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Economic analysis of community wildlife use initiatives in Namibia

Jonathan I. Barnes, James MacGregor and L. Chris Weaver

Directorate of Environmental Affairs, Ministry of Environment and Tourism,
Private Bag 13306, Windhoek, Namibia
Tel: + 264 (0)61 249 015 Fax: + 264 (0)61 240 339 email: contact@dea.met.gov.na
http://www.dea.met.gov.na

Contact details:
Jonathan I. Barnes and **James MacGregor**, Environmental Economics Unit, Directorate of Environmental Affairs, Ministry of Environment and Tourism, Private Bag 13306 Windhoek, Namibia
jibarnes@iafrica.com.na
L. Chris Weaver, World Wildlife Fund (US) Living in a Finite Environment (LIFE) Programme, P.O. Box 9681, Windhoek, Namibia
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Abstract

Five community wildlife conservation and utilisation initiatives, or conservancies, established on communal lands in Namibia were analysed using cost-benefit analysis, to determine economic and financial values. The conservancies were found to be economically efficient and able to contribute positively to national income and the development process. They also provide a channel for the capture of donor grants (wildlife non-use values) as income, and generate very attractive financial returns for communities. Community income is derived from wildlife use, but it is considerably enhanced by international donor grants. The grants play a very important catalytic role but are not indispensable. Conservancies are financially viable as projects. Tourism (mostly non-consumptive, with some safari hunting) is the primary income generator, mostly involving joint ventures between communities and the private sector. Other consumptive wildlife uses are less important, but serve to spread risk. The abundance and diversity of natural wildlife stocks affects economic efficiency and financial viability on conservancies. Flexibility and adaptability in design are key factors in ensuring effective rural development and conservation in Namibian conservancies.

1. INTRODUCTION

In this paper, five community wildlife conservation and utilisation initiatives on communal land in Namibia have been analysed to determine their financial profitability and their economic efficiency. The degree to which these community projects can contribute positively to the national income, and thereby to the economic development process, is central to the study. Also investigated was the degree to which the initiatives provide private returns to project investment, as well as to investments made by communities.

Namibia has adopted policy and legislation to allow community-based natural resource management (CBNRM)[1] on communal land. Much of the initial focus of CBNRM has been on wildlife, which is threatened with displacement by illegal use and growing rural human populations. The approach devolves rights over wildlife to local communities and aims to make wildlife conservation part of the rural development process. In this context, CBNRM initiatives must be financially attractive for the community, economically efficient for the nation and reasonably financially viable for donors and the government. Without these incentives, they will not be sustainable, and will not result in development or conservation.

1.1 The setting

Namibia is a large country (830,000 km^2) straddling the Tropic of Capricorn on the west coast of southern Africa. It is very dry, and climate ranges from semi arid in the north east to extremely arid on the west coast. Vegetation ranges from savannah woodland in the north east, through savannah to desert in the west and south. Rain-fed crop production is limited to very small parts of the north and north east. Most land in the country is only suitable for extensive grazing by livestock or wildlife, and rangeland carrying capacities are low. Permanent surface water is restricted to a few rivers on the northern, north eastern and southern borders.

The human population of the country, at 1.7 million, is small, with 30 per cent living in urban centres. The rural economy has two different tenure systems. Forty three percent of the country—mostly in the drier parts—contains private, medium scale, commercial ranches. Forty five percent—mostly in the less dry north—is communal land. Communal land is state-owned, but occupied by rural tribal communities; most of the country's population. Communities practise traditional systems of pastoralism in the south and west, and agro-pastoralism in the north and north east, but their access to markets and infrastructure is poor. In the north east, among San communities, some sedentary hunting and gathering is practised.

Important wildlife resources occur in less densely settled north western and north eastern communal lands. Elephant (*Loxodonta africana*), buffalo (*Syncerus caffer*), hippopotamus (*Hippopotamus amphibius*), sable (*Hippotragus niger*), roan (*Hippotragus equinus*), lechwe (*Kobus leche*), sitatunga (*Tragelaphus spekei*), lion (*Panthera leo*), leopard (*Panthera pardus*) and wild dog (*Lycaeon pictus*) are of conservation importance in the north east. In the north west, desert-adapted wildlife species such as elephant, black rhinoceros (*Diceros bicornis*), mountain zebra (*Equus zebra*), springbok (*Antidorcas marsupialis*), kudu (*Tragelaphus strepsiseros*) and oryx (*Oryx gazella*) occur. Attractive scenery exists in both places. Communities were historically not permitted to use these wildlife resources, and were effectively alienated from them. The tendency

[1] CBNRM projects/programmes are sometimes referred to as integrated conservation–development projects/ programmes (ICDPs), or community based wildlife management (CWM) projects/programmes.

was for expanding traditional land uses to displace wildlife, and poaching was fairly common. In the 1980s, local non-government organisations (NGOs) initiated donor-funded community game guard programmes, giving some communities a sense of 'ownership' over their wildlife.

