

An Assessment and Valuation of Ecosystem Services derived from National Parks in Queensland (Australia)

Dr Simone Maynard
Conservation Manager,
National Parks Association of Queensland
conservation@npaq.org.au

Dr Sally Driml
Honorary Senior Lecturer,
University of Queensland

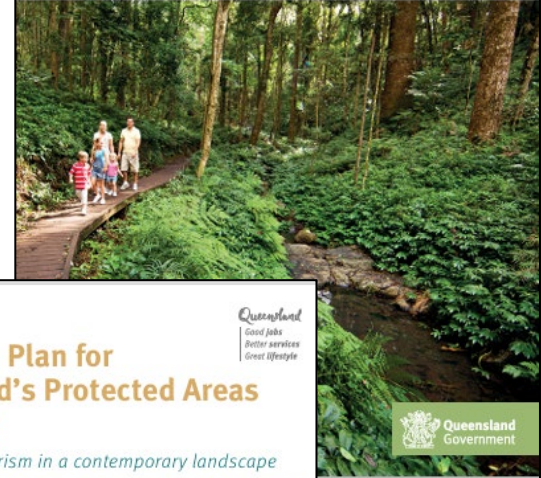


Background

- **Primary purpose of protected areas (national parks) is the conservation of nature but their importance extends well beyond this** (e.g. climate change, Indigenous values, and providing ES).
- Currently **decisions around identifying, assessing, selecting and prioritising land to transfer to the national park estate is based on the ‘comprehensive, adequate and representative’ (CAR) reserve system principles.**
- Contributing most to the **CAR assessment criteria** are the principles of -
 - ✓ *ecosystems or species habitats that are **not represented** or not adequately represented in the protected area system.*
 - ✓ *If the conservation of that ecosystem or species is **less likely to be achieved elsewhere** in the landscape; and*
 - ✓ *ecosystems, habitats or species under **threat** of loss or degradation through competing land uses.*
- As the **goals, objectives and assessment criteria are sufficiently different between CAR and an ES approach - we should not assume that conserving or protecting nature through one approach protects or conserves the values of the other** (e.g. metrics focused on rare, endangered, threatened or representative species are not those required to assess for ecosystem services).
- **Applying an ES approach does not replace traditional biodiversity approaches** but should be applied in addition.
- **Mis-match between funding priorities** – conservation versus visitor infrastructure..

