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Incentives affecting biodiversity conservation and
sustainable use:
the case of land use options in Namibia

by

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This series of Research Discussion Papers is intended to present preliminary, new, or topical information and ideas for discussion and debate. The contents are not necessarily the final views or firm positions of the Ministry of Environment and Tourism. Comments and feedback will be welcomed.

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PREFACE

This paper is based on a workshop presentation "Approaches of the Namibian Government towards the use of incentives for biodiversity conservation and sustainable," which was presented to a workshop on "The creation of conditions and incentives that support the conservation and sustainable use of biological diversity" in Cape Town, South Africa, August 1995.

The paper draws heavily on work of colleagues in the Directorate of Environmental Affairs, particularly Jon Barnes in the economics programme, Brian Jones in the Community Based Natural Resource Management Programme, and Richard Dewdney in Namibia's Programme to Combat Desertification. It also draws on ongoing work by colleagues in the Ministry of Agriculture, and apologies are due for any misinterpretations and inevitable simplifications of their work.

1. INTRODUCTION: ASSESSING INCENTIVES

Namibia is the most arid country south of the Sahara, with an economy fundamentally reliant on natural resources. The most scarce resource is water, and the main economic sectors are mining, fishing, agriculture, and wildlife-based tourism. The majority of the population live in rural areas, dependent on a wide range of natural resources. Sustainable use and conservation of biodiversity are therefore essential for the future. The question is *how* to achieve it? One key strategy is to assess -- and where necessary redesign -- economic incentives affecting use of natural resources. This paper illustrates the role of economic incentives in influencing the use of land-based renewable natural resources (RNR). It identifies incentives which are being, or need to be, changed to promote more sustainable use and conservation of biodiversity.

The Namibian Government's attention to addressing incentives is based on recognition that:

- people's behaviour is usually based on a rational (if not formalised) assessment of costs, benefits and trade-offs, not just on stupidity (in the case of degradation) or moral persuasion (in the case of conservation).
- so there is no point providing environmental information or training, if existing prices and policies still provide incentives for degradation.
- government and policies influence behaviour in many ways and not only through those regulations, permits and taxes specifically designed to regulate resource use.
- more sustainable, efficient, and equitable use of Namibia's natural resources is in the national interest, but is often not in the individual's private financial interest. This divergence between what is best for society and best for the individual often occurs *because* the free market system generally undervalues environmental goods and services -- unless, that is, government corrects market distortions.

Therefore, we need to assess *and where necessary modify* the incentives facing managers of natural resources to encourage optimal and sustainable use, and conservation of biodiversity. For

analysing incentives, it can be helpful to distinguish between the two main causes of biodiversity loss: overuse of a specific species or resource, such as over-grazing, and loss of habitat to other land uses threatening one or many species/resources, such as conversion of wildland for agriculture (discussed further in section 2)⁽¹⁶⁾. We therefore need to look at:

- incentives encouraging *overuse* of natural resources (result: excessive, unsustainable *demand*)
- incentives that discourage activities that are more compatible with conservation

Assessing incentives = assessing the costs and benefits that influence decisions by natural resource users.

of habitat and biodiversity (result: insufficient *supply* of environmental investment).

Often, in practice, there is some overlap. For example, subsidies to livestock agriculture in Namibia both encourage overuse of the rangeland and, by changing the relative returns of agriculture to wildlife, provide disincentives for wildlife uses. But the distinction serves a useful reminder to address both sides of the coin.

This paper will focus on the question of how incentives affect conservation through influencing land uses, particularly in communal areas of Namibia. The following section sets the context, by briefly reviewing the links between land uses and conservation. The main part of the paper, Section 3 identifies the range of incentives affecting land use options. It outlines how incentives encouraging overuse of rangeland and under-investment in wildlife are, or need to be, changed. Section 4 touches on incentives affecting other conservation issues in Namibia, and conclusion in Section 5 identifies some key steps in the process of reforming incentives.

2. LAND USES AND LINKS WITH CONSERVATION

This paper focuses on how incentives influence land uses, based on the premise that some land uses are likely to be better or worse from an environmental perspective. But before examining economic incentives, the assumption needs to be explored: how do land uses affect sustainable use of natural resources and conservation of biodiversity?

Most land in Namibia is only suitable for extensive production. On commercial land (44% of the land area) commercial livestock farming is the main use, often with supplementary game utilisation, and with a small but growing number of farms devoted exclusively to wildlife and tourism. In communal areas (41% of the land area), agro-pastoral systems are more common, combining extensive livestock management with small-scale cropping, and a diverse use of trees and other wild resources. Wildlife populations are particularly rich in the northeast and northwest, and in these areas tourism is growing rapidly (although, until recently, this was driven more by outsiders than by local residents). In communal areas, residents have use-rights over arable land, rangeland, and some trees¹, but no ownership of the land or resources. There are varying (but generally declining) degrees of common property resource management through traditional institutions.