1.2 CBNRM in Namibia

In the late 1960s, Namibia granted *private* land-holders custodial rights to manage and use wildlife on their land (Joubert, 1974). The incentives associated with this have resulted in increased wildlife stocks on this land (Barnes and de Jager, 1997). In 1996, a legislative amendment granted similar custodial rights over wildlife to communities on communal land (Corbett and Jones, 2000; Jones, 1995, Jones and Murphree, 2001). This change, part of the national CBNRM programme, made it possible for communities to form '*conservancies*', register these, and thus acquire, from the state, partial rights to common property management and use of wildlife in defined areas. By 2001, 14 conservancies had been registered and some 20 more were in the process of being developed. About five conservancies had drawn up plans for the use and management of their natural resources, mainly wildlife.

The CBNRM programme is loosely coordinated from within government and local NGOs, by the Namibia Association of CBNRM Support Organisations (NACSO). Communities are assisted by the local NGOs, donor-funded projects and a government-backed policy and legislative framework. Funding for this assistance comes mainly from international donors. It takes the form of grants to pay for technical assistance, local NGO facilitation and training activities and some conservancy recurrent and capital requirements. Since the 1980s, communities interested in CBNRM have benefited to varying degrees from donor funds—initially mainly to employ community members in wildlife protection (community game guards), but also to provide facilitation and training as well as, more recently, capital investments. One aim of CBNRM is for donor inputs to conservancies to be gradually replaced by income from natural resource use, leaving communities self-sufficient. To some extent this has happened, but so far no conservancies are entirely self-sufficient financially, and many still receive a significant proportion of their income from donors.

The potential for income generation from natural resources in conservancies is dominated by non-consumptive tourism (Barnes, 1995a; 1995b), partly through community-owned and run activities (mostly campsites) and partly through joint ventures between communities and private sector investors (lodges and camps). A second important source of income is safari hunting tourism, also involving joint venture arrangements. Other, less significant and more localised income sources include thatch-grass harvesting, fishing, pole and fuel-wood harvesting, cultural services (traditional villages and shows), craft production, game meat harvesting and live game sales. Communities bear costs associated with wildlife in the form of damage to crops in agro-pastoral areas and to water points in the drier pastoral areas. Such costs, as estimated from limited empirical research, are documented by Barnes (1995b). They generally amount to less than five percent of wildlife use values.

CBNRM or ICDP interventions are based on the contention that if communities are allowed to benefit directly from the use of natural resources, then they will have an incentive to invest in and conserve these resources (Child, 1993; Lewis et al., 1990; Barbier, 1992; Callihan and Stuart-Hill, 2000; Roe, 2001; Emerton, 2001). Many conservation programmes in developing countries now include CBNRM strategies, and they are widely seen as essential for wildlife conservation—particularly outside protected areas. Some workers, such as Gibson and Marks (1995), Barrett and Arcese (1995), Sullivan (1998) and Infield (2001), consider that CBNRM, as practiced in Africa, is

inadequate as a conservation and/or development strategy. Problems listed include inappropriate incentive structures, inappropriate distribution of benefits, lack of suitably democratic institutions, intra-community conflicts, excessive reliance on consumptive wildlife use, excessive reliance on financial benefits from natural resource use, etc. Most of the criticisms relate to weaknesses in design rather than fundamental problems with CBNRM as an approach. In the case of Namibia's CBNRM programme, most of them appear to be applicable only exceptionally, or not at all.

One unresolved issue, however, is the common assertion or suspicion that material benefits from tourism and consumptive wildlife use in CBNRM are inadequate to compensate communities for all the costs of investing in wildlife (Barrett and Arcese, 1995; Infield, 2001). Apart from a few studies (Jansen, 1990; Barnes, 1995c; Barnes et al., 2000; Bond, 2001), no rigorous analysis has been done of the financial and/or economic merits of CBNRM as a development strategy. Most discussion about this has had to be conjectural. Our study directly addresses this question, in the context of Namibia.

2. METHODS

Five conservancies were selected as being well enough established, and having sufficiently developed management plans to allow financial and economic appraisal to be carried out. These were examined as investments—in terms of their value to the community, to the project proponents (financial analysis) and in terms of their value to Namibian society (economic analysis). The analyses are thus primarily *appraisals* of conservancy development plans and projected incomes, rather than *ex post evaluations* of past conservancy performance. However, most of the five conservancies studied have been in the process of development for several years, and the models developed, reflect actual events for these early years.

The analysis needs to be seen in the context of 'total economic value' of the wildlife and natural resources, as described by Pearce and Turner (1990) and Emerton (2001). Total economic value embraces direct use, indirect use, and non-use (option, bequest and existence) values associated with natural resources. Direct use values are derived from actual *utilisation* of the resource. They contribute tangible value in the form of *income*, and make up the main component of formal economic growth, which is the focus of national development efforts. Indirect use values are derived from ecological or social function (such as erosion protection, waste assimilation, political stability, etc.). Option values reflect the values perceived in retaining the option to use the resource in the future. Bequest values reflect the value perceived in preserving or retaining the resource for others in the future, and existence values reflect the value perceived in retaining the mere existence of the resource.

The focus of this analysis is on direct use values and here the income derived from actual use of natural resources in Namibia was measured. No significant indirect use values were identified and they were not specifically considered. Non-use values were considered, but only as manifested in donor contributions aimed at conserving wildlife in conservancies, as they benefit communities. An example of non-use value would be the income derived through conservancy game guard wages, where these are funded from donors.

