

Natural Capital Accounting for Biodiversity Offsets and Ridge-to-Reef Management in Australia

Biodiversity Offsets and Natural Capital Accounting

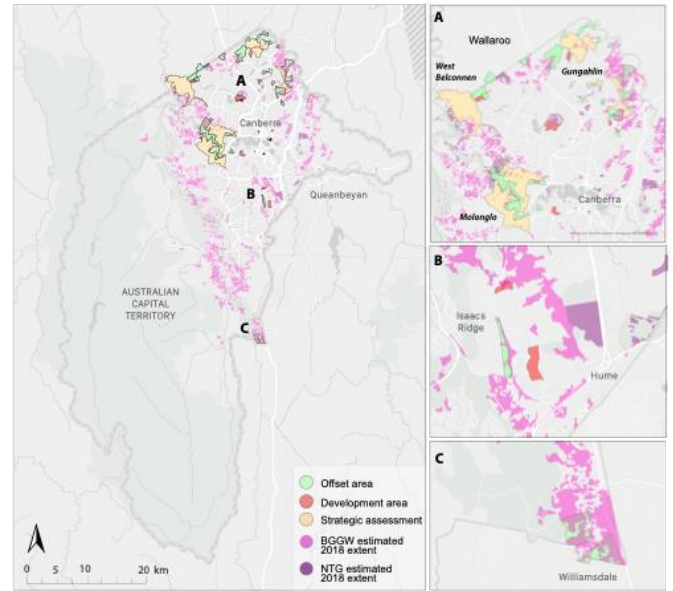
Biodiversity offsetting aims to achieve 'no net loss' by compensating for biodiversity losses from development. In the Australian Capital Territory (ACT), 26 developments required 2217 ha of offsets (2010–2020), mainly impacting Natural Temperate Grasslands (NTG) and Box-Gum Grassy Woodlands (BGGW).

Key Findings:

- Declines in NTG and BGGW (~3011 ha short vegetation, ~5761 ha woodland)
- Offsets are typically placed in zones unlikely to be developed
- Some offsets are based on improvements to ecosystem condition, but the original condition is unknown
- Limited availability of offset land (~9,828 ha)
- The SEEA enables systematic tracking of net biodiversity changes
- The study highlighted data deficiencies that can be corrected
- The legal definitions of the endangered ecosystems did not align with international, national or sub-national classifications of ecosystems

Ecosystem accounts for offset and development areas based on ACT Vegetation Map

	Area	Ecosystem type (ACT Vegetation Map)			Total ACT
		NTG	BGGW	Other ecosystems	
Opening stock 2010		1,140	9,022	225,110	235,271
<i>Of which</i>					
	Offset areas	-	91	39	130
	Development areas	-	-	-	-
	Strategic assessment	-	-	-	-
	Rest of ACT	1,140	8,930	225,071	235,141
Closing stock 2020		1,140	9,022	225,109	235,271
<i>Of which</i>					
	Offset areas	147	513	1,558	2,217
	Development areas	2	4	301	307
	Strategic assessment	56	153	3,366	3,575
	Rest of ACT	936	8,352	219,885	229,172
Net change		(0)	0	(0)	0
<i>Of which</i>					
	Offset areas	147	422	1,519	2,087
	Development areas	2	4	301	307
	Strategic assessment	56	153	3,366	3,575
	Rest of ACT	(204)	(579)	(5,186)	(5,969)



Location of offset, development and Strategic Assessment areas in the ACT

Published as: Vardon, M., Normyle, A., Lynch, A. J., Burnett, P., & Gibbons, P. (2025). Using Natural Capital Accounting for Biodiversity offset policy: A Case Study from the Australian Capital Territory. *Environmental and Sustainability Indicators*, 26, 100687. <https://doi.org/10.1016/j.indic.2025.100687>

Ridge-to-Reef (R2R) management and Natural Capital Accounting

R2R integrates land, freshwater, coastal, and marine ecosystems. Human activities upstream (logging, agriculture, urbanisation) drive sediment, nutrient, and pollution flows downstream, degrading coral reefs and fisheries, and reducing ecosystem services. R2R aims to address the usually fragmented management of the terrestrial, coastal and marine ecosystems. A review of 49 R2R studies identified key concepts of R2R management and linked them to natural capital and ecosystem services accounting as well as identifying the barriers to R2R uptake. The literature review was significantly biased to small islands in the Pacific Ocean.

Barriers

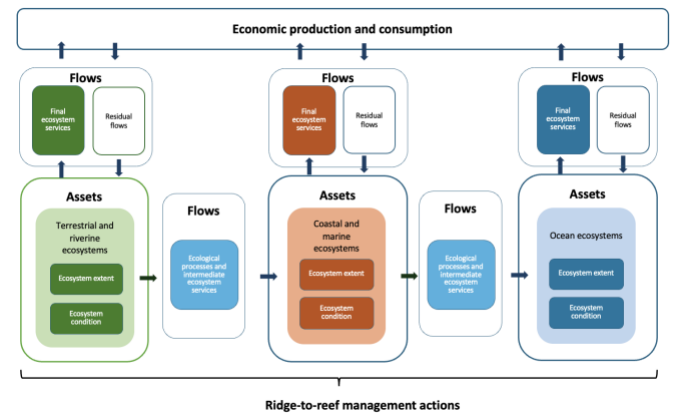
- Lack of standardisation of data and methods
- Limited understanding of the linkages within and between ecosystems and the economy

Opportunities

- SEEA provides a model for integrated land-sea thinking
- SEEA enables the holistic management of interconnected ecosystems

SEEA provides standardised, policy-relevant metrics, addressing these barriers by enabling upstream–downstream impact assessment, cross-institutional coordination, and integration into frameworks like UNCLoS and the Global Biodiversity Framework.

The next step is to test the SEEA application to R2R through case studies in a range of social, economic, and ecological contexts. A case study is underway in New South Wales (NSW), Australia.

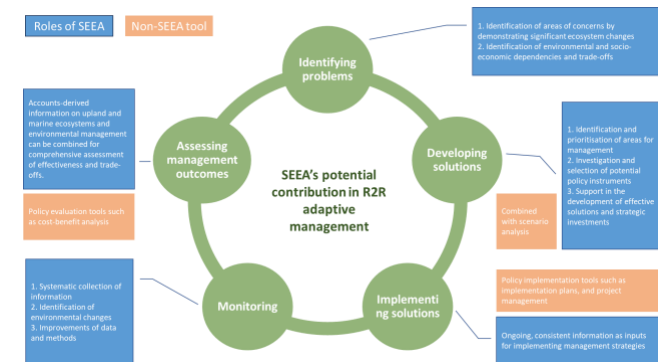


A SEEA-based conceptual model of the ridge-to-reef ecosystems assets and services

Published as: Chen, Y., Conner, N., Liu, D., & Vardon, M. (2025). Opportunities and barriers to ridge-to-reef marine policy: A review and the role of natural capital accounting. *Ocean and Coastal Management*, 270, 107912. <https://doi.org/10.1016/j.ocecoaman.2025.107912>

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SEEA potential to address ridge-to-reef marine policy

