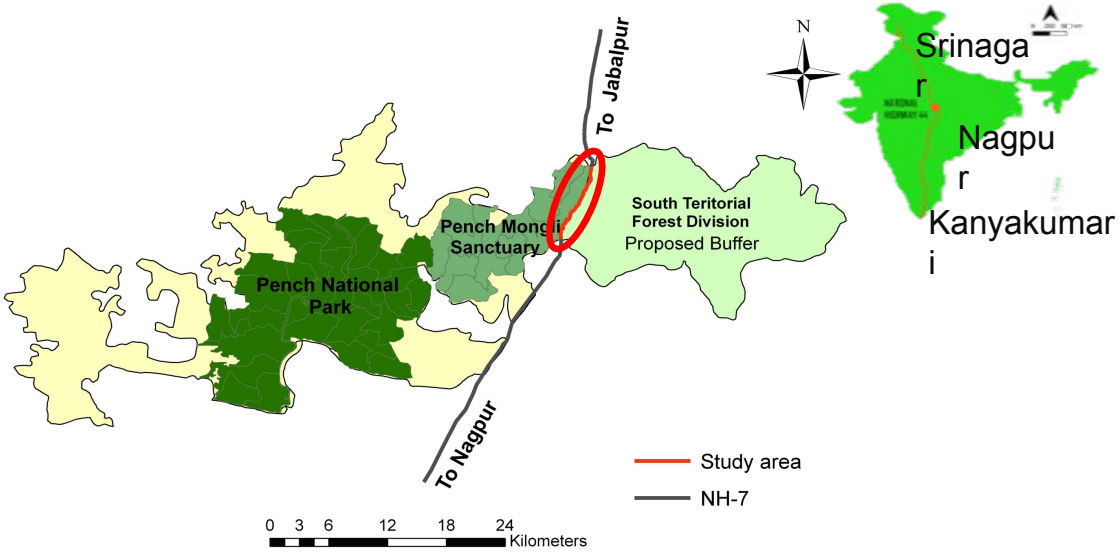
https://aecom.com/without-limits/article/becoming-business-usual/the-four-types-of-ecosystem-services/#

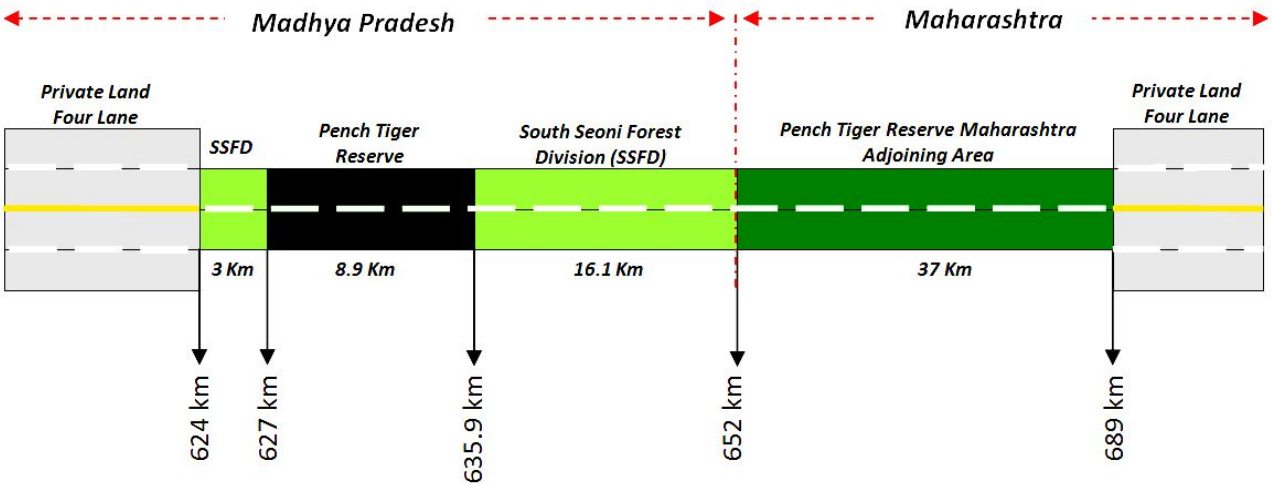
Conservation communities have focused more on obvious threats of transport sector on habitats and species

