Preliminary valuation of the wildlife stocks in Namibia: wildlife asset accounts

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This note describes a set of preliminary wildlife asset accounts for Namibia. These show the physical numbers and monetary values of the national wildlife stocks as capital assets. The asset accounts make up the first of two parts to the wildlife resource accounts. The second part of the wildlife resource accounts comprises the flow accounts, which record the value of use of wildlife in the economy. These flow accounts are still in preparation.

Methods

The basis for the asset accounts are the estimates for standing stock numbers prepared by the DSS. These are estimates compiled from various fixed wing aerial, helicopter aerial, road, waterhole, and questionnaire surveys. They make up the *physical* wildlife accounts. The method adopted to value the standing stocks, conforms with the standardised methodology for natural resource accounting (the IEEA) developed by the UN (2000).

The IEEA was developed to complement the conventional, internationally adopted, system of national accounting (the SNA), used to measure economic performance in most countries around the world (CEC, IMF, OECD, UN & WB, 1993). The SNA includes asset accounts, but only of assets defined as man-made. The SEEA adds natural resources that are not man-made to the asset accounts for national planning. The wildlife stocks fall for the most part, under natural resource accounts, and they have never been included in the Namibian national accounts.

The correct way to value renewable natural resource stocks such as fish, forests and wildlife, is to estimate the present value of all future net returns from the use of the resources. This is termed the "net present value method". In the absence of realistic data on future use, an alternative method called the "net price method" is often used. This measures the annual "economic rent" which is simply the difference between the market price (or unit export value) and the cost of extraction or use, including a normal return to capital. We have applied the net price method to the wildlife stocks. Only that portion of the stocks that could realistically be brought into viable production in the future are valued.

The economic rent described above, reflects direct use values. Strictly speaking, natural resource asset accounts should also include indirect use values, and non-use values, such as existence, option and bequest values. There is little data on these for Namibia's wildlife, and they have not been included in this analysis. The discussion therefore only deals with direct use values.

We have valued the wildlife stocks in terms of their potential for use in wildlife viewing tourism, trophy hunting, live game production and meat production. The country was divided in to five utilisation zones, depending on their potential for different combinations of uses and their situation relative to the "red line" (main veterinary cordon fence). In the absence of optimising allocation models, the combinations of uses for each zone simply gave priority to the most profitable ones (based on financial and economic wildlife use models, developed in the MET economics unit).

Non-consumptive tourism values were assumed applicable for up to 100% of the wildlife populations in all zones. Trophy hunting values were assumed applicable up to estimated sustainable trophy off-take levels (average 1.05% of the population), for all zones except protected areas. The balance of the estimated general sustainable off-take of populations outside protected areas (average 9.11% of the population) was allocated to live game sales and meat production on a 50:50 basis, except north of the "red line" where all was allocated to meat production for local consumption. In protected areas south of the "red line" the full general sustainable off-take of populations (average 10.16% of the population) was allocated to live game sale.

- Zone 1: protected areas north of the "red line", with non-consumptive tourism only (100% of population)
- Zone 2: protected areas south of the "red line", with tourism (89.84% of population) and live game sale (10.16% of population)
- Zone 3: communal land north of the "red line", with tourism (89.84% of population), trophy hunting (1.05% of population), and meat production (9.11% of population)
- Zone 4: communal land south of the "red line", with tourism (89.84% of population), trophy hunting (1.05% of population), live game sale (4.55% of population) and meat production (4.55% of population)
- Zone 5: commercial land, with tourism (89.84% of population), trophy hunting (1.05% of population), live game sale (4.55% of population) and meat production (4.55% of population)

The estimated sustainable general off-take rates for each species are calculated as half of the inherent rate of increase for each species, the "inherent rate" being a function of the average weight of animals in the species population. The trophy off-takes are estimated at around 5% of the general off-take rates for each species. This follows the approach of Caughley (1983), Craig & Lawson (1990), and FGU-Kronberg (1987).

Values for the products of each activity were estimated for 2004, based on various data. Trophy and hunting accommodation prices as well as live game auction prices were obtained from Erb (2003) and searches on the internet. Meat price was determined as replacement cost, using lower-grade prices for beef from the Meat Board of Namibia website.

For non-consumptive tourism prices, the data available on tariffs in the MET economics unit were used. In this case not all the tourism values can be ascribed to wildlife, since

attributes such as scenery and wilderness also play a part. Thus, only 35% of the nature-based tourism prices were attributed to wildlife, based on the results of a open-ended survey question on tourism attractions, reported by Barnes *et al.* (1999).

