Valuation of Ecosystem Services at Blouberg Nature Reserve

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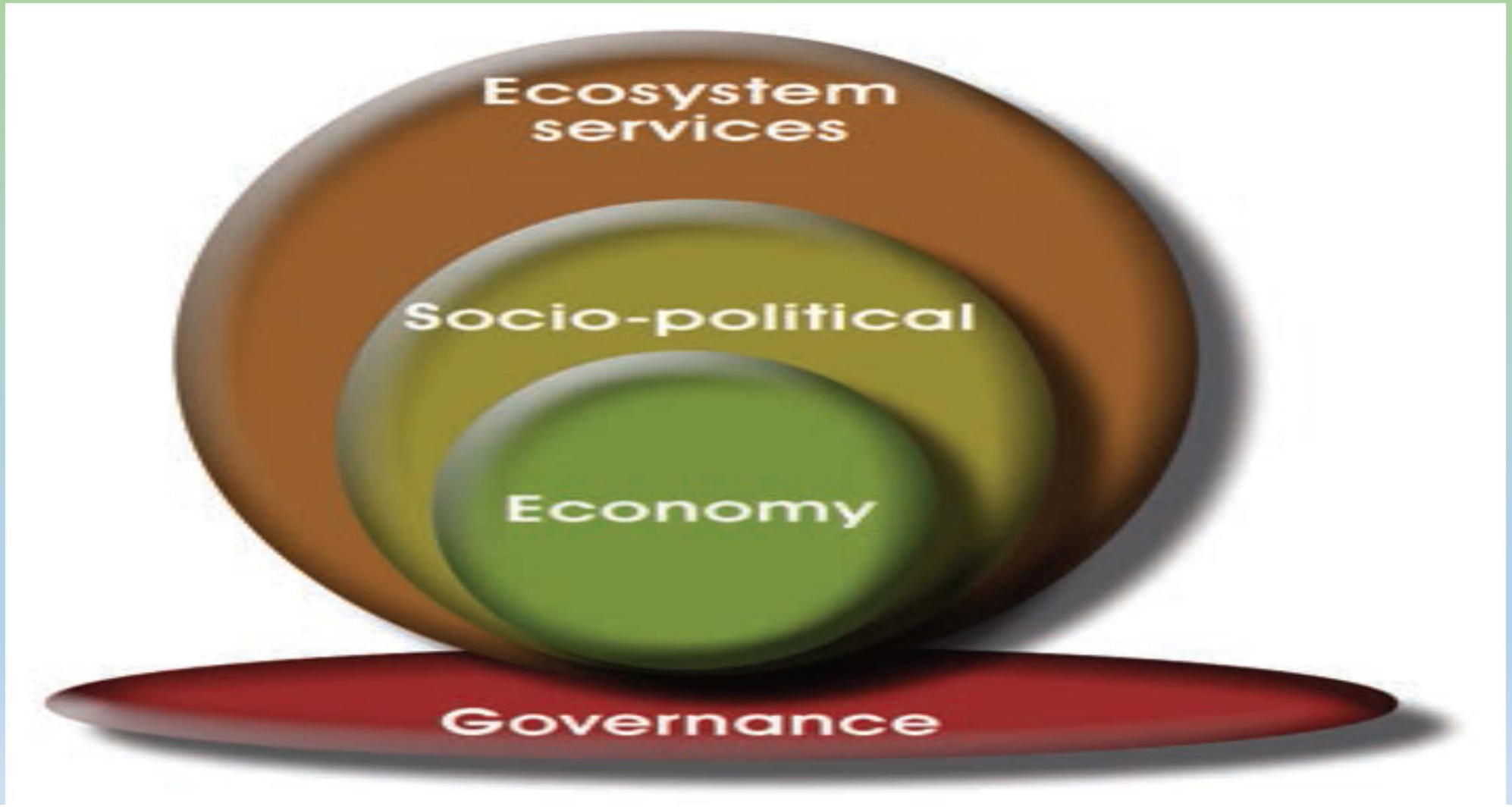
Purpose of the Presentation

- To share with the PSEF the relevance of

ecosystem services valuation in the context of sustainable development

- To present the research results from the valuation of ecosystem services at Blouberg Nature Reserve, Limpopo, SA