Road verges – Unrealized and unrecognized role in the planning of transportation projects

- ‘Stepping stones’ between isolated habitat fragments
- Refuges for species in modified landscapes
- Connectivity between habitat fragments
- Dispersal corridors for wildlife moving through modified landscape
- Contribution to habitat and species diversity

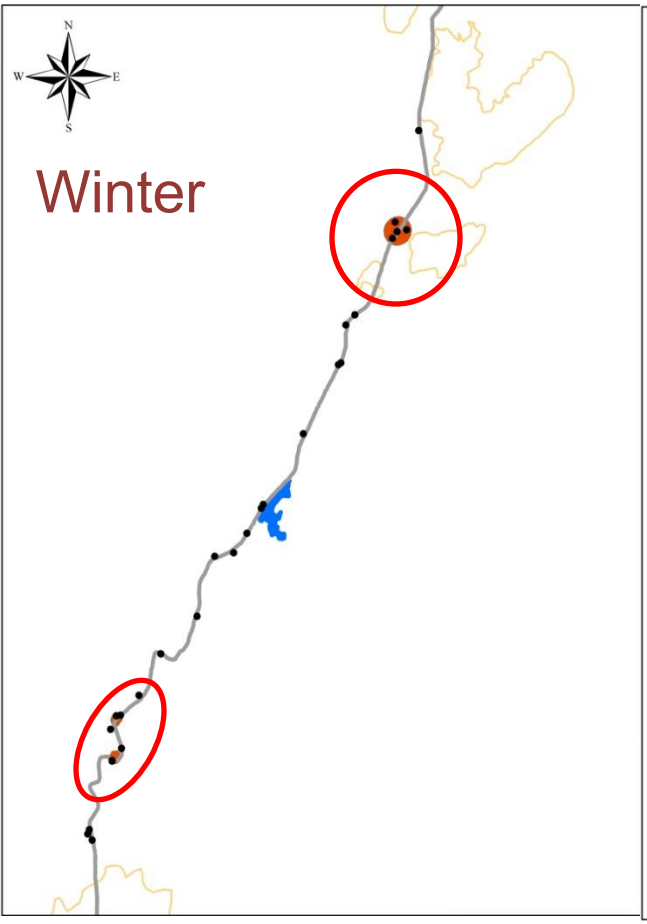
Case Example: NH-7 (renamed NH 44) along Pench Tiger Reserve