Queensland's Protected Area Strategy 2020–2030

Protecting our world-class natural and cultural values



Ecotourism Plan for Queensland's Protected Areas 2023–2028

Redefining ecotourism in a contemporary landscape



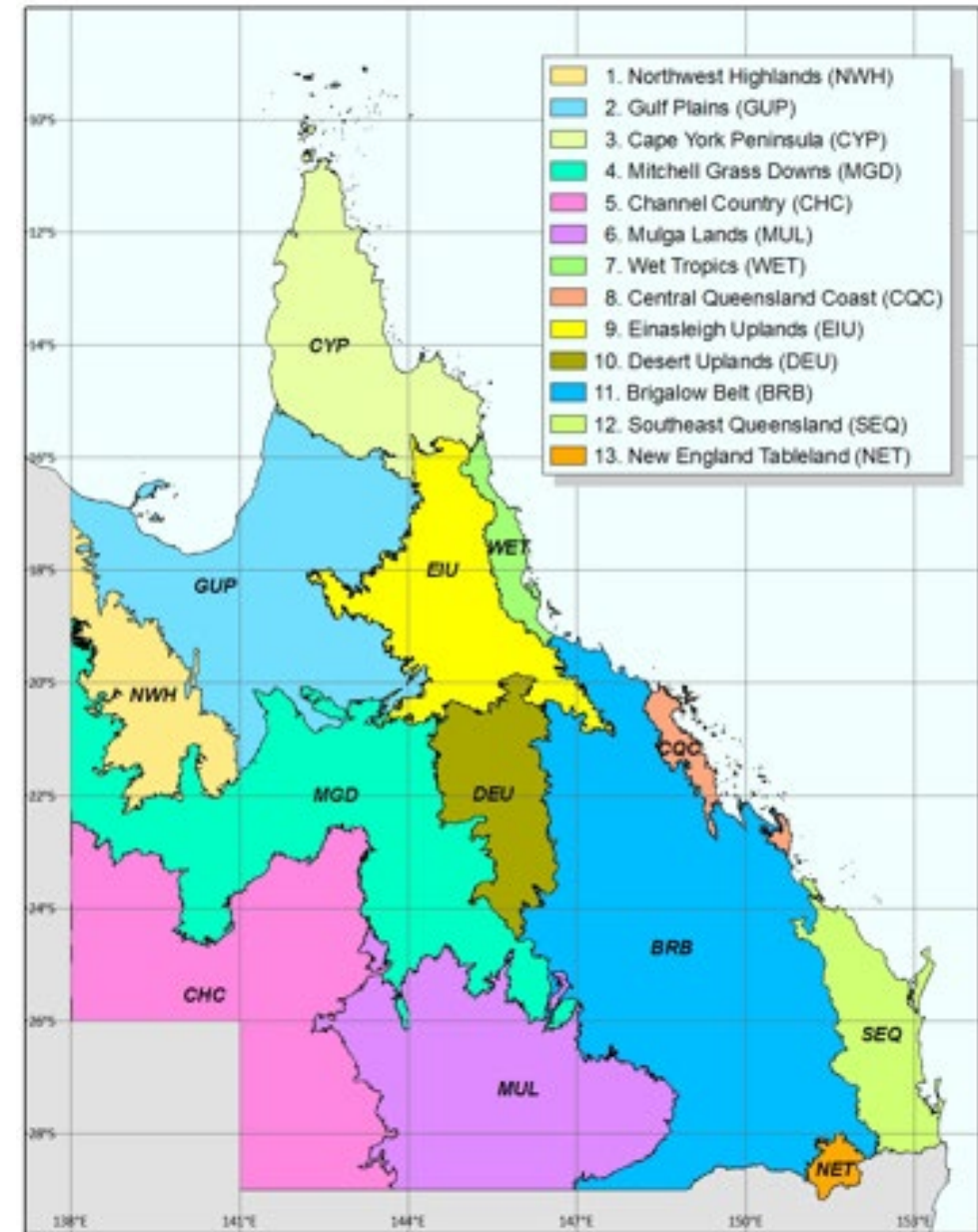
Pilot Study - Aim and Approach

Aim

- To show government that **ES is a proactive tool** for protected area prioritisation and management, **not just a concept**.
- To show the usefulness of an ecosystem services approach to prioritising for new protected areas - **an ES approach adds value to current prioritisation methods**.
- **To reveal hidden values** of Queensland's national parks to our economic and social wellbeing – **why they deserve greater, and new sources, of funding**.

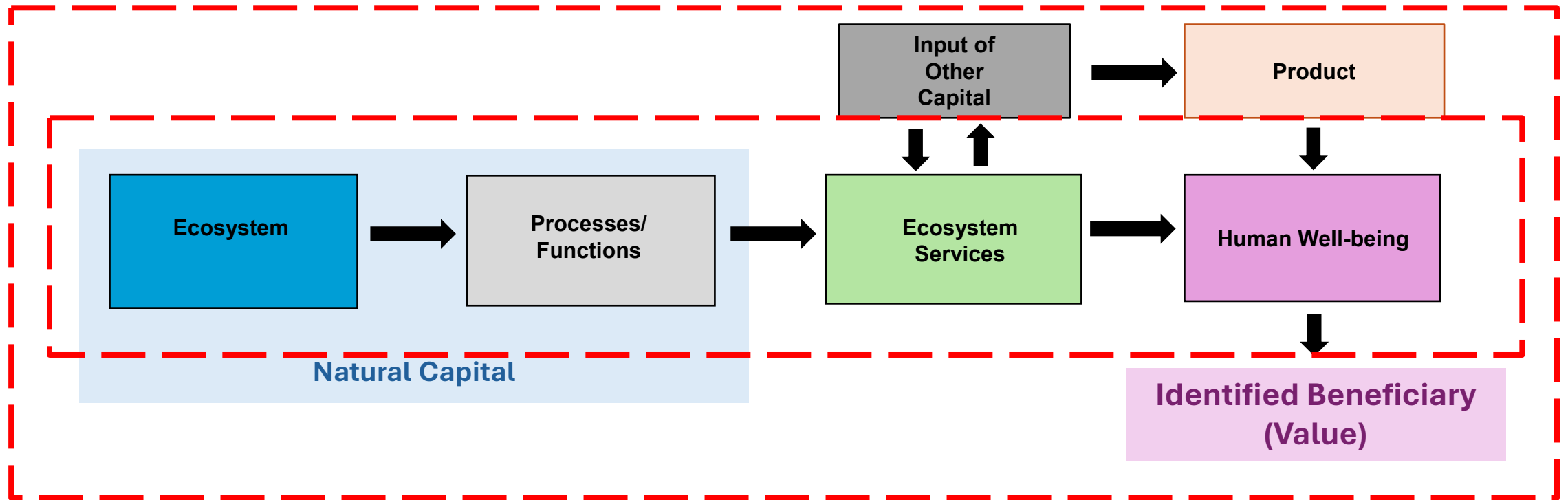
Approach

- Assessed 36 national parks for their 'potential' to provide 22 ES
- Selected 3 national parks and valued 7 'actual' ES
 - Daintree
 - Hinchinbrook
 - Girraween