Sustainable Development Model for South Africa



Ecosystem Services
The benefits people obtain from nature

Provisioning	Regulating	Cultural
Goods produced or provided by ecosystems	Benefits obtained from regulation of ecosystem processes	Non-material benefits from ecosystems



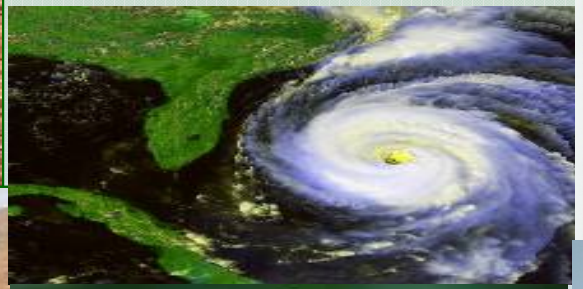
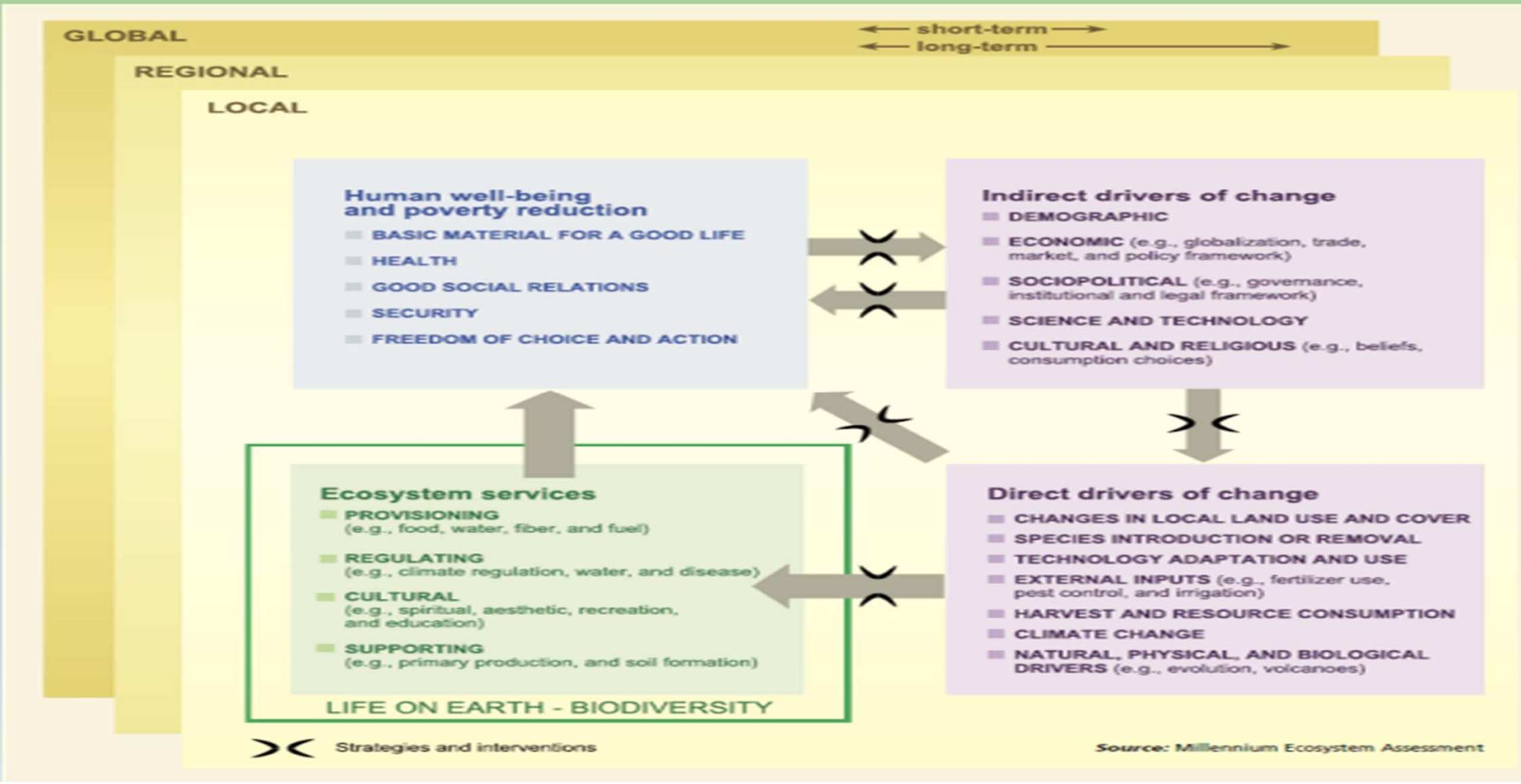