As pointed out by Emerton (2001), Adams and Infield (2001) and Hulme and Infield (2001), costs associated with wildlife include investments in protection, costs of damage caused by wildlife and land use opportunity costs. Our analysis focuses on the value of the conservancy as an investment. Individual models were developed where the project boundary embraced only the specific *conservancy* and the costs and benefits directly associated with it. Land opportunity costs, central

government investment costs, or benefits associated with forward and backward linkages were not included—these would all be part of broader analyses, for example, of a national CBNRM programme, or a national wildlife investment programme. However, the broader context is discussed in relation to some findings from elsewhere.

2.1 Financial and economic models

Detailed static and dynamic, budget and cost-benefit spreadsheet models were developed for specific resource use activities within conservancies, and making use of these results, for each conservancy as a whole. The benefits of natural resource use were measured in a cost-benefit framework against the costs of investing in and undertaking the activity. The project boundary in the conservancy analysis embraced community activities and investment. Thus, where joint ventures between communities and the private sector were involved, only the net benefits accruing to the community from the venture were included in the model.

The models were based on empirical data, gleaned through interviews with wildlife use enterprises and conservancies, through examination of financial data from conservancy operations, and from management plans for conservancies. The data was collected between 1998 and 2000, and financial values in models were inflated to 2000 prices. The wildlife use and conservancy models measured *financial profitability* (annual net income, financial rate of return, financial net present value) from the point of view of the user or investor. They also measured *economic efficiency* (annual contribution to gross and net national income, economic rate of return, economic net present value) in economic (or shadow) prices, from the point of view of Namibian society. The conservancy models measured financial profitability from both the community and project perspectives.

Static budget models measured annual financial returns at full production after deduction of all capital and recurrent financial costs including interest and amortisation. The dynamic cost-benefit models measured financial and economic returns over five and ten year investment periods. Here, interest and inflation were excluded from all calculations. Cost and benefit flows were in constant prices and discounted over time to reflect the time value of money. A real discount rate of eight per cent was used for both financial and economic models. All capital expenditures were included and depreciation (or appreciation) was accounted for in the residual value of assets in the final year of analysis.

Important economic measures from the static budget models are *gross* and *net national income* (GNI and NNI respectively) as defined by Gittinger (1982). These are the returns in gross and net value added to factors of production owned by Namibian nationals. NNI is GNI minus annual capital asset depreciation. In economic analysis the economic cost or benefit to society of using or producing a resource is taken to be its opportunity cost (the value of its best alternative use). The data is based on financial transactions, but where financial prices differ significantly from opportunity cost, then shadow pricing is applied. These GNI and NNI measures thus gauge *economic efficiency*, unlike the statistical measures of national income, presented in national accounts.

Shadow pricing, aimed at ensuring that values applied to inputs and outputs reflect their opportunity cost or real scarcity in society (rather than simply market prices), was applied in the economic analyses. Standard criteria for shadow pricing in Namibia are not available, so preliminary ones developed by Barnes (1994) were used. These were largely modified from standardised ones used in

the past in Botswana (Ministry of Finance and Development Planning, 1986; Matambo, 1988), South Africa (CEAS, 1989), and the World Bank (Gittinger, 1982).

Namibia's economy has been relatively open in recent years, with few price distortions and in many cases market prices fairly reflect opportunity cost. Shadow pricing adjustments were limited to the following. Domestic transfers such as taxes, and subsidies, were eliminated as costs or benefits. Taxes included sales tax, license and permit fees. Subsidies included those from government for live game stocking. All conservancies benefited from grants to assist with capital and recurrent inputs, provided by donors from outside the country. These, however, were considered fungible, with opportunity costs within Namibia and were treated not as subsidies but as costs in the economic analysis.

The models include a detailed stock projection over the investment period, depicting the anticipated growth, or not, of wildlife stocks by species. This incorporated the initial wildlife populations determined from aerial census, the natural growth potential of each species, stock purchases or acquisitions, natural immigration and off-takes. Natural growth potential for each species was calculated using the method of Craig and Lawson (1990) and Spinage (FGU-Kronberg, 1987). This was based on the formula $0.4r_m$, where r_m is the intrinsic rate of increase of the population and a function of the body weight of the species concerned. Wildlife biomass was measured as large stock unit equivalents (LSU), the metabolic equivalent of a 450kg ox, using the conversion ratios of Meissner (1982). Apart from the financial value of some purchases (subsidised) and some natural immigration from neighbouring Botswana (no cost), the value of the stock was made at opportunity cost. In the economic model and the project financial models, the residual value of wildlife stocks in the conservancy was included within residual assets. In the case of community financial analysis these stocks were not included in residual value (as communities would not be able to recover this stock value at the end of the period).

A general shadow price for unskilled and semi-skilled labour of 0.35 of the market price was applied in the economic models to reflect general unemployment and social pressure for higher wages. A foreign exchange premium of six per cent was added to the prices of all tradable items in the economic models to account for general excess demand for traded and tradable goods and services. In the economic models, inflows from, and outflows to, non-nationals were treated as benefits and costs respectively. This ensured measurement of *national* income. All economic models included an opportunity cost of capital of eight per cent, but as explained above, land opportunity costs were excluded. This allowed direct comparison between model results regarding returns to land. Economic models did not include national expenditures made by central government in the wildlife or agricultural sectors. Excluded were benefits accruing to private joint-venture partners in the conservancy, or to service providers or producers outside the conservancy. Cost of damage caused by wildlife was included, mainly through inclusion of the costs of mitigating damage.