Wildlife use enterprise models developed, from empirical data, in the MET economics unit were used to calculate the "economic rent" using the net price method for each activity. Rent was found to make up 31% of turnover on average for all activities. North of the "red line", for meat production this was assumed to be 15%, due to marketing barriers. For each use, the economic rent value per head of standing stock, of each species, was computed. In the case of non-consumptive tourism lack of data prevented differentiation of these values by species.

The values for different uses were then combined for each zone to give the estimated annual economic rent, which can be earned per head of wildlife, in each zone. Then the values per head, per species, per zone were applied to the population figures in the DSS estimates for standing stock numbers, to get the aggregate values for each population.

The numbers of the selected predators, cheetah, leopard and lion, were not captured in the survey data. To make the asset values more complete, the national population estimates for these species were allocated very roughly and subjectively to the areas where we condidered them likely to occur.

For comparison, summary livestock accounts were extracted from Mendelsohn *et al.* (2003) and these were valued using the net price method and empirically-based livestock enterprise models in the MET economics unit. These models embrace commercial production of cattle, small stock (karakul and mutton), as well as traditional small-scale small stock and cattle systems. Livestock enterprises generate surprisingly low economic rents. In many instances these are negative. We used the few positive ones to derive an average for rent as a percentage of turnover. This average was 25%.

Results

Table 1 shows a summary of the physical wildlife accounts, or the estimated numbers per species in protected areas, conservancies, concessions, and commercial farmland. Table 2 shows the monetary values of these stocks as measured using the net price method. Table 3 shows comparative summary livestock numbers and their asset values for Namibia.

Table 4 shows the wildlife numbers and values for different protected areas, conservancies, concessions and magisterial districts in the commercial farm land. A separate Excel spreadsheet, available on request, presents these details broken down by wildlife species. Those parts of the communal lands, which are not in conservancies or concessions, are not included in the wildlife asset accounts, due to lack of stock data. They have low stock numbers, and would be unlikely to add more than about 2% to the total numbers and values.

Both in terms of numbers and value the commercial land contains nearly 90% of values. This illustrates a significant conservation success, probably largely attributable to the custodial rights to wildlife bestowed on landholders in the 1970s, the poor prospects for alternative livestock land uses, and the efficiency of private capital and management. The protected area estate has only 4% of wildlife numbers and stock values, largely because much of it lies in desert, with negligible stocks.

Of interest is the fact that the number of head of wildlife in Namibia (two million) is only one third of the number of livestock (six million) but the asset value of this wildlife resource (N$1.3 billion) is twice that of the livestock (N$600 million). Generally this reflects the high value of the demand for wildlife as a tourist attribute, as well as the high value of the resulting derived demand for live game. It also reflects the very low economic rents being generated by livestock production at present.

The Namibian national accounts (CBS, 2002) give the fixed capital stock for 2001 at N$69 billion. This in 2004 prices would be some N$90 billion. It represents the values of man-made capital assets in the economy. Agriculture's share would be 6.2 billion (7%), and fisheries' share would be N$1.5 billion (1.7%). The wildlife stock value, measured here, of 1.3 billion, is not included, and is additional.

Table 4 shows the estimates of wildlife numbers and asset values for each different land unit as well as the proportions of the values held by the land units in each tenure category. Nearly 70% of the wildlife asset values held by protected areas is in the Etosha National Park. In the case of 31 communal land conservancies, the five that have the most asset value are, in descending order, Torra (18%), Sesfontein, Doro!Nawas, Orupembe and Nyae Nyae (5%). Nearly all of these have been benefiting from CBNRM inputs for a long time. On private land the Mariental, Windhoek, and Gobabis magisterial districts, have the highest shares of the wildlife asset values (15%, 15% and 14% respectively).

Conclusions

This note reports on the first attempt to determine the asset value of Namibia's wildlife resources according to natural resource accounting principles. In this the standing stocks are valued what their future yield in economic value is anticipated to be. An estimated two million head of game has estimated "on the hoof" value amounting to N$1.5 billion. This compares favourably with the livestock sector, where some six million head of livestock, has estimated "on the hoof" asset value amounting to only N$600 million.

By far the most wildlife is found on commercial land farms (88%), and communal land conservancies (8%). This likely reflects the importance of appropriate property rights in encouraging investment in wildlife stocks. In the case of protected areas, many parks are either in desert settings, with negligible productivity, or small in extent. The only large non-desert park, Etosha National Park, contains the bulk (69% of the wildlife asset values.