2.1 Environmental affects of agriculture

From an environmental perspective, there are three main problems with the existing agricultural use of land:

¹ In June this year, legislation was passed to enable residents to gain use-rights over wildlife, by forming a "conservancy" -- a community institution with a defined boundary, membership, and wildlife management plan. The first applications are pending, awaiting finalisation of the regulations.

- unsustainable use of the land leading to degradation -- loss of productivity of arable land, rangeland, and tree cover.
- pressure on water resources -- lowering of water tables, salinisation, sedimentation of rivers.
- changes in biodiversity, particularly on communal land: fall in wildlife numbers and species, loss of wildland and habitat.

Unsustainable use and degradation

There is considerable uncertainty over the extent to which land is over-used for agriculture, and hence degraded. It can be difficult to measure the productivity of the land, more difficult to distinguish long-term decline from short term fluctuation, and even harder to identify over-utilisation as the major cause. Unsustainable use is most evident in the case of trees and forest⁽³⁾: use has far exceeded sustainable supply, and forested areas have simply disappeared⁽⁸⁾. Ecological productivity (the volume of vegetative biomass) and economic productivity (usable output, such as fuelwood and timber) have fallen correspondingly. Over-use of arable land leading to reduced soil fertility has been researched in Okavango⁽²⁴⁾, and is anecdotally reported elsewhere. Lost productivity of rangeland is most tangible in areas of bush encroachment: diverse and palatable grass species have been replaced with unpalatable bush, affecting around 14 million hectares in commercial farming areas alone⁽²³⁾. The productivity or usefulness of the land for livestock production is estimated to have fallen by around 30%, costing farmers around N\$100 million per year in lost income⁽¹⁸⁾. Although the causes of bush encroachment are not well understood, excessive and inappropriate grazing, and other management factors such as fire, are seen as contributing causes^(5,10). In other rangeland areas, changes in the composition of grasses, particularly loss of more palatable perennials is commonly reported^(18,20), and localised denudation of grass cover can be seen, particularly around permanent water points and settlements. Loss of grass cover can in turn lead to soil erosion, loss of seedbanks, and further environmental disruption.

The implication is that use of land for livestock need not necessarily entail unsustainable use and degradation, but it probably is doing so at present. Further expansion is likely to either increase pressure in areas of heavy utilisation, or place pressure on more marginal lands, which are more susceptible to degradation. However, degradation depends on *how* livestock are managed, not only on the numbers. Therefore incentives that encourage keeping of livestock need not necessarily aggravate unsustainable use, if they encourage good management. But as will be discussed below, livestock incentives often aggravate mis-management and rarely encourage more sustainable management.

Degradation of water resources due to agriculture is also unmeasured, but at least 3 trends are clearly discernible. In the Cuvelai drainage basin -- where the highest densities of people and livestock are found -- residents report have to dig deeper for water, and salinisation of existing supplies^(3,18). Along the rivers in the north and northeast, riverine vegetation is cleared for crop production, causing river bank instability and increased run-off, which in turn disturb the river system. On the westward flowing ephemeral rivers, dams to provide water for livestock by upstream farmers is one reason for reduced flows and declining water tables for farmers and wildlife downstream, in the more arid west⁽⁹⁾. It is impossible to disaggregate the affect

of agriculture from human and other causes of these changes in water resources. However, the paper assumes that further expansion of agriculture will increase the current unsustainable pressure on water resources

Biodiversity Loss

A complete assessment of changes in biodiversity (variety of genes, species and habitats) is not possible, but the fact of lost wildlife numbers and species on communal land is indisputable: "*Large mammals as a group have become virtually extinct in Owambo in the last half century. This region which harboured a diverse mammal community in recent times has the worst record of species loss anywhere in Namibia.*"⁽¹⁴⁾ Loss of biodiversity is also evident on commercial land in the extinction, or near-extinction, of certain predators (such as lion and wild dog) and scavenging birds (whiteheaded vulture, bateleur, cape vultures). Reduced diversity of plants and smaller animals is highly likely, given the reduction of wildland and forested areas) but is less well documented. Conversion of land uses and loss or degradation of habitat are the main causes of biodiversity loss, both internationally⁽¹⁷⁾ and in Namibia^(5,19). In Namibia, agriculture, including both livestock and crops, is the main habitat displacing activity.

The direct impact of livestock on wildlife habitat is mainly through competition for food and water, which is most acute at water sources, in drought years, and more arid areas. However, the indirect impacts are more important: human disturbance, clearance of bush for crop production, felling of trees for construction, conversion of seasonal grazing areas to permanent settlements, and other related activities lead to degradation or loss of habitat². This suggests that if land can be used for livestock in a way that minimises habitat disruption, the trade-off can be reduced. Similarly, crop production which avoids clearing riverine vegetation, will reduce risks to river banks stability, increased run-off and loss of biodiversity. Hence the importance of developing agriculture and wildlife as *complementary* land uses, as this provides incentives to conserve habitat while maintaining livestock production. Further exploration is needed of the degree to which the two land uses can in practice be complementary, and how to minimise conflicts.