Ecosystem Services

Ecosystem services are nature's positive contributions to human health and well-being, including economic prosperity



- Ecosystems have the **potential** to provide ES regardless of whether humans actually receive a positive contribution to their well-being or not
- Potential ES are realised as **actual** ES when there is a positive contribution to the wellbeing, livelihood or economic activity of an identified individual, community, or business
- A **beneficiary** is a person, community or business who receives a positive contribution from an ES

Why assess potential Ecosystem Services?

- Meet government **obligations under the CBD** to mainstream an Ecosystem Approach into decision making.
- Better understanding **how changes to the land surface impact diverse values** - averting unintended negative consequences.
- **Optimising net benefits to society and the economy** arising from decision-making.
- **Being able to communicate the broader ramifications of decisions, policies, strategies and plans** to the community, industry or treasury.
- Broadening the scope of **environmental and social impact assessments**.
- **Incorporating ES conservation and protection in park management plans** and identifying management options that optimise public benefit across the range of services.
- Serving as a **foundation for better collaborative, cross-jurisdictional management** of protected areas.
- **Better engagement with local communities in nature conservation, facilitating greater local action** to protect and improve nature, strengthening the connections between people and nature to the benefit of both.
- **Targeting payments for ecosystem services** hence providing **economic incentives for conservation** in areas where none presently exist (e.g. nature refuges, private protected areas).
- **To consider options for the future use or management of habitats.**

Potential Ecosystem Services

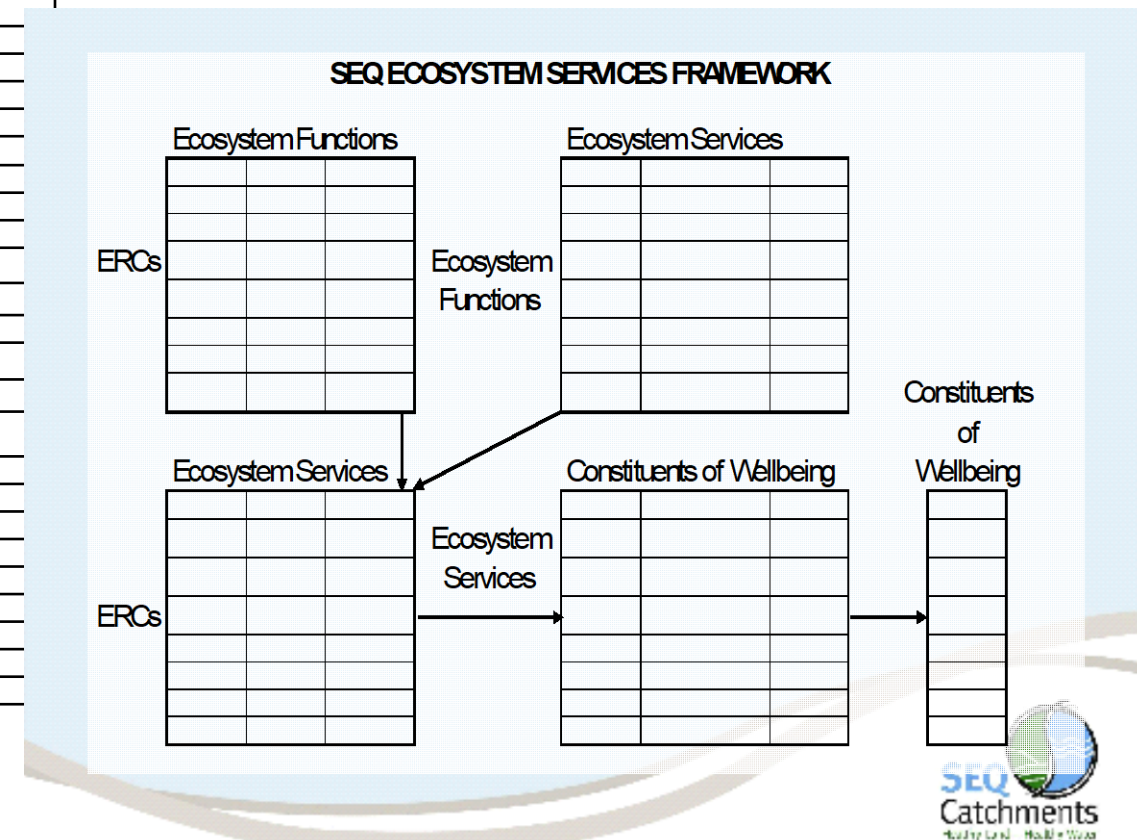
Method: South-east Queensland Ecosystem Services Framework