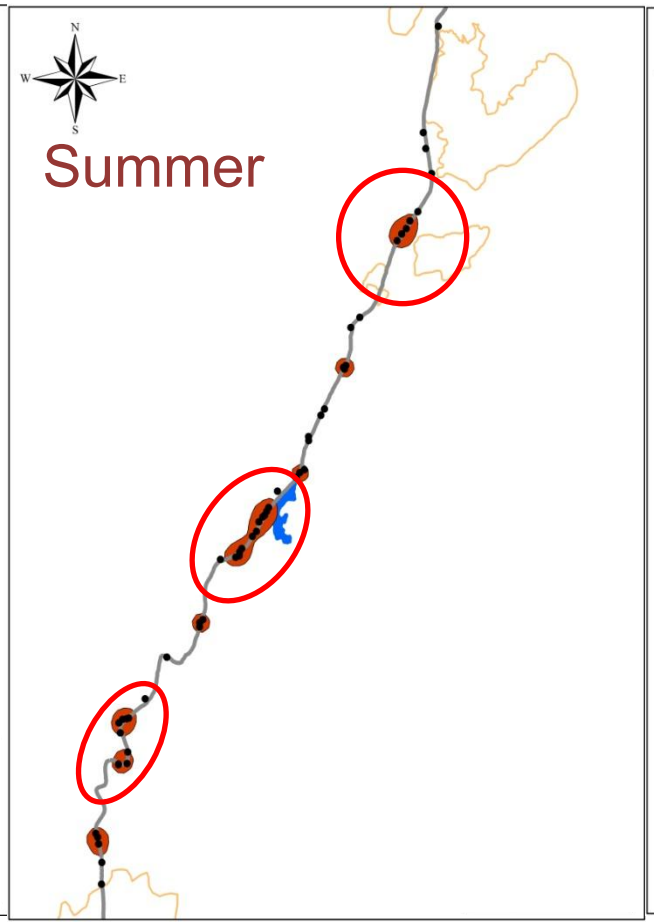


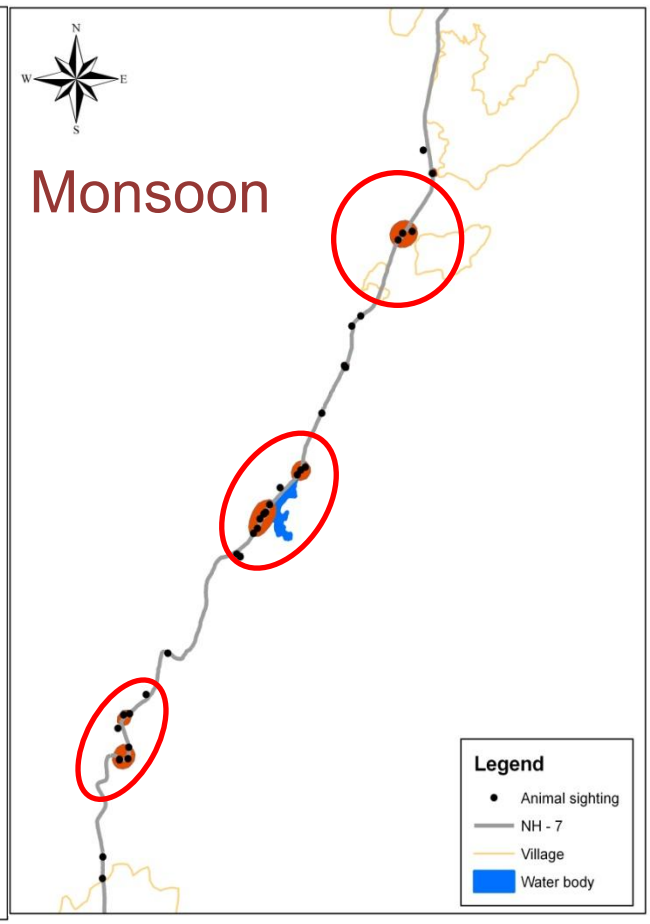


Total stretch of road in MP and Mahrashtra: 65 km

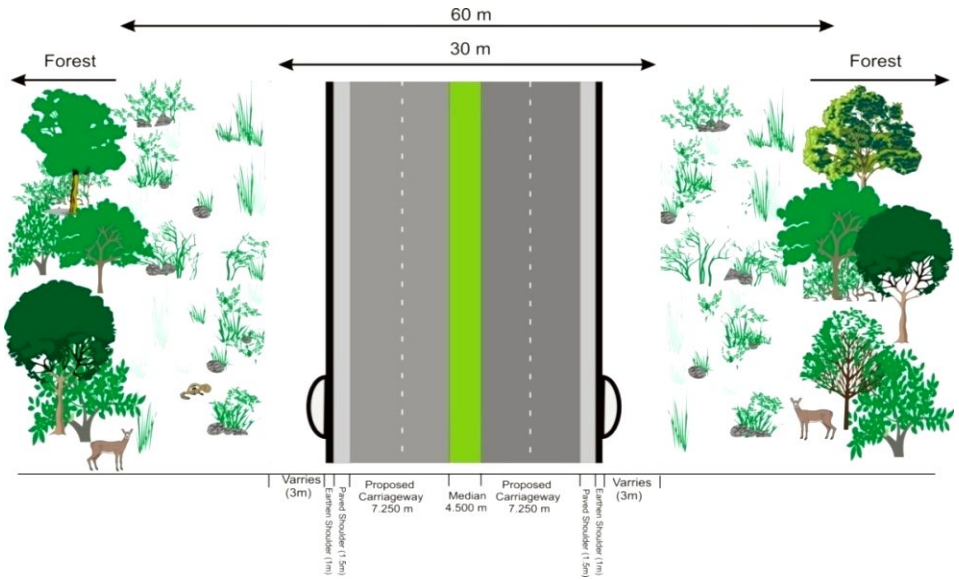
Presence of animal sightings in the road verge