A third and related cause of biodiversity loss is disruption of eco-systems, whether due to land conversion, use of pesticides, introduction of invasive organisms, or development of infrastructure. This may be due to agricultural expansion, or other developments. A different cause, unrelated to agricultural land use, is over-exploitation and over-consumption. However, this is mostly relevant for a few species with high subsistence or commercial value (e.g. fish, rhino) or conflict costs (e.g. wild dog).

The assessment of conservation incentives in this paper therefore rests of the working assumption that *incentives for expanded livestock production will continue to place pressure on wildlands, biodiversity, and eco-systems*. This negative affect will be reduced if livestock

² However, traditional agro-silvi-pastoral farmers rely on a variety of breeds and resources in order to spread risk⁽¹¹⁾ (unlike commercial monoculture production which relies on intensive management inputs to cope with ecological fluctuation), so is likely to require greater conservation of species and genetic diversity and of habitat than commercial production.

and wildlife are actively promoted as complementary land uses. However, more research on the nature, scale, and possible mitigation of these links between livestock and wildlife is needed, as well as on the impact of livestock and settlement on other components of biodiversity (other than wild mammals). As explained above, the paper also assumes that *in the absence of improved range management, incentives for expanded livestock production are also likely to lead to unsustainable use and degradation of rangeland*, though again further research is needed.

2.2 Environmental benefits -- and limitations -- of wildlife as a landuse

Given that loss of habitat is a major threat to biodiversity *"Namibia believes that the most effective and efficient mechanism for conserving biodiversity (genetic, species, ecosystem and culture diversity) is to prevent the destruction of landscapes and ecosystems"*⁽⁵⁾. Wildlife utilisation is the key strategy for this, because once wildlife pays its way, conversion of habitats to other productive land uses is less likely. Tourism depends on maintaining a good stock of key species, for tourists to see or hunt (and often a diversity of species, for the eco-tourist rather than just the "big-five"). This in turn means maintaining the necessary habitat and eco-system in which they can thrive, which is likely to be compatible with maintaining other components of biodiversity of less relevance to tourists. These positive impacts are evident on commercial land, where farmers can profit from wildlife. Although a full inventory of biodiversity change is not available, it is evident that the area of land used by wildlife, the variety of species, and total wildlife stocks have increased dramatically in the last twenty five years⁽⁴⁾.

However, some caveats should be borne in mind.

- in hunting areas, the emphasis will be on encouraging key hunting species. This may result in unsustainable stocking levels resulting in over-use of the range, and/or introduction of aliens with implications for genetic pollution of indigenous species. Specialisation in a few key species may disrupt overall eco-system balance⁽¹⁹⁾.
- the same problems may arise in tourism areas through over-stocking of popular photographic species.
- tourism enables the landowner to capture benefits of habitat and species conservation, but it does not provide economic benefits from (and hence incentives for) other ecological values, such as eco-system functions, genetic information, existence values etc.⁽²²⁾
- while conserving biodiversity habitat, tourists may cause other problems such as overuse of water resources, off-road driving, disturbance of sensitive species.
- there are a range of wildlife use systems with varying impacts on biodiversity. For example, intensive ostrich production and low-volume non-consumptive tourism will have quite different impacts. This paper, and work to-date in Namibia, has focused on the low-impact wildlife uses.

On the other hand, incentives for wildlife can actively promote other components of environmental management. In communal areas, development of "conservancies" with rights to manage and profit from wildlife can create the institutional mechanisms (e.g. for regulating access, sharing benefits) and capacity (e.g. in resource monitoring, planning and sustainable harvesting) for common property resource management. This then facilitates other aspects of improved environmental management.

The overall implication is that promotion of wildlife and tourism as a land use is likely to contribute to biodiversity conservation, but clearly is not sufficient. As the Green Plan goes on to say, "*habitat protection will have to be complimented by a wide array of other techniques.*" Furthermore, while promoting wildlife utilisation, attention should be paid to how the land and resources are managed within the sector, to minimise negative impacts and maximise benefits. Again, further research is needed, but this paper proceeds on the assumption that *incentives that promote wildlife as a land use are one useful strategy for encouraging biodiversity conservation and preventing conversion to more detrimental land uses.*

A final caveat is that economic incentives are only one factor determining the number of livestock, intensity of rangeland use, use of wildlife, and rate at which wildlands are conserved or converted. Other non-economic factors must also be taken into account. Nevertheless, the limited available evidence indicates that economic incentives are affecting land-use choices in Namibia, as outlined in the following section.

3. INCENTIVES AFFECTING LAND USE OPTIONS

3.1 Current incentives and strategy

Why are residents of communal land over-investing in livestock and under-investing in biodiversity? A major cause³ is the difference in both the scale and distribution of the costs and benefits of the main alternative land uses -- livestock and wildlife. Table 1 summarises who benefits and how from these two activities, with local residents (or livestock owners) highlighted in italics.

³ Local capacity, management institutions, and socio-cultural values are also fundamental factors determining land-use decisions.

