Towards accounting the for the multiple benefits of agroforestry

Anthony O'Grady, Stephen Stewart, Sue Ogilvy, Greg Smith, Claire Horner Daniel Mendham

Natural capital and ecosystem services

- Natural capital

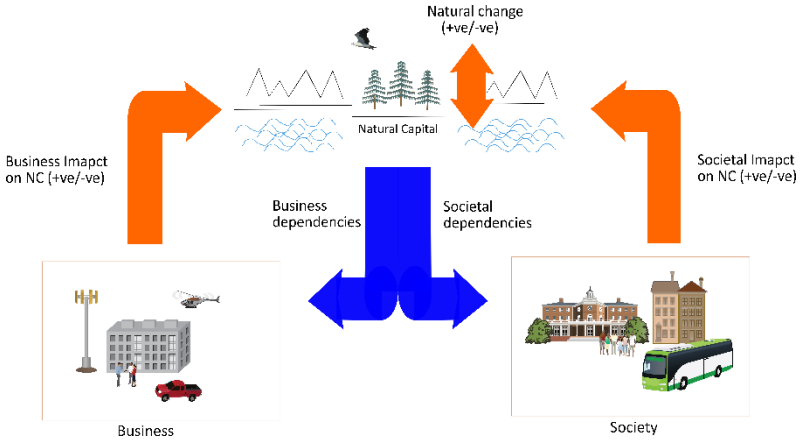
Natural Capital is the stock of renewable an non-renewable resources (e.g. plants animals, air, water, minerals etc) that combine to yield a flow of benefits to society

- Natural capital accounting (EEA)

The process of calculating and valuing the stocks and flows of natural resources and services in a given ecosystem or region. (Valuations may be in physical units, monetary or both)

- Natural capital assessment

Systematic assessment of a organisations dependencies and impacts on natural capital to support decision making



Agroforestry as a nature-based solution

- Nature based solutions[1]

"Actions that involve the protection, restoration or management of natural and semi-natural ecosystems; the sustainable management of aquatic systems and working lands such as croplands or timberlands; or the creation of novel ecosystems in and around cities."

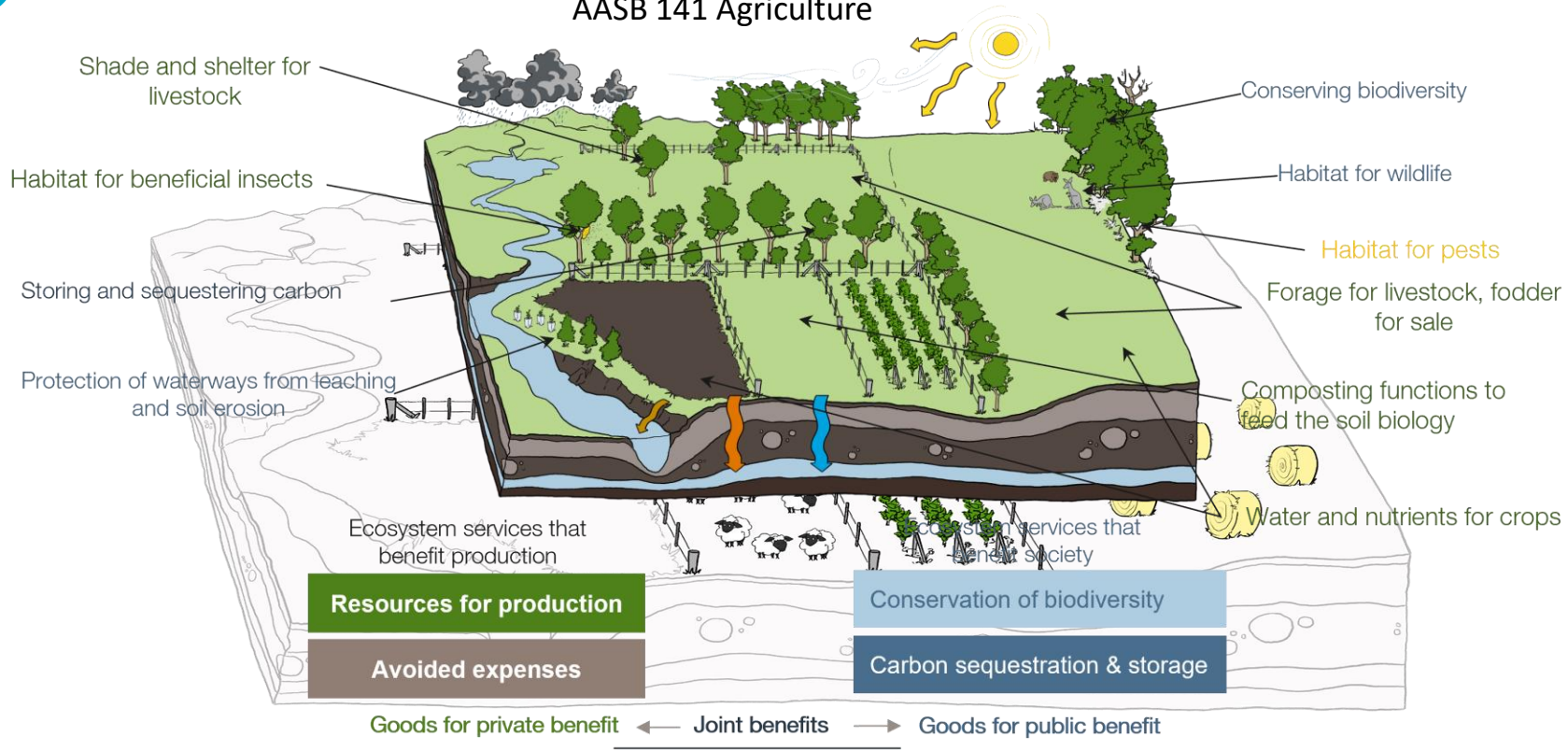
- Ecosystem Services[2]