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Table 1: Namibia estimated wildlife numbers summary (2004)

Species	Protected areas	Conservancies	Concession areas	Commercial farms	TOTAL
Buffalo	1,275	90	0	0	**1,365**
Cheetah	765	675	90	2,970	**4,500**
Eland	2,084	245	144	34,743	**37,216**
Elephant	8,993	890	74	0	**9,957**
Gemsbok	8,265	23,754	6,300	350,092	**388,411**
Giraffe	3,491	734	421	5,769	**10,415**
Hartebeest, red	1,583	700	0	122,805	**125,088**
Hippopotamus	1,262	300	0	0	**1,562**
Impala, black-faced	1,500	0	0	1,870	**3,370**
Impala, common	77	385	0	14,980	**15,442**
Kudu	2,497	2,545	1,050	345,801	**351,893**
Lechwe	0	250	0	284	**534**
Leopard	2,000	1,600	400	4,000	**8,000**
Lion	546	131	51	0	**728**
Ostrich	3,787	4,860	690	36,336	**45,673**
Rhinoceros, black	859	0	0	134	**993**
Rhinoceros, white	116	0	0	75	**191**
Roan antelope	560	95	0	435	**1,090**
Sable antelope	316	15	0	902	**1,233**
Springbok	18,932	74,420	16,650	621,561	**731,563**
Tsessebe	15	0	0	162	**177**
Warthog	209	40	0	173,866	**174,115**
Waterbuck	0	0	0	4,475	**4,475**
Wildebeest, blue	5,199	470	0	16,623	**22,292**
Zebra, Burchell's	18,098	20	0	7,303	**25,421**
Zebra, Hartmann's	3,974	4,305	8,937	55,520	**72,736**
TOTAL	**86,403**	**116,524**	**34,807**	**1,800,706**	**2,038,440**
Percent	4%	6%	2%	88%	100%

Table 2: Namibia wildlife asset values summary (N$ 2004)

Species	Protected areas	Conservancies	Concession areas	Commercial farms	TOTAL
Buffalo	1,047,420	90,078	0	0	**1,137,498**
Cheetah	502,269	644,570	74,621	3,396,525	**4,617,985**
Eland	1,232,887	183,943	108,114	30,509,539	**32,034,483**
Elephant	4,945,340	2,399,571	194,776	0	**7,539,688**
Gemsbok	4,608,132	14,087,878	3,673,658	220,427,159	**242,796,827**
Giraffe	1,963,401	591,348	331,144	5,726,259	**8,612,152**
Hartebeest, red	876,555	407,533	0	77,459,225	**78,743,312**
Hippopotamus	693,986	179,214	0	0	**873,200**
Impala, black-faced	824,865	0	0	1,761,975	**2,586,840**
Impala, common	42,343	222,719	0	8,992,387	**9,257,448**
Kudu	1,391,543	1,633,724	659,864	229,190,019	**232,875,150**
Lechwe	0	192,821	0	280,276	**473,097**
Leopard	1,351,545	1,671,597	359,238	5,058,907	**8,441,288**
Lion	300,251	180,636	66,358	0	**547,245**
Ostrich	2,079,444	2,731,646	381,461	20,894,554	**26,087,106**
Rhinoceros, black	1,203,364	0	0	1,100,370	**2,303,734**
Rhinoceros, white	454,502	0	0	259,440	**713,942**
Roan antelope	864,037	182,545	0	1,749,491	**2,796,072**
Sable antelope	358,728	20,234	0	2,484,505	**2,863,467**
Springbok	10,395,085	41,701,370	9,173,905	354,095,752	**415,366,113**
Tsessebe	16,654	0	0	168,211	**184,865**
Warthog	113,319	22,139	0	98,520,144	**98,655,601**
Waterbuck	0	0	0	4,153,421	**4,153,421**
Wildebeest, blue	2,869,889	309,040	0	11,708,333	**14,887,262**
Zebra, Burchell's	9,952,271	12,469	0	5,052,469	**15,017,208**
Zebra, Hartmann's	3,118,401	2,988,618	5,503,613	42,805,651	**54,416,284**
TOTAL	**51,206,232**	**70,453,692**	**20,526,753**	**1,125,794,611**	**1,267,981,289**
Percent	4%	6%	2%	88%	100%

Table 3: Namibia livestock numbers and asset values summary (2004)