Response to directives for reduction in forest area diversion



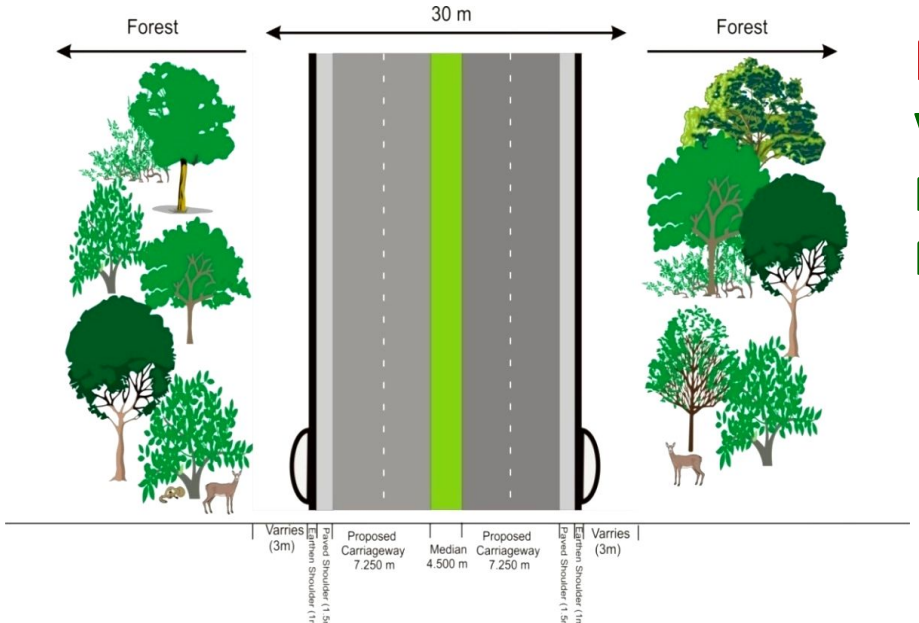
Initial Proposal

Road Verge:30 m

Right of Way : 60m

Median: 4.5m

Need for road verge not visualised



Revised Proposal

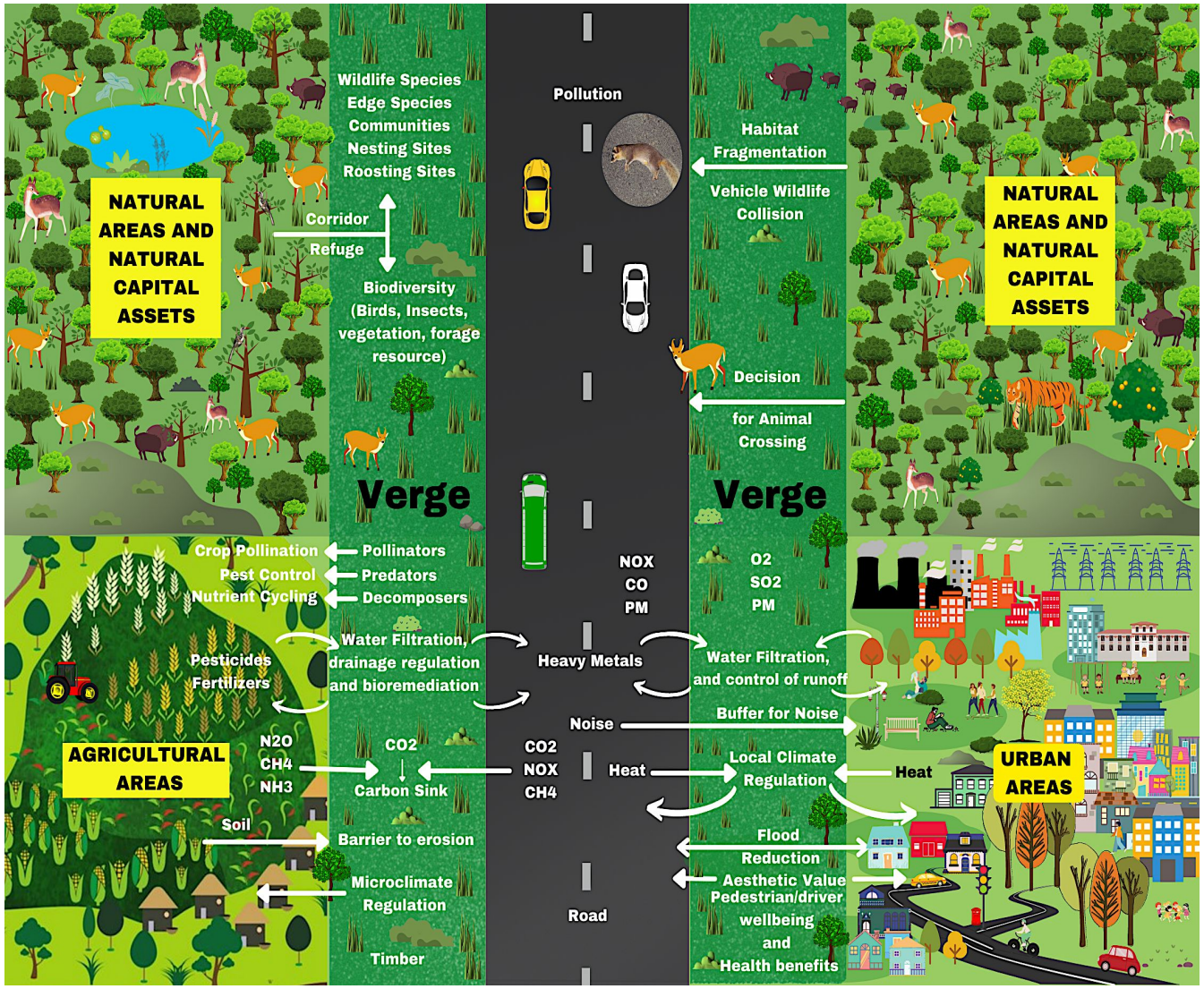
Verge Area: Nil

Right of Way : 30 m

Median: 4.5 m

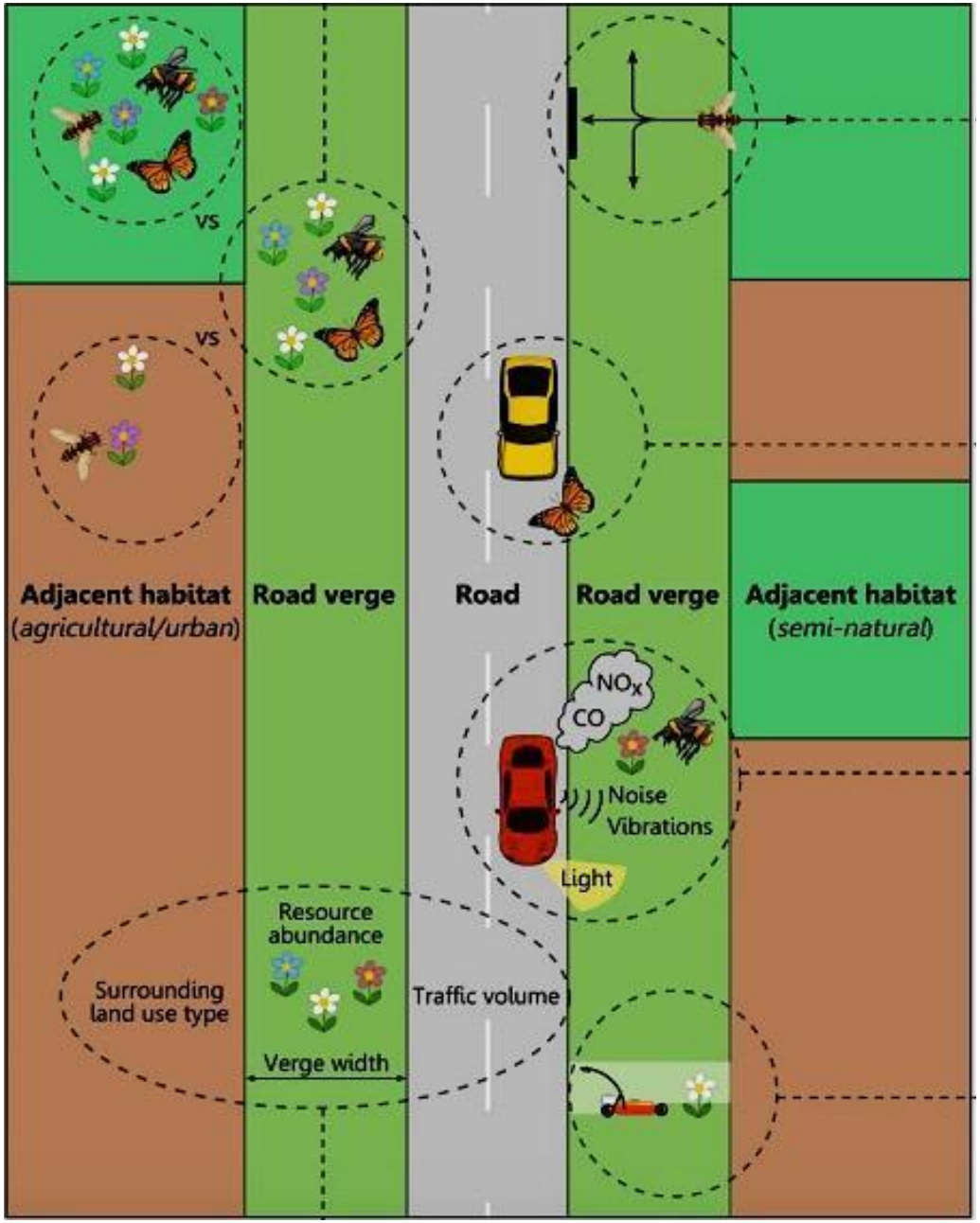
Recognition of ES provisions of road verges is an emerging priority

Road verges offer a significant opportunity to address demand for ES in most roaded landscapes



Graphic designed by Sharmistha Singh

Modified from: Benjamin B. Phillips; James M. Bullock; Juliet L. Osborne and Kevin J. Gaston (2020). Ecosystem service provision by road verges. *Journal of Applied Ecology* 57 (3) 488-501



Phillips et al. 2020 (Biological Conservation, 250 : 108687)

Impacts of roads and verges

- Distribution of pollinators
- communities and resources
- Animal movement and dispersal
- vehicle induced collision
- Pollution induced impacts
- Verge management induced impacts

Road verges can help mitigate impacts of roads on provision of ES

- Strategic design, management, size and shape of road verges can enhance ecosystem Service
- Mosaic mowing and mowing regimes can enhance ES benefits

Mainstreaming Natural Capital for promoting sustainable transport

There is Natural Capital in every SDG Goal

Sustainable transport: critical driver for achieving Sustainable Development Goals

Sustainability should therefore be embedded into all stages of the life cycle of transport infrastructure

Role of Governance in Planning Conservation-Friendly and Sustainable Transportation Projects