"The contributions of ecosystems to the benefits are used in economic and other human activity"

[1]https://www.naturebasedsolutionsinitiative.org/what-are-nature-based-solutions

[2]United Nations (2021). System of Environmental-Economic Accounting-Ecosystem Accounting (final draft). Department of Economic and Social Affairs-Statistics Division.

AASB 141 Agriculture



AASB 116 Property plant and equipment

Source: Farming for the Future

Natural capital performance statements

Beginning Balance Sheet

Assets (e.g.):
Environmental resources
Mineral and energy resources
Aquatic resources
Other biological resources
Total environmental resources
Ecosystem resources
Ecosystem types
Total ecosystem resources
Total Assets
***Less* Liabilities** (e.g.)
Ecosystem types

Natural capital equity
Retained earnings
Revaluation reserves

Ecosystem Change Statement

Loss/degradation due to operating activities
E.g. Exploration
Enhancements due to investing activities
E.g. Rehabilitation
Change due to financing activities
E.g. Acquisition/disposal of land
Loss/degradation due to external activities
E.g. Fire/flood

Net change in Ecosystems

Income Statement

Services received
E.g. Provisioning services
Regulating and maintenance services
Cultural services

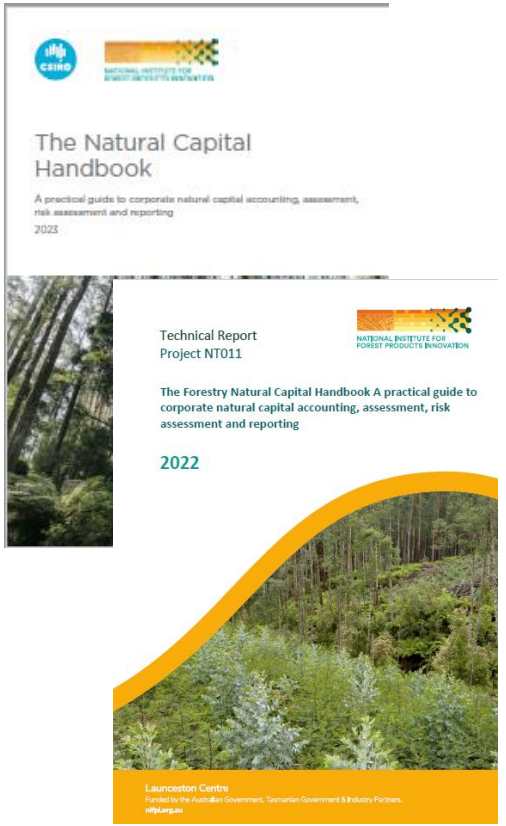
***Less* Services expended**
E.g. Ecosystem disservices
Ecosystem losses

Net profit (loss)
+/- Gains/losses on asset revaluations
Total comprehensive income

Ending Balance Sheet

Assets (e.g.):
Environmental resources
Mineral and energy resources
Aquatic resources
Other biological resources
Total environmental resources
Ecosystem resources
Ecosystem types
Total ecosystem resources
Total Assets
***Less* Liabilities** (e.g.)
Ecosystem types

Natural capital equity
Retained earnings
Revaluation reserves



Natural Capital Income Statement: June 30 2050	Unit	Quantity	Private Benefit ($)	Public benefit ($)	June 30 2020 Private Benefit ($)	Public benefit ($)
Natural capital income received from ecosystem assets						
Provisioning services						
Fodder production	t DM ha^{-1}	87,165	$ 26,149,453		$ 2,290,500	
Regulating services						
C sequestration	t CO_2 eq	103,311		$ 3,615,875		$ -
Shade and shelter	Ha	7,900	$ 79,000.00		$ 7,050	
Cultural services						
Habitat	Ha	450		$ 4,504		$ 47,973
Total natural capital income received			$ 26,228,453	$ 3,620,379	$ 2,297,550	$ 47,973
Less Natural capital income expended						
Provisioning services						
Fodder production	t DM ha^{-1}	- 3,950	- 1,185,000			
Regulating services						
Farm emissions		- 178,398		-$ 6,243,930		-$ 208,096
Total natural capital income expended			-$ 1,185,000	-$ 6,243,930		-208096
Net Natural capital profit			**$ 25,043,453**	-$ 2,623,551	$ 2,297,550	**-$ 160,123**

Some notes on ecosystem services

- Ecosystem services can be
- expenditure
- Amenable to presentation as an income state.

- The valuation of ecosystem
- Highly speculative, difficult to quantify at farm scale
- Not necessarily realisable value
- Always include the physical units

Key purpose of monetary valuation of ecosystem services is to have diverse ecosystem services in a similar unit-enables an estimate of natures contribution to production.

Acknowledgement

This work was funded through the Australian Governments National Landcare Program, Smart Farming Partnership