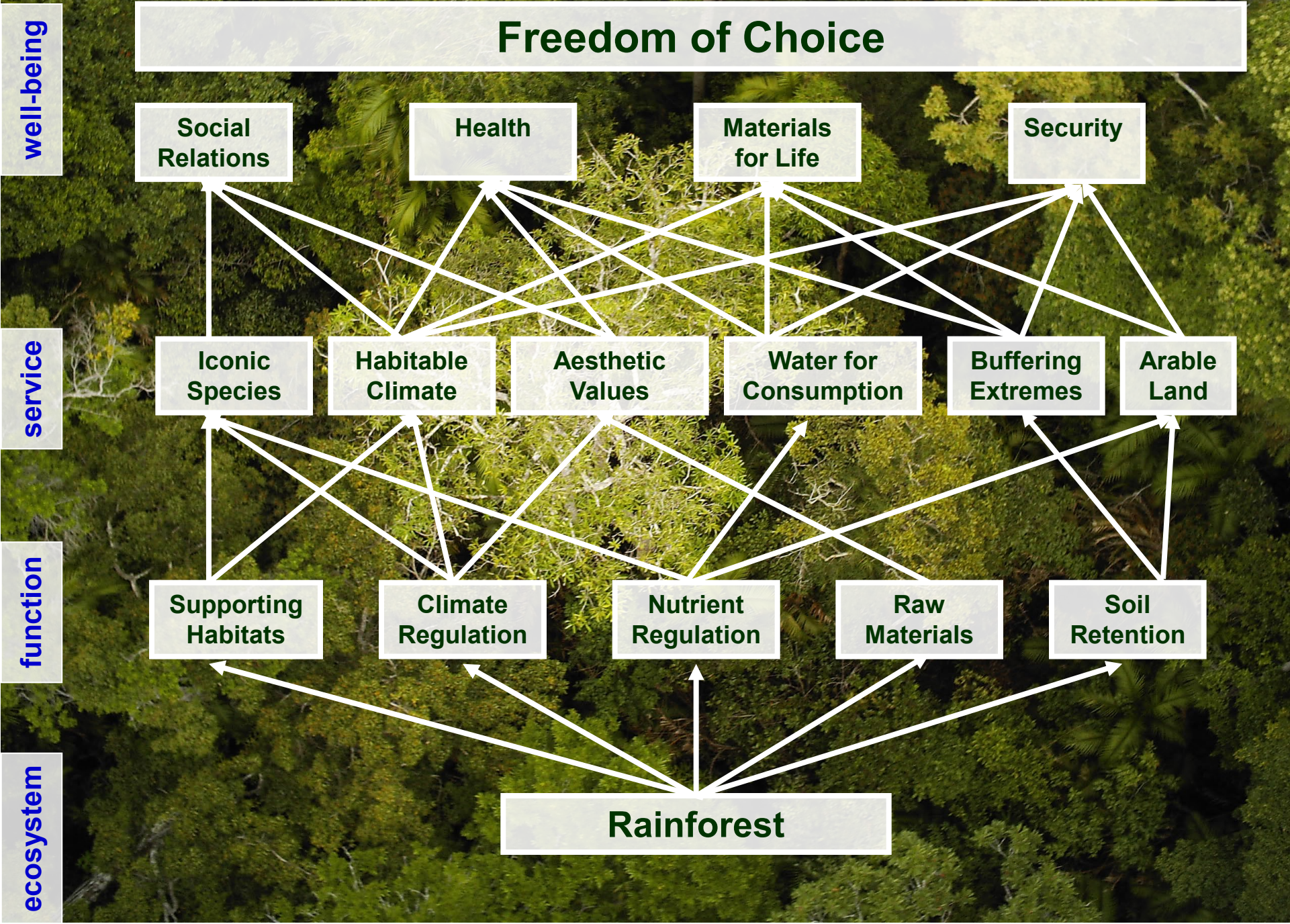
- Developed for the South-east Queensland (SEQ) region - only framework developed for Qld
- Best practice in ES assessment methodologies
 - Peer reviewed (see Maynard et al. and Petter et al.)
 - Planning Institute of Australia Award 2008
 - Bordt and Saner (2018) evaluated 16 ES frameworks for potential application in ecosystem accounting, the SEQ framework rated among the highest against 10 criteria.
 - Nahlik et al. (2012) evaluated 11 frameworks for ability to be operationalised, the SEQ framework again rated among the highest against 6 criteria .
- Inclusion as Policy 4.3 Ecosystem Services in the SEQ Regional Plan 2009 – 2031 and the Program to meet 3 other policies
- Local government planning schemes