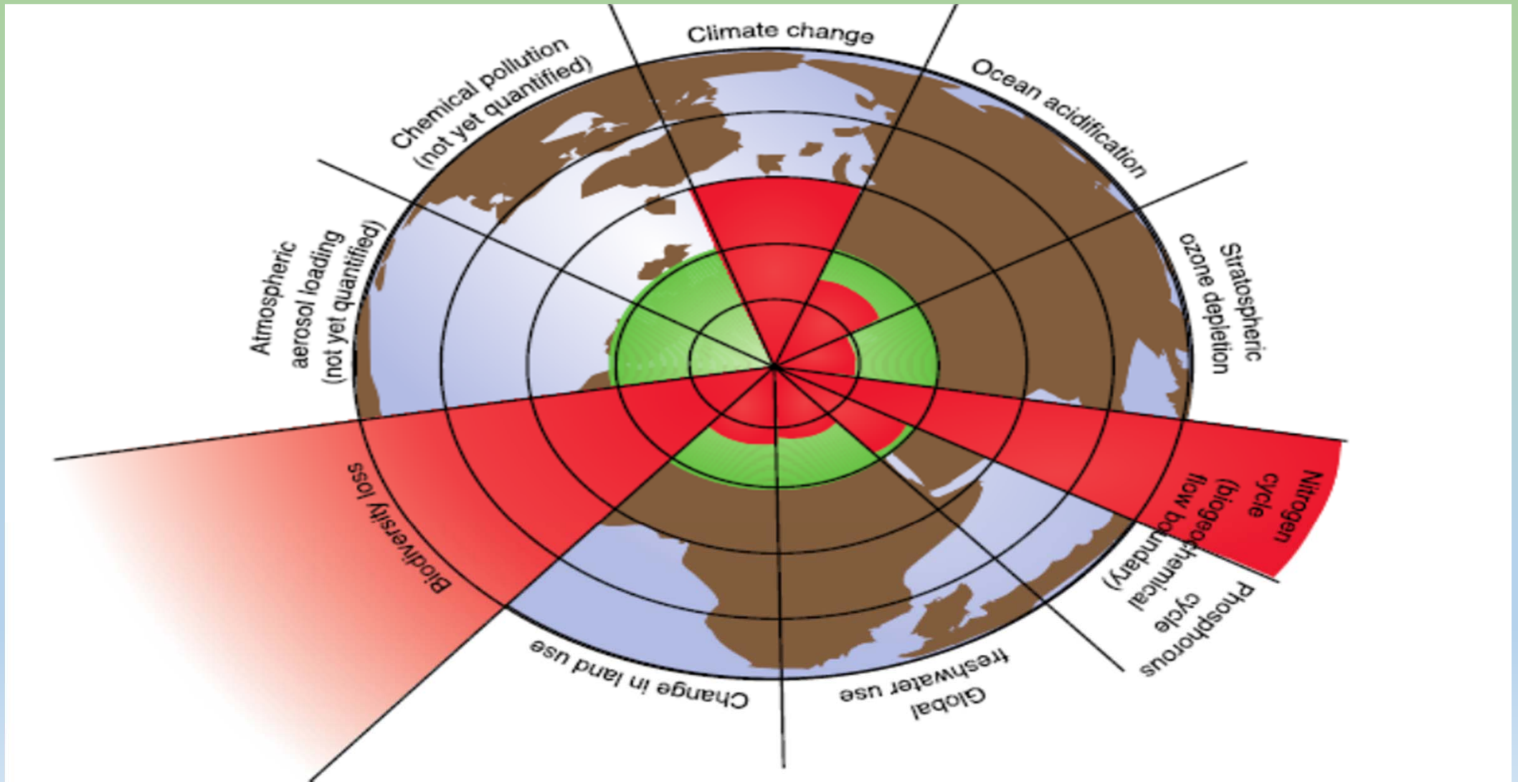



Photo credits (left to right, top to bottom): Purdue Univ

Millennium Ecosystem Assessment Framework



Planetary Boundaries, Stockholm Resilience Institute



STATEMENT OF THE PROBLEM

Natural capital – the benefits humans derive from ecosystem services is not accounted through the general economic indicators. Thus it is perceived as free or its value is equated to zero.