All models were tested through sensitivity analysis, by varying key assumptions to determine the robustness of the models and the strength of conclusions drawn from the results. The extent to which financial returns differed from the economic ones was used to provide a measure of the influence of policy and/or market imperfections, as described by Jansen et al., 1992.

Where values are given in this paper they are in Namibia dollars (N$). At the time of the analysis, in 2000, N$1.00 was equal to US$0.14

3. RESULTS AND DISCUSSION

3.1 Conservancy profiles

Table 1 shows some of the features of the five conservancies analysed. They range from near desert conditions in the north west (Torra, #Khoadi //Hôas) and the northern Kalahari (Nyae Nyae), to semi-arid woodlands/floodplain habitats in the north east (Mayuni, Salambala). They vary greatly in extent from almost a million hectares in Nyae Nyae—where non-wildlife land uses are relatively unimportant—to 28,000 hectares in Mayuni[2]—where half the land is used for fairly intensive agro-pastoralism. Some conservancies possess naturally intact wildlife resources combined with attractive scenery on at least part of their land (Torra, Mayuni), while in others wildlife resources are depleted and require restocking or investment (Salambala, Nyae Nyae).

Table 1 Comparative physical characteristics of the five conservancies in 2000

Characteristic	Torra	#Khoadi //Hôas	Nyae Nyae	Mayuni	Salambala
Land area (ha)	352,200	386,000	900,095	28,400	93,000
Core wildlife area[1] (ha)	108,586	177,650	900,095	13,300	11,000
Households (no.)	120	700	700	450	1,200
Mean annual rainfall (mm)	90	150	450	600	650
Rangeland carrying capacity (ha/LSU equivalent)	30	25	15	12	12
Starting wildlife density[2] (ha/LSU equivalent)	427	160	464	43	3,875
Expected wildlife density in year ten[2] (ha/LSU equivalent)	257	119	251	29	85
Non-consumptive tourism potential	High	Mod High	Mod low	High	Mod low
Safari hunting tourism potential	Mod high	Mod	Mod high	Low	Mod
Consumptive wildlife use potential	Low	Low	Low	Low	Low
Other natural resource use potential	Low	Low	Mod low	Mod	Mod
Livestock keeping potential	Very low	Very low	Mod	Mod	Mod

[1] Core areas allocated primarily to wildlife (rest of land shared between wildlife and livestock)
[2] Density calculated for the total land area

In the north west (Torra, #Khoadi //Hôas, occupied by Damara communities) the traditional land use is pastoralism, in the northern Kalahari (Nyae Nyae, occupied by San communities) it is hunting and gathering with low intensity pastoralism, and that in north east (Mayuni, Salambala, occupied by Mafwe and Masubia communities) is agro-pastoralism. Mayuni is unusual among the five in that it embraces part of a protected area. #Khoadi //Hôas is unusual in being permitted by the veterinary authorities to capture and sell live game. The numbers of households associated with conservancies vary from 120 in Torra to 1,200 in Salambala.

3.2 Financial and economic values

The results of the conservancy valuation are summarised in Table 2. These values give comparisons of the project investment, project income, community income and economic value of the conservancy investment. The economic values indicate whether the initiative contributes positively to national development or not. In all cases the conservancies do, with positive annual contributions to gross and net national income, positive net present values and favourable internal rates of return (all significantly higher than the eight per cent cut-off rate). For comparative purposes it is useful to separate the conservancies ecologically into those in semi-desert sites (Torra and #Khoadi //Hôas), those in the mesic north east (Mayuni and Salambala) and that in an intermediate setting (Nyae Nyae). Land use is generally much less intensive in the semi-desert of the north west and relatively more intensive in the woodlands and floodplains of the north east.

The Torra and Mayuni conservancies stand out as having the most favourable returns, both within their own ecological setting and overall. It is notable that Mayuni, which has access to a dry-season wildlife concentration area with prime tourism potential, has particularly high net benefits per unit of land. Torra and Mayuni also show relatively high annual contributions to national income as well as some overall gains in wildlife stocks. Nyae Nyae and Salambala are relatively inefficient economically, with lower rates of return and lower net contributions per unit of land. They both have low annual net contributions to income and rely more on net gains in wildlife stocks and required significant capital investments in development of these stocks. #Khoadi //Hôas is intermediate in terms of economic value. The differences tend to reflect the balance between the annual net benefits and the capital gains generated by the conservancy.

The community financial values tell us to what extent the communities have an incentive to invest in the initiative. In all cases the communities can derive very favourable returns on their investments. The Torra and Mayuni conservancies are able to earn the most cash income and dividends per household, while Mayuni, #Khoadi //Hôas and Torra all show very high financial rates of return. Nyae Nyae and Salambala provide the least attractive returns for communities. The dominant feature of the community analysis is the fact that donors, and not the communities, bear many of the initial capital and recurrent input costs. All conservancies benefit from donor assistance in this way. Another feature of the community analysis is that it does not incorporate the accumulation of wealth in conservancy wildlife stocks.