Table 1: The distribution of costs and benefits from livestock and wildlife

	Livestock	Wildlife and Tourism
Benefits (who and how)	<p><i>Livestock owners:</i> meat, milk, wealth, status...</p> <p>Nam economy: output, exports</p>	<p>Nam economy: output, foreign exchange, multiplier effect.</p> <p>Local environment: species and habitat conservation.</p> <p>Private operators: profit</p> <p>Foreigners: use and non-use values of wildlife</p> <p><i>Residents:</i> jobs, market for local crafts, building materials etc</p>
Costs (who and how)	<p>Govt: boreholes, vet. and extension services, marketing support</p> <p>Local environment: degradation</p> <p>Neighbours: opportunity costs of grazing & water; lost productivity due to degradation.</p> <p><i>Livestock owners:</i> herders wages, transport costs.</p> <p>RSA and EU: price support in their markets</p>	<p><i>Residents:</i> loss of crops and livestock to problem animals; use of water and grazing by wildlife.</p> <p>Economy: costs of lost output</p>

It is clear that from the national point of view (environmental and economic), wildlife and tourism have several benefits, and livestock some significant costs, which are not experienced by local residents. They gain few of the benefits of tourism while bearing most of the costs, while the reverse is true for livestock. Yet it is the incentives facing local residents that most strongly determine land use, because residents are the de facto decision-makers on land use. These incentives are summarised in Table 2.

Table 2: Costs and benefits to local residents in communal areas

	Livestock	Wildlife
Benefits	high	low
Costs	low	high
net benefits (B-C)	+	-
comparative returns	+	-
Result	high investment in LS excess demand for rangeland	low investment in wildlife conservation

As the table shows, investment in wildlife by local residents is low for two reasons: the *net benefits* (benefits minus costs) are low or negative, so it is not worth the effort; and the

comparative returns (compared to livestock) are low, so alternative landuses are preferred. Conversely, investment in livestock and use of rangeland is high because both the net benefits and the relative returns are high. i.e. decisions made by local residents result in landuses that are quite different from what would be optimal from a national point of view, taking into account the full range of costs and benefits in Table 1⁴.

Strategy

To encourage landuses more compatible with national environmental and economic objectives, the Namibian Government is seeking to modify the incentives facing residents by focusing on:

- increasing the benefits of wildlife to local residents
- increasing the costs of rangeland use to livestock owners.

This in turn will reduce distortions affecting the relative returns between the two land uses (although reforms in the agricultural sector are primarily motivated by a desire to improve management within that sector, rather than to level the playing field with wildlife).

It would be inappropriate and impossible to *force* people to change to less-preferred land-uses. The aim is to create options and alternatives from which farmers can benefit, while also benefiting the national environment and economy. The next section looks at the existing and required incentives affecting the two land uses in more detail.

3.2 Creating incentives for wildlife by increasing local benefits

There are many reasons why local residents currently receive few benefits from wildlife. These constraints are analysed in Table 3.

⁴ Section 2 indicated that current land use is sub-optimal from an environmental point of view. Economic research, investigating some of the positive externalities of wildlife and negative externalities of livestock, indicates that it is also sub-optimal from an economic point of view. For example, the economic rate of return on wildlife tourism is generally considerably higher than the financial rate, given the generation of jobs, foreign exchange, and government revenue, even before environmental benefits are quantified. Meanwhile, the costs of degradation of agricultural land in the northern communal areas has been estimated at around NS100 million per year in lost output. However, this paper does not explore the *degree* to which current land use is sub-optimal. Instead it takes it as given that wildlife investment is too low and rangeland use too high, in order to focus on the role of incentives in determining and changing landuses.

Table 3: Addressing constraints to increase local benefits from wildlife

Existing constraint	Action to create incentives
No tenure over wildlife & tourism assets, so no benefits to be won from investment or sustainable utilisation.	Devolve tenure (use rights) to "conservancies"
Low market value (even with tenure, low financial benefits): - low value-added uses - markets for WL/T products undeveloped or inaccessible - low prices - lack of skills	- encourage trophy hunting and up-market tourism - facilitate joint ventures with private sector, develop international product markets - use tender process to bid up prices - training, enterprise support
Benefits earned by others Environmental benefits gained by the nation and foreigners. Value is not captured by residents (ie. positive externalities not reflected in market).	Transfers from beneficiaries: eg restocking of wildlife populations by Govt. at low prices. Grants from NGOs and donors. Conservation levy on tourists. "Eco-tourism" to capture environmental value in local prices.
Distortion of relative returns Has to compete with livestock as a landuse -- which has subsidies and powerful political support	Level the playing field. (see section 4)
IMPACT TO DATE	INTENDED IMPACT
Steep decline in wildlife numbers Inefficient use of wildlife (only for the pot or illegal trade)	Community investment in wildlife management. Efficient utilisation to maximise economic, financial & environmental benefits.