SEQ Ecosystem Services Framework

Ecosystem Reporting Category	Ecosystem Function	Ecosystem Service	Constituents of Well-being
Deep Ocean	Gas Regulation	Food	Breathing
Open Water - Pelagic	Climate Regulation	Water for Consumption	Drinking
Open Water - Benthic	Disturbance Regulation	Building and Fibre	Nutrition
Coral Reefs	Water Regulation	Fuel	Shelter
Seagrass	Soil Retention	Genetic Resources	Mental health
Rocky Shores	Nutrient Regulation	Biochemicals, medicines and pharmaceuticals	Physical Health
Beaches	Waste Treatment and Assimilation	Ornamental Resources	Secure and Continuous Supply of Services
Dunes	Pollination	Transport Infrastructure	Secure Access to Services
Coastal Zone Wetlands	Biological Control	Air Quality	Security of Person
Palustrine Wetlands	Barrier Effect of Vegetation	Habitable Climate	Security of Health
Lacustrine Wetlands	Supporting Habitats	Water Quality	Security of Property
Riverine Wetlands	Soil Formation	Arable Land	Family Cohesion
Rainforests	Food	Buffering Against Extremes	Community and Social Cohesion
Sclerophyll Forests	Raw Materials	Pollination	Social and Economic Freedom
Native Plantations	Water Supply	Reduce Pests and Diseases	Self - Actualisation
Exotic Plantations	Genetic Resources	Productive Soils	
Regrowth	Provision of Shade and Shelter	Noise Abatement	
Native and Improved Grasslands	Pharmacological Resources	Iconic Species	
Shrublands/ Woodlands	Landscape Opportunity	Cultural Diversity	
Moreton Island		Spiritual and Religious Values	
Bribie Island		Knowledge Systems	
North Stradbroke Island		Inspiration	
South Stradbroke and other Bay Islands		Aesthetic Values	
Montane		Effect on Social Interactions	
Sugar Cane		Sense of Place	
Horticulture - small crops		Iconic Landscapes	
Horticulture - tree crops		Recreational Opportunities	
Other Irrigated Crops		Therapeutic Landscapes	
Dams			
Hard Surfaces			
Parks and Gardens			
Residential Gardens			