Table 2 Base case financial and economic values for the five conservancies in 2000 (N$)

Value	Torra	#Khoadi //Hôas	Nyae Nyae	Mayuni	Salambala
Project financial values					
Initial capital investment	1,190,432	868,586	3,522,521	770,778	1,418,610
Capital investment per ha.	3.4	2.3	3.9	27	15
Capital investment per household	9,920	1,241	5,032	1,713	1,182
Annual net cash income	95,300	69,400	-267,100	333,100	133,800
Financial rate of return (%)	16	19	15	8	8
Financial net present value[1]	860,800	1,428,500	2,377,400	0	0
Community financial values					
Annual community cash income[2]	406,544	418,556	204,673	732,704	426,058
Cash income per household	3,388	598	292	1,628	355
Cash income per ha.	1.2	1.1	0.2	26	4.6
Financial rate of return (%)	133	205	23	220	40
Financial net present value[1]	2,133,200	3,350,000	1,364,400	3,696,300	1,347,900
Annual community dividends[3]	228,000	207,900	114,400	225,000	168,700
Dividends per household	1,900	297	163	500	141
Economic values					
Annual gross value added[4]	557,600	503 800	501 600	860 200	525 800
Annual net value added[5]	487 611	459 551	278 621	820 816	455 368
Net value added per ha.	1.4	1.2	0.3	29	4.9
Economic rate of return (%)	131	66	22	126	31
Economic net present value[1]	3 662 300	4 010 100	4 114 900	4 059 000	2 587 800
Number of jobs created[6]	8	12	26	22	12
Economic capital cost per job	138,394	67,257	177,955	32,025	127,285

1 Measured over ten years at eight per cent discount.
2 Includes salaries and wages for conservancy employment, net cash income and dividends.
3 Annual surplus extracted for distribution to households.
4 Gross value added to national income at opportunity cost (economic prices).
5 Gross value added minus asset depreciation.
6 Permanent formal employment opportunities from conservancy operations, excluding jobs created within revenue sharing and joint venture tourism operations

The project financial values reflect the returns to the project investor, i.e. the donors, government and community, viewed as one entity. They provide an indication of the broader financial viability of the initiative. Here, all donor contributions are costs as are household dividend payments, but increase in the value of wildlife stocks is included as a benefit. Project investors do not themselves require large positive returns but seek only to ensure that they do not incur losses, which would require subsidisation. As seen in Table 2, the project returns are moderate but generally positive and acceptable.

3.3 Sensitivity analysis

The degree to which the values measured in the financial and economic analyses are robust in the face of changes in model parameters was tested using sensitivity analysis. This provides an indication of the validity of the conclusions drawn from the results, as well as more information on the characteristics of the investments.

Table 3 provides some results of sensitivity analysis of the Nyae Nyae conservancy model. Variation in capital expenditure, tourism development, wildlife stock densities and stock off-take rates were tested, as well as the inclusion (or not) of live game sales and stock purchase/acquisition. The economic viability is only weakly affected by significant changes in capital investments. It is also only moderately affected by the changes in wildlife densities and tourism investments, the two of which are closely linked. Replacement of subsistence hunting with live game sales (assuming relaxation of veterinary restrictions) would only slightly enhance the economic value. However, an increase in wildlife off-take intensity to that approaching the maximum sustainable level, would halt herd growth, reduce the potential for tourism development and reduce the economic value of the investment. This finding confirms the need for increases of wildlife stocks in the conservancy, but such increases, through acquisition from within Namibia *reduces* the economic viability of the conservancy. These acquisitions carry opportunity costs which are not sufficiently offset by increased tourism and stock enhancement benefits. The benefits of restocking efforts are likely to have wider and longer term impacts, outside the framework of the specific conservancy analysis and will be reflected through stock enhancement in the neighbouring protected and communal areas.

The effect of sensitivity analysis on project financial returns shows patterns similar to those for the economic returns. One difference concerns stock acquisition, which does not reduce the project or community financial values as it did with the economic value. This is because stock acquisition is generally heavily subsidised. The findings in Table 3 show that community incentives (community rates of return) are moderately affected by variation in capital expenditure. Community incentives are also moderately affected by loss of income earning possibilities caused by low wildlife densities and resultant loss of tourism potential.

Tables 4, 5 and 6 show some sensitivity analysis results for all five conservancies. The effects on economic net value added and community income, of changes in capital costs and tourism income, as well as inclusion, or not, of consumptive wildlife uses, are shown. Table 4 depicts results for Torra and #Khoadi //Hôas. Both measures, in both conservancies are weakly sensitive to changes in capital expenditures. Changes in income from both non-consumptive and consumptive tourism, have a moderate effect on the economic and community values, with the Torra model being a little more sensitive than that for #Khoadi //Hôas. The #Khoadi //Hôas values are highly sensitive to the elimination of consumptive wildlife uses, while those of Torra are not. Generally, these sensitivity analyses confirm the findings in Table 2—that the Torra investment is economically very efficient and that of #Khoadi //Hôas, while slightly more vulnerable, is moderately so.