Table 3 also shows what actions are necessary to correct distortions and redesign incentives. To date, most action is occurring on the first two issues: creation of tenure and market value. Legislation to allow for creation of conservancies was gazetted in June 1996. Government and NGOs are assisting communities in northeast and northwest Namibia to register as conservancies, make landuse plans, develop management skills, establish tourism enterprises, and enter joint ventures.

It is worth noting that these measures are aimed at changing *both* the *distribution* of benefits and the *total value* of benefits generated by wildlife. e.g devolving tourism rights to communities *redistributes* some of the benefits of tourism: communities earn lease-fees that in the past either would have been earned by government, or would have been unpaid by private companies, operating for free or for a small voluntary donation. At the same time, the *total* benefits earned from wildlife are increased by expanding the markets, and by replacing open access use with local management institutions which can plan wildlife uses to maximise (economic and social) value.

However, generation of benefits is not the same as creation of *incentives* for wildlife management. Distribution of benefits *within* a community is also of vital concern. Benefits from wildlife will not lead to conservation unless they are shared amongst all the resource users and the link to wildlife is tangible⁽¹⁾. Therefore conservancies have to have an "equitable" revenue distribution plan, and NGOs are working with communities to implement equitable and visible revenue-sharing. Furthermore, incentives alone are insufficient without skills and institutions for resource management, and this is another focus of community work.

Indicators of impact -- comparison with commercial land

It is too soon to judge the impact of these changing economic incentives in communal land. However, a comparison with commercial areas helps indicate the relative significance of the four types of constraints (tenure, market value, externalities and relative returns), and the potential scale of impact from change. In commercial areas, the first two issues (tenure and low market value) are much less of a problem, but the second two remain, as outlined in Table 3.

Table 4: Incentives affecting wildlife benefits on commercial land

Constraint/incentive	Situation on commercial land
Tenure	Land tenure plus use rights over wildlife. Temporary tenure over mobile WL can lead to over-utilisation (eg kudu).
Market value of wildlife	Well developed links with trophy hunting and sport hunting markets, and increasingly with tourism. Problem of low venison price.
Positive environmental externalities not captured	Same problem as on communal land
Comparative returns to alternative land use	Relative returns distorted by livestock subsidies - much less so now than in the past.
IMPACT	Increase in wildlife numbers (80%) & species (40%). Increase in wildlife-based farm income.

The comparison highlights *the importance of tenure*. Since 1967, commercial farmers have had conditional use rights to use, hunt, and sell wildlife on their land. Furthermore, freehold ownership enables them to control, and charge for, access of tourists. As a result, hunting farms and guest farms have multiplied, and farmers have invested in game. In twenty years (1972-92), the numbers of wildlife occurring on commercial land virtually doubled, and the number of species increased by 40%. The share of wildlife uses in the total economic benefits derived from private rangeland uses appears to have doubled⁽⁴⁾.

This increase has happened *despite* the distortion of returns relative to agriculture. However, it does not mean that this distortion has no impact -- an issue which will be touched upon below.

3.3 Livestock: Reducing Incentives for Overuse

Incentives for investment in livestock

Prior to Independence, agricultural support was focused on commercial farmers through livestock subsidies, loans, extension and veterinary services, drought relief, and protected markets. Since Independence, more of this has been focused on the communal farming sector. All these measures contribute to increasing the private net benefit (B-C) of livestock production and hence provide farmers with incentives to expand herds and increase use of rangeland.⁵ But as Table 4 shows, there is a wide range of incentives, in addition to the tangible subsidies.⁶

The various categories of incentives and distortions that are typically related to distorted allocation of resources can all be identified here: general subsidies (investment, price support, drought relief), problems of tenure (land, water); market failure (unpriced communal resources undervalued); policy failure (drought relief aimed at welfare but causes degradation); distortion of relative returns (compared to alternative investments).

⁵ A change in net benefit of livestock affects production in complex ways. It does not necessarily lead to a similar change in farmers' investment, herd size and off-take rates. If farmers aim for a given level of income, rather than profit maximisation, prices and production may move opposite directions, particularly when prices (B-C) fall. For example, when karakul prices crashed, commercial farmers in southern Namibia intensified production to maintain basic income⁽¹⁸⁾. In communal areas where livestock provide a store of wealth and other non-consumptive benefits, rather than a source of income from meat sale, an increase in net benefit will lead to an increase in herd size but not in off-take rates. Much depends on how livestock fit into livelihood strategies, and there is no uniform pattern. Nevertheless, in general, whatever the benefit farmers receive from their livestock, subsidised livestock costs will enable farmers to maintain more livestock than could otherwise be afforded.

⁶ The table and this section do not provide a comprehensive review of the policy framework affecting agriculture. They are intended to highlight key incentives affecting livestock investment and hence the intensity of rangeland use and/or comparative returns to wildlife.