well-being

Freedom of Choice

Social Relations

Health

Materials for Life

Security

service

Iconic Species

Food

Habitable Climate

Buffering against Extremes

function

Supporting Habitats

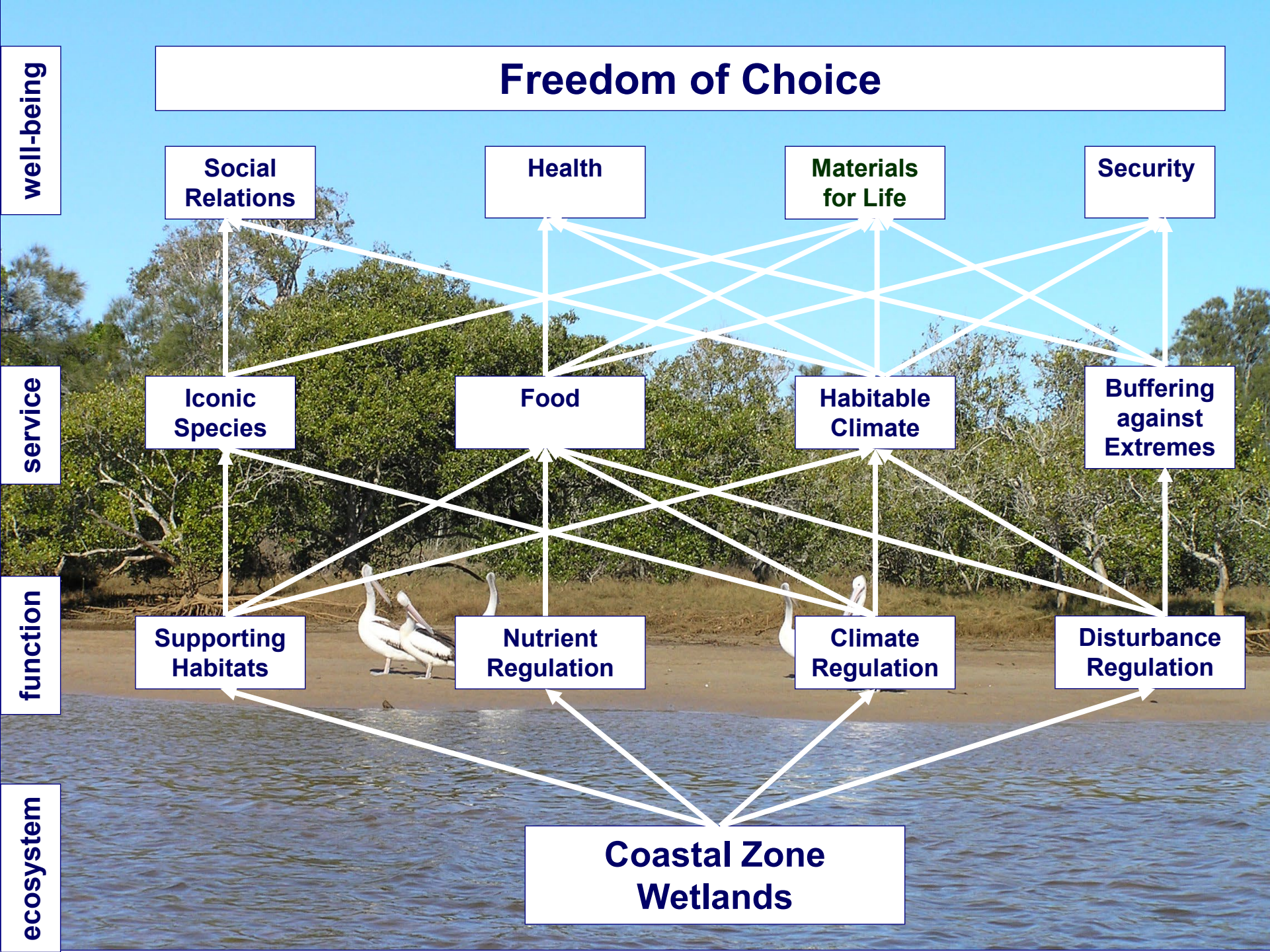
Nutrient Regulation

Climate Regulation

Disturbance Regulation

ecosystem

Coastal Zone Wetlands





Potential Ecosystem Services from 3 National Parks

Ecosystem Type	Daintree		Girraween		Hinchinbrook	
	Ha	ES Potential	Ha	ES Potential	Ha	ES Potential
Rainforest	78 436	4 029 141	-	-	3 899	200 263
Shrubland / Woodland	8 903	352 504	7 630	302 114	8 875	351 389
Schlerophyll Forest	26 251	1 158 805	3 518	155 292	17 426	769 245
Regrowth	198	6 805	-	-	16	563
Non-remnant	-	-	371	12 765	-	-
Grasslands	55	1 878	-	-	-	-
Heathland	-	-	243	8 370	-	--
Coastal Wetlands	1 056	46 132	-	-	8 877	387 909
Palustrine	766	33 661	-	-	322	14 135
Riverine Wetland	532	24 271	-	-	187	8 527
Native Plantation	Rank land/NPs based on Total ES					
Total Hectares / ES score	116 207	4 387 971	11 762	370 833	39 601	1 342 632

Ecosystem Type	Daintree		Girraween		Hinchinbrook	
	Ha	Buffering Extremes Potential	Ha	Buffering Extremes Potential	Ha	Buffering Extremes Potential
Rainforest	78 436	148 616	-	-	3 899	7 387
Shrubland / Woodland	8 903	13 187	7 630	11 302	8 875	13 145
Schlerophyll Forest	26 251	43 818	3 518	5 872	17 426	29 087
Regrowth	198	242	-	-	16	20
Non-remnant	-	-	371	455	-	-
Grasslands	55	66	-	-	-	-
Heathland	-	-	243	293	-	-
Coastal Wetlands	1 056	1 722	-	-	8 877	14 483
Lacustrine Wetland	-	-	-	-	-	-
Palustrine Wetland	766	1 290	-	-	322	542
Riverine Wetland	532	944	-	-	187	332
Native Plantation	Prioritise land/NPs for specific ES					
Total Buffering Extremes	116 197	209 886	11 762	17 921	39 601	64 996