Table 3 The effects of change in some base case parameters on internal rates of return in the Nyae Nyae conservancy financial and economic model in 2000

	Internal rate of return (%)		
	Economic	Financial (project)	Financial (community)
Capital expenditure			
50% of base case	36	25	51
75% of base case	27	19	33
Base case	22	15	23
125% of base case	18	12	16
150% of base case	15	10	11
Tourism development[1]			
No lodges, 2 campsites	11	8	0
1 lodge, 2 campsites	16	11	12
2 lodges, 3 campsites (base case)	22	15	23
3 lodges, 4 campsites	28	19	32
4 lodges, 5 campsites	36	24	40
Wildlife densities			
50% of base case	12	6	14
75% of base case	17	11	18
Base case (251 ha/LSU)	22	15	23
125% of base case	26	19	27
150% of base case	30	22	30
Live game sale			
None (base case)	22	15	23
25% of meat off-take[2]	22	16	24
50% of meat off-take	23	16	25
75% of meat off-take	24	17	26
Stock acquisition[3]			
Base case (447 LSU)	22	15	23
Halved	29	15	22
None	36	15	22
Stock off-take intensity			
Half growth potential (base case)	22	15	23
Maximum – reduced tourism[4]	13	7	14

1 Different scenarios of tourism development.

2 Live game capture and sale replaces 25 per cent of subsistence hunting off-take.

3 Purchase of wildlife stock for release in conservancy halved.

4 Initial wildlife stock densities maintained through maximum off-take; tourism growth reduced.

Table 4 The effects of change in some base case parameters on net value added and community income in the financial and economic models for the Torra and #Khoadi //Hôas conservancies in 2000

Torra					
Tourism income[1] *(variation)*	*50%*	*75%*	*Base case*	*125%*	*150%*
Net value added per ha.	0.41	0.90	1.38	1.87	2.36
Community cash income per ha.	0.35	0.75	1.15	1.56	1.96
Capital costs (variation)	*50%*	*75%*	*Base case*	*125%*	*150%*
Net value added per ha.	1.63	1.51	1.38	1.26	1.14
Community cash income per ha.	1.36	1.26	1.15	1.05	0.95
Meat and live game[2] *(inclusion)*		Yes[4]		*No*	
Net value added per ha.		1.38		1.06	
Community cash income per ha.		1.15		0.88	
Consumptive wildlife use[3] *(inclusion)*		*Yes*[4]		*No*	
Net value added per ha.		1.38		0.83	
Community cash income per ha.		1.15		0.69	
#Khoadi //Hôas					
Tourism income[1] *(variation)*	*50%*	*75%*	*Base case*	*125%*	*150%*
Net value added per ha.	0.78	0.89	1.19	1.49	1.79
Community cash income per ha.	0.74	0.83	1.08	1.83	1.58
Capital costs (variation)	*50%*	*75%*	*Base case*	*125%*	*150%*
Net value added per ha.	1.34	1.27	1.19	1.11	1.04
Community cash income per ha.	1.22	1.15	1.08	1.02	0.95
Meat and live game[2] *(inclusion)*		Yes[4]		*No*	
Net value added per ha.		1.19		0.44	
Community cash income per ha.		1.08		0.46	
Consumptive wildlife use[3] *(inclusion)*		*Yes*[4]		*No*	
Net value added per ha.		1.19		0.14	
Community cash income per ha.		1.08		0.21	

[1] Tourism here embraces both non-consumptive tourism and safari hunting.
[2] Embraces all consumptive use of wildlife by communities, but excludes safari hunting.
[3] Embraces all consumptive use of wildlife, including safari hunting.
[4] Base case.

Table 5 shows results for Nyae Nyae and here it is clear that the economic and community returns are sensitive to capital expenditure changes, highly sensitive to changes in tourism income and extremely sensitive to the exclusion of consumptive wildlife uses. The relative vulnerability of the returns is a reflection of the somewhat weak economic efficiency and financial profitability noted for this conservancy in Table 2. Table 6 shows results for Mayuni and Salambala. Here, the

Salambala investment shows itself to be somewhat sensitive to changes in tourism income and only moderately sensitive to changes in capital expenditures or loss of consumptive wildlife uses. The Mayuni investment is only moderately sensitive to changes in tourism income and very insensitive to changes in capital costs and loss of consumptive wildlife uses. The results confirm the finding in Table 2, that Mayuni is a very attractive investment for Namibian society and the community, while that for Salambala is somewhat less so.

Table 5 The effects of change in some base case parameters on net value added and community income in the financial and economic models for the Nyae Nyae conservancy in 2000

Nyae Nyae					
Tourism income[1] *(variation)*	*50%*	*75%*	*Base case*	*125%*	*150%*
Net value added per ha.	-0.23	0.04	0.31	0.58	0.85
Community cash income per ha.	-0.28	0.03	0.23	0.48	0.74
Capital costs (variation)	*50%*	*75%*	*Base case*	*125%*	*150%*
Net value added per ha.	0.61	0.46	0.31	0.16	0.01
Community cash income per ha.	0.62	0.42	0.23	0.03	-0.16
Meat and live game[2] *(inclusion)*		*Yes*[4]		*No*	
Net value added per ha.		0.31		-0.19	
Community cash income per ha.		0.23		-0.24	
Consumptive wildlife use[3] *(inclusion)*		*Yes*[4]		*No*	
Net value added per ha.		0.31		-0.54	
Community cash income per ha.		0.23		-0.58	

[1] Tourism here embraces both non-consumptive tourism and safari hunting.
[2] Embraces all consumptive use of wildlife by communities, but excludes safari hunting.
[3] Embraces all consumptive use of wildlife, including safari hunting.
[4] Base case.