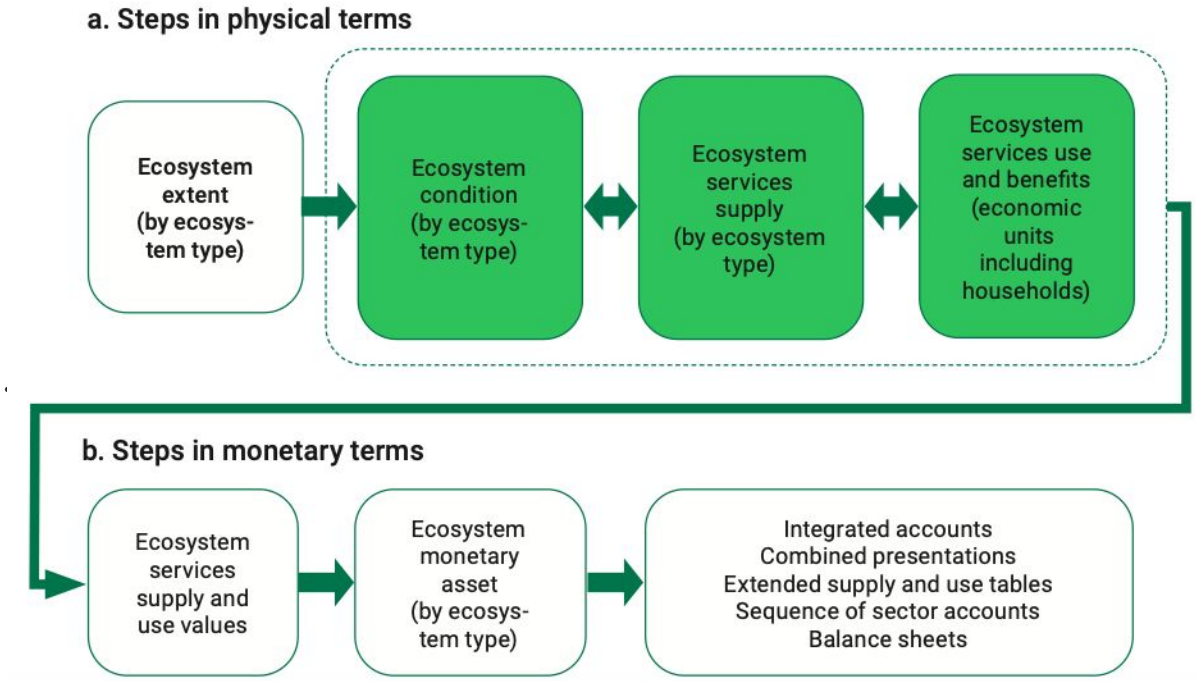
- Government should lead the development and coordination of a long-term programme of investment in natural capital
- **State of Natural Capital report** and **Register of natural capital**
- Govt. should develop credible ES approaches to support decisions that fulfil dual goals of development and conservation
- Develop rationale for dividing responsibilities between the private and public sectors
- Donor agencies should establish lending principles for infrastructure to ensure maintenance of natural capital
- Assessment and accounting frameworks should be developed and integrated with other decision frameworks

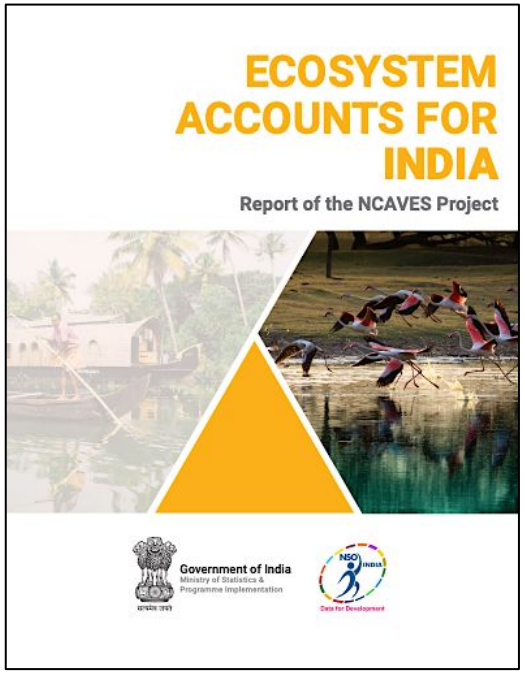
Natural Capital Accounting and Valuation of Ecosystems Services (NCAVES)

From the System of Environmental Economic Accounting (SEEA) –conceptual framework for ecosystem accounting.