Well-being Potential Derived from National Parks in Queensland

	# Hectares	National Park	ES Score	Well-being Score
1	511 221	Diamantina (4 & 5)	14 582 115	15 523 398
2	468 785	Staaten River (2)	14 524 035	19 311 416
3	280 003	Boodjamulla (1, 2 & 4)	8 557 754	11 379 006
4	170 497	Astrebla Downs (4 & 5)	4 647 965	6 010 549
5	169 969	Cape Melville (3)	5 406 790	6 993 793
6	123 541	Welford (4, 5 & 6)	3 686 184	4 875 529
7	116 207	Daintree (3, 7 & 9)	4 387 971	5 755 517
8	61 784	Culgoa Floodplain (6 & 11)	1 692 742	2 284 869
9	57 399	Bowling Green Bay (7 & 11)	1 846 051	1 943 294
10	42 520	Alwal (13)	1 309 484	1 742 162
11	39 601	Hinchinbrook (7)	1 342 632	1 374 466
12	32 593	Moorinya (10)	986 658	1 310 816
13	21 217	Cudmore (10)	1 351 200	896 098
14	16 495	Jngaynggarr (3)	547 756	730 640
15	11 762	Girraween (13)	370 833	491 476
16	7 828	Mutton Hole Wetland (2)	264604	334 341
17	7 576	Tregole (6 & 11)	200 221	306 464
18	7 476	Wiliyun-ngurru (1)	229 609	305 389
19	7 363	Albinia (11t)	230 866	305 415
20	7 189	Cape Palmerston (8)	236 328	313 148
21	5 891	Forest Den (10)	183 956	243 851
22	3 482	Chillagoe-Mungana Caves (9)	113250	150 061
23	2 894	Noosa (12)	95 709	125 707
24	2 221	Basilisk Range (7)	87 136	114 097
25	1 958	Ban Ban (12)	70 905	93 279
26	1 755	Dalrymple (9)	54 470	72 414
27	644	Andromache (8)	20 866	27 653
28	557	Alton (11)	19 019	24 978
29	409	Auburn River (11)	12 770	16 982
30	326	Clump Mountain (7)	12 928	16 920
31	145	Baga (11)	5 144	6 884
32	118	Jardine River (3)	3 889	4 549
33	71	Ferntree Creek (12)	2 532	3 293
34	38	Amamoor (12)	1 490	1 971
35	42	Eudlo Creek (12)	1454	1 901
36	29	Reliance Creek (8)	973	1 299



Potential Ecosystem Services – Key Messages

- **Regulating Services** (e.g. air quality, habitable climate, water quality, buffering against extremes, pollination, reduce pests/diseases) were shown to contribute most to human well-being.
- **Mental health**, related to possessing a 'sense of self' within a social context, was identified as the constituent of human well-being depending most on ecosystem services.
- The size of national parks is important - the **larger the park the higher potential** to provide ES
- The need to protect a diversity of ecosystems, as **different ecosystems** have the potential to provide a **different magnitude and suite of ES**.
- ES can be used as a **prioritisation tool, in addition to current methods (i.e. CAR)** used to prioritise areas for the protected area estate.
- **Areas for potential transition** to the protected area estate can be prioritised based on total ES or specific ES.
- Intergenerational equity - it is **important to protect natural areas outside of the protected area estate** and maintain national parks as assets for their ES provision to future generations, and for future options.



Why value actual Ecosystem Services in monetary terms?

- The ability to **compare ES to human-made goods and services** and their contribution to society's wellbeing; to **provide treasury information** in a form that decision-makers can weigh alongside other social and economic information
- Linking ES with information on economic and other human activity (e.g. **building on the System of National Accounts**).
- **Communicating investment in protected areas** within state departments and treasury.
- **Mainstreaming ES into natural resource planning** and decision making.
- **Avoiding potentially significant costs and risks** arising from overlooking implications of loss or damage to ES or expose transparently the social and economic costs implicit in any trade-offs.
- Foundation for **better collaborative, cross-jurisdictional funding and management** of protected areas.
- Taking full account of ecosystems and their services can **increase the long-term resilience of business** decisions, policies and actions, sustaining economic growth.
- Recognising and determining the value of the environment for health outcomes.

Method: Actual Ecosystem Services

- ES are 'actualised' where we can identify a specific beneficiary.
- ES valued in terms of the annual flow of economic value, but also recognised as assets that will continue to provide annual flows over time, if managed carefully.
- Planning periods of 30 and 50 years were selected to reflect asset values.
- Benefit Transfer.