3.4 Discussion

Our study has shown that conservancy investments in Namibia are economically efficient and contribute positively to national economic well-being. This conforms to the findings of Barnes, 1995c and Barnes et al., 2000 for community wildlife use initiatives in Botswana. It refutes the speculative assertion, made by Barrett and Arcese that wildlife use initiatives tend to be economically unsound (1995). Our analysis of economic efficiency measures only the return in national income—which reflects direct use value and does not include international donor grant contributions (which it treats as having opportunity costs within Namibia). This is a reflection of the fact that the project boundary for the economic analysis is around the individual conservancy. Without the specific conservancy, international donor contributions would almost certainly be spent on wildlife conservation elsewhere in the country, and thus in the national context they can be seen as wildlife *non-use values*. In the national context, therefore, the economic value of CBNRM initiatives is enhanced by the inclusion of these non-use values.

Table 6 The effects of change in some base case parameters on net value added and community income in the financial and economic models for the Mayuni and Salambala conservancies in 2000

Mayuni					
Tourism income[1] *(variation)*	*50%*	*75%*	*Base case*	*125%*	*150%*
Net value added per ha.	14.43	21.66	28.90	36.13	43.37
Community cash income per ha.	12.17	18.99	25.80	32.62	39.43
Capital costs (variation)	*50%*	*75%*	*Base case*	*125%*	*150%*
Net value added per ha.	30.69	29.80	28.90	28.00	27.10
Community cash income per ha.	27.33	26.56	25.80	25.03	24.27
Meat and live game[2] *(inclusion)*		*Yes*[4]		*No*	
Net value added per ha.		28.90		27.69	
Community cash income per ha.		25.80		24.66	
Consumptive wildlife use[3] *(inclusion)*		*Yes*[4]		*No*	
Net value added per ha.		28.90		27.69	
Community cash income per ha.		25.80		24.66	
Salambala					
Tourism income[1] *(variation)*	*50%*	*75%*	*Base case*	*125%*	*150%*
Net value added per ha.	1.27	3.08	4.90	6.71	8.52
Community cash income per ha.	1.58	3.08	4.58	6.08	7.59
Capital costs (variation)	*50%*	*75%*	*Base case*	*125%*	*150%*
Net value added per ha.	5.83	5.37	4.90	4.43	3.96
Community cash income per ha.	5.37	4.98	4.58	4.18	3.79
Meat and live game[2] *(inclusion)*		*Yes*[4]		*No*	
Net value added per ha.		4.90		4.79	
Community cash income per ha.		4.58		4.49	
Consumptive wildlife use[3] *(inclusion)*		*Yes*[4]		*No*	
Net value added per ha.		4.90		3.69	
Community cash income per ha.		4.58		3.58	

[1] Tourism here embraces both non-consumptive tourism and safari hunting.
[2] Embraces all consumptive use of wildlife by communities, but excludes safari hunting.
[3] Embraces all consumptive use of wildlife, including safari hunting.
[4] Base case.

Our study has also shown that the financial returns for communities from wildlife use initiatives exceed their investments. This similarly refutes the general arguments made by Barrett and Arcese, 1995 and Infield, 2001, among others, which suggest they may not. However, the generally highly positive returns enjoyed by communities in Namibian conservancies come from two sources. On one hand they come from utilisation of wildlife in the conservancies (mainly through joint venture agreements in tourism activities) and on the other, they come via the grants from donors investing in the CBNRM programme. The former are direct use values (net benefits of wildlife use) and the

latter (as discussed above) are effectively manifestations of non-use values (willingness to pay for conservation of the wildlife resources). In as much as both reflect true economic value and both flow into conservancies as a result of conservancy development, they are both legitimate forms of income for the communities.

Table 7 shows the effects the removal of donor grants would have on the community financial rate of return. These effects are shown with and without the inclusion of stock residual value—an intangible benefit for communities. The findings suggest that receipt by conservancies of donor grants significantly enhances community returns, but that only in the weakly viable conservancies would their removal jeopardise community financial incentives to participate. In three or four of the five conservancies, direct use values alone should be sufficient to attract community investment. The availability of donor grants itself provides an incentive for communities to increase conservancy investment costs. This is happening to some extent in Namibia and the relatively weak viability of conservancies such as Nyae Nyae, is partly due to the inclusion of non-essential expenditures. Avoidance of these would enhance conservancy economic and financial viability and should be part of the planning process.

Table 7 The effect of donor grants (non-use values) on the financial rate of return to communities in the five conservancies in 2000

Community financial rate of return (%)	Torra	#Khoadi //Hôas	Nyae Nyae	Mayuni	Salambala
With donor grants without stock[1]	133	205	23	220	40
Without donor grants with stock[2]	44	39	18	24	17
Without donor grants without stock[3]	39	28	1	20	11

[1] Includes income to the conservancy from donor grants, but excludes residual value of wildlife stock appreciation (an intangible value for communities) in benefits.