In Limpopo more than half of the population depends on living natural resources for its immediate survival. Unless the value of those natural resources is translated in economic terms, decisions around their maintenance, preservation and beneficiation will be incorrect.

The provincial protected areas network is under assessment. There is a window of opportunity to advocate the importance of protected areas for the local economy and the national and global community.

The province has embarked on implementation of its Green Economy Plan.
The key focus area: *Management of Natural Resources* states valuation of ecosystem services as a founding process to advice policy and decision-making.

This project represents the first step.

GOALS AND OBJECTIVES

Goal: To build the foundation for the full valuation of ecosystem services in Limpopo province, by creating a concrete example at Blouberg Nature Reserve

Objectives:

1. Identify the ecosystem services (provisioning, regulating, cultural and supporting) at Blouberg Nature Reserve
2. Determine the stakeholders and beneficiaries of these services
3. Calculate the value of the protected area based on these services
4. Select a service with clear market price (e.g. wildlife) and calculate its value
5. Formulate policy advices based on the findings.

Objective 1: Identification of Ecosystem Services

Methodology: The Protected Areas Benefits Assessment Tool, WWF, 2008

Biodiversity values

1. Is the protected area valued for its biodiversity?

Protected area management

2. Does management of the protected area provide jobs (e.g. for managers or rangers)?

Values related to food

3. Is the hunting of wild game permitted in the protected area?
4. Is the use of wild food plants permitted in the protected area?
5. Are fisheries (permissible fishing and/or contribution to fish stocks by protecting spawning area) an important resource in the protected area?
6. Is traditional agriculture (i.e. use of locally adapted crops (landraces) and/or practices) undertaken legally in the protected area?
7. Is livestock grazing and fodder collection permitted in the protected area?

Objective 1: Identification of Ecosystem Services

Values related to water

8. Is non-commercial water use (e.g. subsistence agriculture, drinking, washing and/or cooking) or commercial water use (e.g. for large-scale irrigation, waterways, bottling plants, hydro-electric power or municipal drinking water source) permitted in the protected area?

Cultural and Spiritual Values

9. Does the protected area have cultural and historical values (e.g. archaeology, historic buildings including temples, pilgrimage routes and/or historic/culturally important land use patterns)?
10. Does the protected area include sacred natural sites or landscapes (e.g. sacred groves, waterfalls and/or mountains)?
11. Does the protected area contain wilderness values or other similar iconic values?

Health and Recreation Values

12. Is the collection of medicinal resources (e.g. herbs) for local use or for the pharmaceuticals industry permitted from the protected area?
13. Is the protected area important for recreation and tourism?

Objective 1: Identification of Ecosystem Services

Knowledge

14. Is the protected area an important resource for building knowledge?
15. Does the protected area contribute to education (i.e. formal and informal dissemination of information)?
16. Is the collection of genetic material (e.g. crop wild relatives, tree species) permitted from the protected area?

Environmental Services

17. Can the protected area contribute to climate change mitigation (i.e. by providing significant carbon sequestration and / or by ameliorating local climate impacts)?

18. Is the protected area important for soil stabilization (e.g. avalanche prevention, landslide and erosion)?

19. Is the protected area important for coastal protection (e.g. mangroves, sand dunes, coral reefs)?

20. Is the protected area important for flood prevention (e.g. mitigation in small watersheds, flood plains and wetland protection)?

21. Is the protected area important for water quality and quantity (e.g. filtration, groundwater renewal, maintenance of natural flows)?

22. Is the protected area an important resource for pollination of nearby crops or for pollination products such as honey?

Materials

23. Is the management and removal of timber, including for fuel wood, permitted from the protected area?

24. Is the extraction of other materials (e.g. coral, shells, resin, rubber, grass, rattan, minerals, etc) permitted from the protected area?