Livestock	Livestock numbers	Asset values (N$)
Cattle	1,995,000	336,656,250
Sheep	2,223,700	116,744,250
Goats	2,051,200	107,688,000
Donkeys	143,300	2,507,750
TOTAL	**6,413,200**	**563,596,250**

Table 4: Total wildlife numbers and asset values for land units

Land unit	Number	Asset value (N$, 2004)	Percentage of value
Protected Areas			
Ai-Ais Hot Springs Game Park	937	701,700	1.37%
Bwabwata National Park	5,017	2,758,788	5.39%
Daan Viljoen Game Park	1,551	1,032,241	2.02%
Etosha National Park	64,702	35,580,275	69.48%
Gross Barmen Hot Springs Resort	0	0	0.00%
Hardap Recreation Resort	923	710,769	1.39%
Khaudom Game Park	2,826	1,553,936	3.03%
Mahango	2,009	1,104,659	2.16%
Mamili National Park	2,126	1,168,999	2.28%
Mudumu National Park	713	391,976	0.77%
Namib Naukluft Park	4,050	2,996,918	5.85%
Naute Recreation Resort	0	0	0.00%
S. Von Bach Recreation Resort	0	0	0.00%
Skeleton Coast Park	97	53,218	0.10%
Waterberg Plateau Park	1,454	3,152,755	6.16%
Protected areas subtotal	**86,403**	**51,206,232**	100.00%
Conservancies			
!Khob-!Naub	136	128,296	0.18%
#Gaingu Spitzkoppe	571	384,436	0.55%
//Gamaseb	216	175,123	0.25%
//Huab	622	465,711	0.66%
Anabeb	3,621	2,049,106	2.91%
Doro !Nawas	7,892	4,802,336	6.82%
Ehi-Rovipuka	3,476	2,191,792	3.11%
Joseph Mbambangandu	0	0	0.00%
Khoadi Hoas	5,063	3,062,761	4.35%
Kwandu / Mayuni / Mashi /Wuparo	913	766,559	1.09%
Marienfluss	5,063	2,876,649	4.08%
Mashi	98	94,998	0.13%
Mayuni	98	94,998	0.13%
N#a Jaqna	76	66,554	0.09%
Nyae Nyae	4,258	3,676,447	5.22%
Okangundudumba	2,480	1,468,295	2.08%
Omatendeka	4,576	2,615,496	3.71%
Orupembe	9,089	5,139,223	7.29%
Oskop	494	332,173	0.47%
Otjimboyo	296	223,276	0.32%
Ozondundu	538	398,906	0.57%
Puros	10,196	5,805,967	8.24%
Salambala	613	443,273	0.63%
Sanitatas	7,371	4,189,002	5.95%
Sesfontein	15,206	8,819,686	12.52%

(Continued)

(Table 4, continued)

Sorris Sorris	3,471	2,119,050	3.01%
Torra	21,478	12,840,060	18.22%
Tsiseb	7,361	4,407,658	6.26%
Uibasen-Twefelfontein	1,106	682,755	0.97%
Uukwaluudhi	76	66,554	0.09%
Wuparo	76	66,554	0.09%
Conservancies subtotal	**116,524**	**70,453,692**	100.00%

Concessions

Etendeka	7,275	4,215,402	20.54%
Hobatere	4,661	2,911,912	14.19%
Palmwag	22,870	13,399,439	65.28%
Concessions subtotal	**34,807**	**20,526,753**	100.00%

Commercial land magisterial districts

Bethanie	25,970	16,318,442	1.45%
Gobabis	249,737	154,736,164	13.74%
Grootfontein	107,542	71,510,582	6.35%
Karasburg	54,008	32,171,665	2.86%
Karibib	65,233	42,135,353	3.74%
Keetmanshoop	123,736	73,117,308	6.49%
Luderitz	30,446	18,661,242	1.66%
Maltahohe	89,186	53,769,852	4.78%
Mariental	290,739	169,848,109	15.09%
Okahandja	99,797	63,692,135	5.66%
Omaruru	82,756	53,919,991	4.79%
Otjiwarongo	149,839	96,989,321	8.62%
Outjo	133,932	87,509,653	7.77%
Rehoboth	7,567	4,590,909	0.41%
Tsumeb	34,002	22,562,171	2.00%
Windhoek	256,222	164,261,714	14.59%
Commercial land subtotal	**1,800,706**	**1,125,794,611**	100.00%

GRAND TOTAL	**2,038,440**	**1,267,981,289**