Daintree	Hinchinbrook	Girraween
Recreational Opportunities (Tourism)	Recreational Opportunities (Tourism)	Recreational Opportunities (Tourism)
Habitable Climate	Food - Fish Stock	Pollination
Indigenous Spiritual and Religious Values	Buffering Against Extremes	Water for Consumption





Method: Actual Ecosystem Services

- Environmental economics techniques used to estimate dollar values for ES.
- Tourism and recreation 3 NPs – used Driml et al. study dollar values and benefit transfer to the individual NPs.
- Carbon sequestration Daintree NP – estimated carbon storage x avoided costs to offset (Australian Carbon Credit Units) if hypothetically cleared.
- Four ES in NPs – used benefit transfer of conservative average \$ per ha per year from global data base ESVD – and (2 ES) benefit transfer from Parks Victoria study.
- Cultural ES in Daintree NP – Indigenous cultural values described, no \$ valuation.
- No direct markets in national parks to set \$ values.
- Apart from tourism and recreation and mental health economic studies, no studies with \$ values for ES in Queensland national parks were found.



Daintree National Park

Recreational opportunities - Tourism and Recreation

Beneficiaries: businesses, regional economy (visitors)
800,000 visitor days (conservative)

Annual flow = spending \$151 million

50-year Asset value = \$4.8 billion

Confidence: high (conservative)

Habitable Climate via carbon sequestration

Beneficiaries: global population

Asset value = carbon storage of 26 million tonnes carbon
Hypothetical avoided cost of offsets via ACCUs = \$3.6 billion

Annual flow = ongoing sequestration + hypothetical avoided cost = \$43 million

Confidence: moderate

Indigenous Cultural Ecosystem Services

- Iconic species
- Iconic landscapes
- Sense of place
- Knowledge systems
- Spiritual and religious values
- Inspiration
- Effect on social interactions
- Cultural diversity

Recreational opportunities are also derived from Indigenous managed areas.

Value demonstrated by hand back to traditional owners and joint management.

Girraween National Park

Recreational opportunities - Tourism and Recreation

Beneficiaries: businesses, regional economy (visitors)

120,000 visitor days (conservative)

Annual flow = spending \$12 million

50-year Asset value = \$391 million

Confidence: high (conservative)

Water for Consumption

Beneficiaries: Local residential, agricultural and tourism users

Annual flow = \$2.2 million

50-year Asset value = \$71 million

Confidence: indicative only

Pollination

Beneficiaries: Growers of horticultural and agricultural crops in local region

Annual flow = \$1.3 million

50-year Asset value = \$43 million

Confidence: indicative only

Hinchinbrook Island National Park

Recreational opportunities - Tourism and Recreation

Beneficiaries: businesses, regional economy (visitors)
12,500 camper nights (conservative)

Annual flow = spending \$1.5 million

50-year Asset value = \$49 million

Confidence: high (conservative)

Food: Fisheries harvested outside NP

Beneficiaries: Commercial and recreational fishers, businesses

Annual flow = \$8.5 million* or \$33 million[#]

50-year Asset value = \$273 million* or \$1.0 billion[#]

Confidence: indicative only

*ESVD, [#]Parks Victoria

Buffering against extremes

Beneficiaries: coastal communities

Annual flow = \$6.2 million[#] or \$18 million*

50-year Asset value = \$200 million[#] or \$584 million*

Confidence: indicative only

*ESVD, [#]Parks Victoria





Actual Ecosystem Services – Key Messages

- ES assessments enable the **hidden value** of NPs to be revealed.
- These are real economic **values (millions and billions \$) that underpin industries and communities** – provided free of charge from well-maintained ecosystems.
- NPs are **long term economic assets** – it is important to maintain NPs to continue the provision of ES - the cost of replacement is prohibitive if they can be replaced at all.
- Proximity of NPs to residential populations provides higher opportunities to actualise more ES, but **beneficiaries** were also identified for more remote NPs: people travel to visit NPs, rural industries (agriculture, fisheries) adjacent to NPs benefit and the global population benefits from carbon storage.
- **Funding should be considered from other government budgets** (e.g. tourism)

*Imagine the economic value (annual and asset values)
if all actual ES from Queensland national parks were to be valued in dollars*

Strengths

SEQ Framework

- Best practice – peer reviewed
- Developed for Qld
- Planning Policy, Guiding Principle/Targets in NRM Plan, Local Government

Benefit Transfer

- Globally recognised method
- Tourism values from a Queensland study
- Global data base in \$ per hectare per year by RE and ES available

Hectares for Regional Ecosystems in National Parks

Limitations

SEQ Framework

- Developed for SEQ – extrapolated
- Proxy ecosystems
- Typology, landforms, geology not included in assessment

Based on existing information

Benefit Transfer

- Lack of relevant Queensland studies
- Global values from database required a conservative approach
- Confidence = indicative only

Didn't do many actual ES valuations, just examples

Thank You Questions?

Dr Simone Maynard
and
Dr Sally Driml

Contact:
conservation@npaq.org.au
or +61 403 940 055