Table 5: Incentives and policies affecting livestock production and rangeland use

Incentive / policy	Affect on farmers and rangeland	Corrective Action
Government investment/services: boreholes, vet. research & extension services, soft loans	Reduces costs of livestock paid by farmers (redistributed to government). Encourages investment in livestock. C↓, (B-C)↑	Either reduce subsidies (happening in commercial areas) or equalise subsidies to alternative land uses.
Drought relief paid per head of livestock	Discourages destocking (tracking) during drought	Redesign drought relief
Price support, access to protected markets	Increases benefits from livestock. B↑, (B-C)↑	?
Risk of losing protected markets	Encourages short-term maximisation of production on commercial farms.	
Uncertain tenure Commercial: "under-utilised" land a target for redistribution. General insecurity re. future policy. Communal: tenure forthcoming, no sign of action against private fences.	Discourages setting aside land for recovery, drought reserve, or game, in case classed as "under-utilised." Encourages short-termism rather than planning for the future. Incentive to "land-grab" by installing fences and LS now (a de facto claim), before tenure is allocated.	Recognise need for rest periods, drought reserves, and game areas, in defining "underutilised". Decide land tenure policy Immediate moratorium on private fencing. Clarify tenure allocation criteria.
Communal land only:		
Free access to unpriced communal resources: water and grazing	Reduces costs to farmer (redistributes them to neighbours, local environment). C↓, (B-C)↑	Create tenure. Charge resource-user fees.
Lack of alternative saving/investment opportunities	Increases relative returns to livestock compared to alternatives.	Develop alternative investment options in communal areas

LS = livestock. C = costs to farmers. B = benefits to farmers. B-C = net benefits to farmers.

Source: much of this is summarised from NAPCOD, 1996

Incentives for over-use of rangeland?

The net policy impact is to encourage investment in livestock, but is this the same as encouraging *over-use* of rangeland? The extra benefits gained today from overuse should be balanced by benefits lost tomorrow from degraded rangeland. A wise farmer with a long-term perspective and tenure would be expected to take the long term costs into account before expanding production to unsustainable levels. However, this ignores two key issues:

(i) *avoiding degradation requires a long-term perspective*

Subsidies increase net benefits (B-C) from livestock, by reducing costs borne by the farmer or increasing revenue per head. This encourages additional investment in livestock *unless* the farmer expects this to result in future costs from degradation that are just as great as the current increase in benefits. This is unlikely given the incentives for farmers to take a *short-term view*, due to lack of land tenure in communal areas and insecurity over tenure and protected markets in commercial areas.

(ii) *degradation is caused by too many livestock, in one place for too long*

It is not just the number of livestock that matters. A key principle of arid land management is that vegetation varies enormously both temporally and spatially, and to prevent degradation livestock should "track" the vegetation -- this means moving herds to areas with rain, and destocking during drought and restocking afterwards. Therefore incentives that discourage *mobility* -- over time and space -- also encourage degradation. Mobility of livestock has been reduced by increased fencing, and provision of permanent boreholes. There are several constraints to destocking and restocking over drought cycles, including the fact that some drought relief subsidies are paid *per head* of livestock, giving farmers incentives to keep rather than sell their herds^{(6),7}.

The implication is that in assessing incentives, it is important to look beyond the direct subsidies affecting costs and benefits per head of livestock. Other factors affecting costs and benefits of improved management strategies, and affecting the trade-off between short-term and long-term costs and benefits, play a crucial role. Therefore assessment is needed of how incentives affect not only the costs and benefits of livestock productions, but also the relative costs and benefits of alternative management strategies, and the balance between short-term and long-term net benefits from livestock.

Correcting Distortions, Redesigning Incentives

Some of the suggested actions are already occurring. Commercial farmers are bearing a greater share of costs of livestock production, as government support diminishes. Drought relief is being redesigned. Many of the other correctives are under either discussion, as part of the land debate (eg allocating tenure over communal land and water points, and initiating resource user fees) or depend on a final outcome of the land issue (removing tenure uncertainty). A Cabinet-appointed taskforce is currently redesigning drought relief and addressing the broader issue of drought preparedness. However, identifying negative effects of existing policies is much easier than designing new, positive, incentives, as illustrated in the box below on drought relief reform options. The overall aim of agricultural reforms is not to hit farm viability with increased costs, but to redesign government intervention so that is targeted most efficiently and encourages improved management.

⁷ This is a clear example of policy failure: the intention is to boost *welfare*, by maintaining farmers incomes and assets. But the unintentional effect is to encourage degradation.