- Initiated by Ministry of Statistics and Programme Implementation (MoSPI), GoI.
- Being implemented in Brazil, China, India, Mexico and South Africa.
- **For mainstreaming biodiversity and ecosystems into policy through natural capital accounts in five countries.**

Figure 1: Broad steps in ecosystem accounting





Rigorous and integrated EAs needed to mainstream natural capital in all stages of evaluation frameworks

Key stages in EIA framework

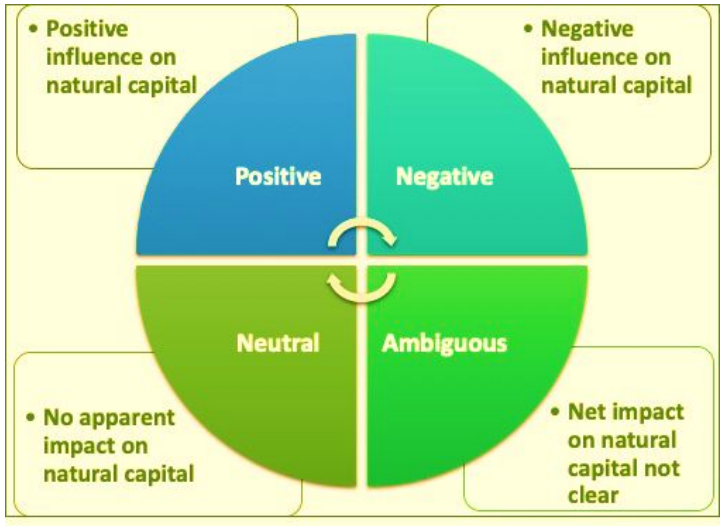
Screening- Analysis of issues and alternatives

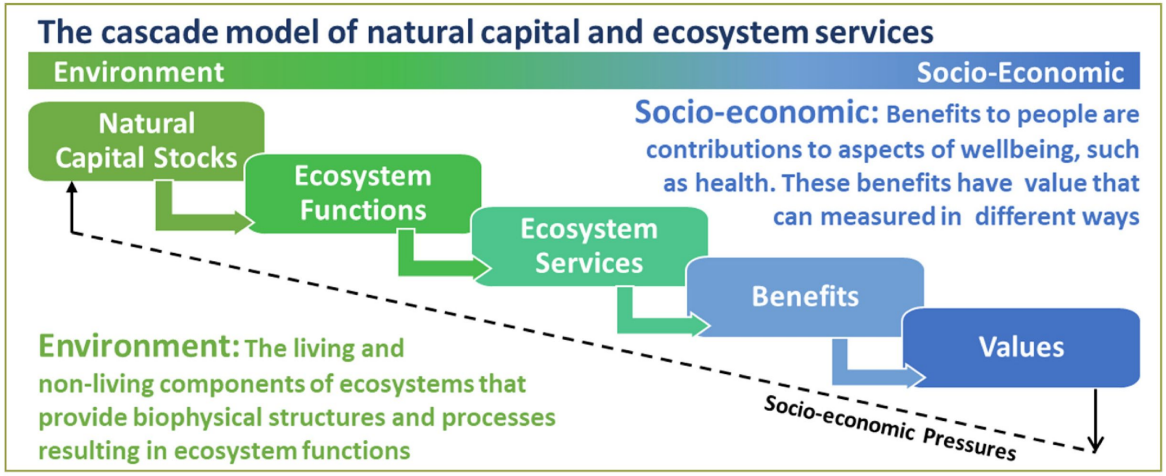
Scoping -Prioritise ES to be considered
Assessing and managing project dependencies on ecosystem services

Assessment- Generate baselines- *Asset register* of the natural capital assets and services linked to a planned development

Valuation- Capture the of ES value from a natural-capital accounting framework

Decision relevant outcome- Information about the trade-offs involved in development decisions.





Source: https://www.mdpi.com/2071-1050/12/19/8033/htm

Policy Inputs

- Strong policy support for exercising 'least regrets' option in different stages of transport infrastructure development as biodiversity loss is hard to reverse
- Policies for mainstreaming natural capital and ecosystem services in the planning of transport sector which are backed by evidenced based research
- Encourage 'no net loss' and 'net gain' approaches that incorporate natural capital accounting
- Enabling policies to promote sustainability-oriented planning approaches such as strategic planning to avoid unintended consequences before they occur

Coordination between various agencies and/or ministries for strategic planning - Biggest challenge

Thank you