Objective 1: Identification of Ecosystem Services

Determine the types of benefits supplied

- Potential: this value exists and there are benefits which could arise from it that have not been exploited

- Minor: this could either reflect low importance for the stakeholder group or that importance is significant to only a small proportion of the stakeholder group, and thus overall the level of importance is minor

- Major: this assessment should be made where the benefit is of significance for a large proportion of the stakeholder group.

Objective 2: Determine Stakeholders / Beneficiaries of the Services

- Indigenous/ traditional people living, either permanently or temporarily, in the protected area
- Other local people living, either permanently or temporarily, in the protected area
- Indigenous/ traditional/local people living near the protected area, this can include people living in other countries when the protected area is located near national boundaries; local groupings of people including NGO's and those living downstream of protected areas
- National population
- Government
- Industry, including national and international industries both within the protected area, such as the tourism industry, and those industries which rely on resources from a protected area such as water which then supplies hydro-electric power to the wider population
- Global community, who, for example, benefits from environmental services such as climate regulation, recreational values, etc. This category includes international organizations who work in protected areas.

Results: Objectives 1, 2
Template for Ecosystem Service / Stakeholders at a Protected Area

Ecosystem Service	Presence /Absence on the reserve	International	Regional (SADC)	National	Provincial	District	Local municipality	Immediate neigh
Provisioning								
1. Food								
2. Water								
3. Raw materials								
4. Genetic resources								
5. Medicinal resources								
6. Ornamental resources								
Regulating								
7. Air purification								
8. Climate regulation								
9. Disturbance prevention								
10. Regulation of water flows								
11. Waste treatment								
12. Erosion prevention								
13. Maintaining soil fertility								
14. Pollination								
15. Biological control								
Habitat								
16. Lifecycle maintenance								
17. Gene pool protection								
Cultural & Amenity								
18. Aestetic information								
19. Recreation and tourism								
20. Inspiration for culture, art and design								
21. Spiritual experience								
22. Information for cognitive development								

Results: Objectives 1, 2
Ecosystem Services / Stakeholders Identified at Blouberg NR

Ecosystem Service	Presence /Absence on the reserve	International	Regional (SADC)	National	Provincial	District	Local municipality	Immediate neighb
Provisioning								
1. Food	Yes							X
2. Water	Yes							X
3. Raw materials								
4. Genetic resources	Yes	X	X	X	X	X	X	X
5. Medicinal resources	Yes			X	X	x		X
6. Ornamental resources								
Regulating								
7. Air purification	Yes	X	X	X	X	X	X	X
8. Climate regulation	Yes	X	X	X	X	X	X	X
9. Disturbance prevention								
10. Regulation of water flows								
11. Waste treatment								
12. Erosion prevention	Yes			X	X	X	X	X
13. Maintaining soil fertility	Yes						X	X
14. Pollination	Yes			X	X	X		X
15. Biological control	Yes	X	X	X	X	X	X	X
Habitat								
16. Lifecycle maintenance	Yes	X	X	X	X	X	X	X
17. Gene pool protection	Yes	X	X	X	X	X	X	X
Cultural & Amenity								
18. Aestetic information	Yes			X	X	X	X	X
19. Recreation and tourism	Yes							
20. Inspiration for culture, art and desigr	Yes			X	X	X	X	X
21. Spiritual experience	Yes							
22. Information for cognitive developme	Yes			X	X	X	X	X

Objective 3: Calculate the total value of the protected area based on its ecosystem services

Methodology: An Assessment of the Economic Value of Biodiversity to the Province of Kwa-Zulu Natal, South Africa, 2012

Estimated Ecosystem Services Value per Year per Unit Habitat Type

Rivers	***R***	***13 137 year $^{-1}$ km^{-1}***
Savannah	***R***	***8 545 year $^{-1}$ ha^{-1}***
Grassland	***R***	***4 985 year $^{-1}$ ha^{-1}***
Forest	***R***	***42 776 year $^{-1}$ ha^{-1}***
Wetland	***R***	***417 228 year $^{-1}$ ha^{-1}***

Results Objective 3:
Total Value of Ecosystem Services at Blouberg Nature Reserve

	Size	Value per unit per year in SA R	Monetary value by habitat
Rivers	3	181 032	543 097
Savannah	8300	8 545	70 923 500
Grassland	500	4 985	2 492 500
Forest	43	42 766	1 838 938
Wetland	500	417 228	208 614 000
Total Value			**284 412 035**