REDESIGNING DROUGHT RELIEF

Drought relief can serve distinct social, economic, and environmental objectives: to maintain welfare of farmers, particularly poorer farmers during drought; to maintain economic output of the sector, by protecting existing stock; to encourage drought-adapted range management for long-term sustainability. Conflicts can arise between the three: for example fodder subsidies help the capital stock to survive drought but go mainly to large farmers and discourage de-stocking. However, redesigning a system which meets social, economic and environmental criteria is not easy:

- One socially-oriented option is to avoid fodder payments per head of livestock and refocus subsidies on farmer welfare, de-linked from production. e.g. pension payments, food distribution. This would avoid incentives for maintaining livestock and could also be targeted at poorer households rather than those with most livestock. But then if the aim is social welfare, is temporary welfare support in drought years more necessary and effective than investment in long term rural development?
- Another option is to redesign subsidies to actively encourage de-stocking and re-stocking. i.e price support for sales at the onset of drought, subsidised purchases later. This environmentally-sensible option also supports economic objectives in the long-term by supporting sustainability of the sector. However it conflicts with social objectives because the subsidy goes mainly to larger farmers. Effectiveness also needs to be assessed: if applied to *all* sales, it will cover those that would have happened anyway, while if introduced late to encourage *additional* sales it penalises good managers and encourages delay. Furthermore, the price support may be captured by traders rather than farmers, or abused by simultaneously destocking and restocking. If communal farmers have few investment options for their cash from sales, will it effectively encourage destocking anyway?
- These problems with marketing incentives suggest it may be more effective to achieve environmental and economic objectives through mechanisms that promote destocking, restocking, and livestock mobility. eg: expansion of marketing infrastructure to allow rapid takeoff at the beginning of drought, assignment of areas for emergency grazing, facilitation of transport and exchange of grazing rights between areas. However, similar questions arise over who benefits and what additional impact is gained.

This suggests that economic and environmental objectives can overlap if maintenance of *long-term* rather than short-term agricultural output is targeted. However, one drought relief measure cannot effectively both increase short-term welfare of vulnerable farmers *and* maintain sustainable long-term output of rangeland. Schemes designed to promote the former will target people and activities quite differently from those designed to promote the latter.

The questionable effectiveness in achieving policy objectives raises another question: whether any of these schemes are sufficiently effective in generating benefits to farmer welfare, agricultural output, and/or long term productivity to justify the expenditure? Even if national benefits exceed costs, there are many other economically-viable activities also needing government support. Efficient allocation of scarce government resources therefore depends on the original question in this paper -- what land uses are optimal for Namibia?

Adapted from Dewdney (1996).

3.4 Relative Returns to livestock and wildlife

While it is impossible to quantify the impact of the incentives discussed above on over-use of rangeland and under-investment in wildlife, it is clear that they distort the *relative returns of livestock and wildlife*, and therefore discourage activities more compatible with biodiversity conservation.

An indication of this distortion, comes from research on financial and economic returns to game and wildlife on commercial farms⁽⁴⁾. An assessment of two farming options in the north/central commercial area, suggests that from the *national* economic point of view, the returns to a wildlife/tourism ranch were greater than from a livestock farm with supplementary game use. However, when the private *financial* benefits to the farmer were estimated, the two options provided very similar returns (both significantly lower than the economic returns), as shown in Table 5. This is largely because economic benefits, in terms of foreign exchange, unskilled jobs, and taxes generated by the lodge are not reflected in the benefits earned by the individual. If environmental costs and benefits of the activities were quantified and added, the economic benefits of wildlife use would be even greater, as would the gap between private (financial) and national (economic) returns.

Table 6: Comparison of estimated economic and financial benefits from livestock and tourism on northern commercial land. N\$1994

Benefits	Land Use	Cattle farm with supplementary game use ¹	Game lodge, wildlife only ²
National benefits ³ :			
- value added to national income per year ⁴		N\$ 129,635	N\$ 438,434
- economic rate of return on investment		8.5%	13.6%
<i>plus:</i>		+ economic linkages - externalities from land/water degradation ⁵	+ economic linkages + conservation values
Benefit to owner			
Net cash income per year ⁶		37,442	129,120 ⁷
Financial rate of return on investment		2%	4%

1 9,000 ha beef cattle ranch. Game used for venison and trophies.

2 14,000 ha plus lodge, used for non-consumptive tourism.

3 national economic benefits are calculated by converting financial prices to economic prices, taking account of, for example, the fact that foreign exchange has greater value and unskilled labour lower value than is reflected in market prices, and that tax payments are simply transfers not economic costs or benefits.

4 net value added -- net of costs and net of depreciation.

5 eg: negative effects downstream due to damming of rivers by farmers upstream, documented in Jacobson et al, 1995.

6 pre-tax profit

7 although the profit per year is high, so is the initial capital investment, so the return on investment is relatively low.

Adapted from Barnes and de Jager, 1995

Switching from livestock to wildlife has high transaction and capital costs (eg removing fences, restocking wildlife, building new infrastructure). Therefore the financial incentive -- or opportunity -- for farmers to switch completely is limited. It appears that many farmers have been gradually adding consumptive wildlife use to farming as a *diversification* strategy. Once game numbers have built up after some years, some then switch to wildlife (hunting and tourism) as the primary land use⁽²⁾.