[2] Excludes income to the conservancy from donor grants, but includes residual value of wildlife stock appreciation (an intangible value for communities) in benefits.

[3] Excludes income to the conservancy from donor grants and excludes residual value of wildlife stock appreciation (an intangible value for communities) in benefits.

As Infield points out, CBNRM programmes have become important in international aid and this is true for southern Africa (2001). It might be suggested that this partial dependence on donor contributions makes the initiatives unsustainable, but it can be argued that this is unlikely. First, as shown in Table 7, loss of the donor income does not eliminate community financial incentives in most conservancies. In addition, intangible benefits, such as empowerment, training and improved livelihood security provide further significant motivation. Secondly, donor inputs in conservancies are concentrated in the initial capital, and are focused on building wildlife stocks, institutions and skills, thus establishing the base for a new land use approach. Later, further investments by conservancies, based on these sunk costs will have higher returns and will most likely not need enhancement by donors. Finally, the donor contributions—in as much as they reflect *non-use values* perceived in developed countries—are likely to persist. Experience over 15 years in southern Africa suggests that the flow of donor funds to CBNRM programmes has been enduring.

Instability in markets for wildlife use activities can affect conservancy sustainability. For example, recent political events in southern Africa have severely affected growth in non-consumptive tourism in parts of Namibia and tourism income was sharply reduced in some of the conservancies under

study. These conditions are likely to be temporary, but the sensitivity analyses presented in Tables 3 to 6 indicate that conservancy economic and financial efficiency is moderately resilient in the face of them. Safari hunting and other consumptive wildlife uses, might be severely affected by pressure from animal rights organisations. The sensitivity analyses in Tables 4 to 6 show that the viability of three conservancies would be resilient, while that of two would be vulnerable, in the face of a ban on consumptive wildlife use. The most successful conservancies are those with several different uses, dominated by non-consumptive tourism.

Ashley (1998) investigated CBNRM initiatives in Namibia, including all of the conservancies analysed here, for the importance of intangible or non-financial benefits as these accrue to communities, the natural resource base and Namibian society. These were found to be substantial. The communities benefit from capacity building and empowerment, cultural and aesthetic values associated with wildlife and local traditions, and more secure livelihoods. The latter are linked to the financial benefits described in this paper, but go further in that cash injections from wildlife initiatives fill a critical gap within household coping strategies thereby enhancing livelihood security (Ashley and LaFranchi, 1997). This complementary role reduces the likelihood of earnings from wildlife being invested in agriculture and thus undermines the sustainability of conservancies. Namibia's CBNRM programme appears able to capture the potential benefits from including cultural values in community conservation initiatives, as recommended by Infield (2001).

The economic viability as demonstrated in this paper and the financial incentives available for communities in conservancy development fit in the broader framework of rural or national development. We have not measured the economic efficiency of the CBNRM programme as whole, or the wildlife sector as a whole, but evidence from Botswana—where this has been done (Barnes, 2001; Barnes et al., 2000)—suggests that the economic viability of individual conservancies extends to the broader context. Thus, allocation of conservancy land to wildlife, and not to other uses, is likely to be economically sound. However, more research on the economics of land use allocation is needed.

Namibia's CBNRM programme appears to have avoided most of the design flaws and problems which have been highlighted by Barrett and Arcese (1995), Gibson and Marks (1995), Infield (2001), Wells (1995) and Bond (2001). A key feature has been *flexibility* in design (Jones and Mosimane, 2000). Conservancies in Namibia appear able to deliver positive financial incentives to communities, contribute positively to national development, conserve wildlife and be at least as sustainable as other rural development initiatives. *Ex post* evaluation, using our measures of efficiency and profitability in future years will confirm whether this is truly so or not.

4. CONCLUSION

1. Conservancies in Namibia, as constituted and planned, are *economically efficient*. They are able to contribute positively to national income and the development process. The likelihood of their being sustainable is high. Their receipt of donor funding, as part of the national CBNRM programme, means that they also provide a channel for the capture of wildlife *non-use values*, as income.

2. Conservancies also provide *very attractive financial returns for communities*. These returns are made up of income from wildlife use (direct wildlife use values) as well as donor grants (reflecting international non-use values). The latter considerably enhance the attractiveness of conservancy investment for communities and perform a very important role in starting up. However, direct use values can generate positive financial returns for communities. Conservancies also tend to be financially viable as *projects*.

3. *Tourism* (primarily non-consumptive tourism but also safari hunting) is a particularly important income generator for all conservancies. In the development of tourism, *joint ventures* between private investors, with skills and access to markets, and communities are very important. Other consumptive wildlife and natural resource uses are less important, but they serve to spread risk.

4. The *existence of natural wildlife populations* on conservancies (reducing the need for investments in stock) is a very significant factor affecting the economic efficiency and financial viability of conservancies. Acquisition of stock for restocking is not economically efficient at the conservancy level, unless there are no opportunity costs. However, it can have wider, longer term economic benefits.

5. *Flexibility and adaptability in design* has allowed Namibia's conservancy initiative to embrace an apparently sound rural development framework, which includes significant intangible values and benefits as well as financial income for communities. The conservancies appear able to deliver positive financial incentives to communities, contribute positively to national development, conserve wildlife and be at least as sustainable as other rural development initiatives.

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