Objective 4. Select a service with clear market price and calculate its value

Wildlife

Availability of game monitoring results 2003-2014

Game Monitoring Results for Blouberg Nature Reserve 2003-2014

Species	Total		Total Comparative data					
	2014	2003	2004	2005	2006	2010	2012	2013
Grazers								
Buffalo	**256**	45	62	77	80	150	205	191
Plains zebra	**260**	104	130	66	103	93	140	169
Mountain reedbuck	**35**	33	66	14	13	16	7	9
Ostrich	**4**	89	44	62	39	6	4	7
Red hartebeest	**29**	62	43	88	72	53	54	45
Sable antelope	**33**	31	38	37	44	38	36	38
Warthog	**14**	58	56	59	41	52	23	20
Waterbuck	**57**	25	21	20	10	27	51	58
Mixed feeders								
Bushpig	**9**	3	2	4	1	6	22	3
Common duiker	**26**	19	11	7	7	9	37	33
Eland	**2**	23	20	19	27	8	8	5
Gemsbok	**9**	52	59	66	38	44	51	29
Impala	**496**	143	326	197	304	277	417	512
Steenbok	**13**	7	5	3	2	2	7	12
Browsers								
Bushbuck	**17**	28	22	11	5	17	22	11
Giraffe	**121**	73	68	50	64	76	82	98
Klipspringer	**49**	28	41	13	24	14	38	6
Kudu	**255**	320	267	147	195	216	143	212
TOTAL	**1685**	**1143**	**1281**	**940**	**1069**	**1104**	**1348**	1458
Other								
Baboon troops	14		11	15	11	5	9	10
Black-backed jackal	1		1	5		1	1	1
Brown hyaena	1						1	
Crested Guinea Fowl flocks							5	
Leopard							1	

Results Objective 4: Market Value of 6 Game Species at Blouberg Nature Reserve Based on Auction Prices, 2014 in RSA

	Game Count 2014	Price Auction Lowest	Auction Value SA R	Price Auction Highest	Auction Value SA R Highe
Grazers					
Buffalo	256	955 683	244 654 848	1 570 357	402 011 392
Plains zebra	260	4 500	1 170 000	6 000	1 560 000
Sable	33	93 474	3 084 642	410 949	13 561 317
Mixed Feeders					
Impala	496	3 107	1 541 072	5 532	2 743 872
Browzers					
Giraffe	121	13 909	1 682 989	15 000	1 815 000
Kudu	255	20 000	5 100 000	200 000	51 000 000
Total			**257 233 551**		**472 691 581**

Results Objective 4: Market Value of 6 Game Species at Blouberg Nature Reserve Based on Prices for Trophy Hunting, 2014 in $

	Game Count 2014	Price $ Trophy Hunting	Value in $
Grazers			
Buffalo	256	14 500	3 712 000
Plains zebra	260	2 800	728 000
Sable	33	9 000	297 000
Mixed Feeders			
Impala	496	480	238 080
Browzers			
Giraffe	121	3 800	4 598 000
Kudu	255	2 890	736 950
Total			**10 310 030**

Main Findings

1. The total economic value of the ecosystem services at Blouberg nature reserve is R 284 412 035 *year* $^{-1}$ *ha*$^{-1}$

2. The value of 6 game species based on auction prices for 2014 ranges from R 257 233 551 to R 472 691 581

3. The value of 6 game species based on trophy hunting prices for 2014 is $ 10 310 030 (R 113 410 330)

4. The calculated values are comparable, which justifies the use of the different methodologies.

Objective 5: Formulate policy advices based on the findings

- 1. Ecosystem Services should become the main planning framework for sustainable resource use
- 2. The methodologies for calculating monetary value of ecosystem services can be used at different scales
- 3. Change in land use should be informed by the value of ecosystem services of the area

References

Environmental Economics Tool Kit, United Nations Development Programme (UNDP), 2006

Protected Areas in Today's World: Their Values and Benefits for the Welfare of the Planet, Convention on Biological Diversity (CBD), 2008

Economic Values of Protected Areas, World Commission on Protected Areas (WCPA), 1998

The Protected Areas Benefits Assessment Tool, WWF, 2008

How Much is an Ecosystem Worth? World Bank, 2004

Environmental Economics, DEAT, 2004

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