Levelling the playing field

The measures discussed above to increase benefits from wildlife and reduce incentives for livestock would change the relative returns between the two. This would encourage greater investment in wildlife and biodiversity conservation. However, it is also important to note that:

- the main focus is on increasing farmers' benefits from wildlife, for which there is enormous potential. Farmers' costs of livestock should be reformed to encourage sound management, but not to the extent of making vast tracts of rangeland unviable. There are physical and market constraints to the extent to which wildlife would be viable as a landuse across Namibia.
- the Government's aim is not to replace cattle with wildlife, particularly in communal areas where livestock have multiple social and economic roles. The aim is to expand opportunities, encourage wildlife as a complementary activity, particularly in areas of prime potential, and to reverse negative trends in wildlife numbers and habitat.
- much greater understanding of the comparative benefits of wildlife and livestock from financial, economic, social and environmental perspectives, and the degree of complementarity between the two, is needed. Research is planned.
- the distortion in relative returns between wildlife and livestock is not the only distortion to be addressed. Investment in tourism is probably also affected by the fact that it does not qualify for manufacturing and export incentives (despite generating foreign exchange), as other investment opportunities do.

4. INCENTIVES AFFECTING OTHER CONSERVATION ISSUES

Apart from the comparison between livestock and wildlife, there are, of course, many other ways in which incentives encourage and discourage conservation activities in Namibia. A few of the main issues are highlighted here. These are explored in more depth in Richardson (1996) and NAPCOD (1996).

Water is probably Namibia's most scarce resource, and there is no doubt that it is being over-utilised at present. A range of economic incentives can be identified as culprits, but by far the most significant one is the fact that *price does not reflect value*. Water prices do

not even reflect the cost of provision, let alone other costs such as externalities and opportunity costs. In Windhoek, the Municipality has already increased prices significantly, and this seems to have more impact on demand than "awareness" campaigns alone⁽³⁾, but there is still a long way to go.

Pricing is not always the appropriate answer. In some rural areas, *local management* combined with restrictions on borehole proximity and use (rather than high price) are needed to ration supply. However, this requires clear *tenure* and management rights to rest with a defined community. This is currently lacking, although Water Point Committees are being established to maintain equipment, and in future to collect use fees.

There is no mechanism to ensure that *externalities* have to be taken into account by water users. For example, farmers dam the westward-flowing ephemeral rivers, to the detriment of other farmers, wildlife and vegetation downstream⁽⁹⁾. Catchment planning is needed to ensure that such costs are taken into account in water planning and utilisation.

The bureaucratic workings of government and the profit-seeking of the private sector can both create incentives for over-use in different ways. Currently, the water bill of all government departments is paid by Department of Works, so there is no incentive whatsoever for Ministries to reduce their water consumption. At the same time, any increase in water fees paid by users is received by Ministry of Finance, not Department of Water Affairs, so cannot be reinvested in sustaining the water resources (except indirectly if it leads to increased budgetary allocation). If DWA could retain some of the funds, the incentive to raise water prices would be stronger. A major forthcoming change is the establishment of a parastatal for bulk water supply. The commercially-oriented parastatal will have strong incentives to raise prices to cover operating and investment costs. However, there is a twist in the tale. Once it has sunk billions into new infrastructure to meet *long term* demand, it will need to increase revenue immediately to start recovering costs. If demand is price elastic, that means *increasing the volume of water sold* rather than increasing price. Until capacity is fully utilised, cost-recovery motives would lead it to encourage higher, not lower, water use.

The gap between those *receiving* revenue from resource uses and those responsible for *managing* the resource is true in other sectors also, such as **forestry and wildlife**. National Parks are suffering from under-investment, while the prices tourists pay capture only a part of the value they enjoy. Tourists express willingness to pay more than current prices (which are very low by international standards), particularly for conservation expenditure. But MET cannot receive park revenue so has little incentive to raise park prices. To address this, an Environmental Investment Fund is being established, so that legislated resource user fees can be levied that are paid into the EIF for reinvestment in the resource base.

Extensive **deforestation** in recent decades can be attributed to three main factors: lack of tenure over tree resources (except inside homesteads, where the number of fruit-bearing trees has remained constant⁽⁸⁾); felling for construction using traditional wood-intensive methods; and clearance for agriculture. The tenure problem may be resolved along with land tenure, and is also being addressed by new forestry legislation allowing

for communal forest reserves. The problem of lack of alternative materials is difficult to address: efforts are underway to stimulate alternatives to fuelwood for energy, but there is relatively little that can be done directly to bring commercial construction materials within affordable reach of the majority. The conflict between agriculture and trees is beginning to be addressed with research focusing on agro-forestry potential. In addition, efforts are underway to research and expand markets for tree-products, such as mopane worms and marula oil, to add value to these local resources⁽¹³⁾.

Promotion of agro-forestry, non-timber tree productions, and of wood production from managed woodland rather than plantations, counter the prevailing international development bias towards single species production -- another significant cause of biodiversity loss. Diversification is particularly important where rainfall is as low and variable as in Namibia. Not surprisingly, the limited research that exists indicate that local farmers are experts at diversifying risk: for example, planting different breeds of millet with different qualities to minimise risk, exploiting a wide range of wild foods^(11,21). It is therefore important that new "solutions" -- whether wildlife exploitation, ostrich-breeding, mopane coppicing, or the drought-resistant Okashana 1 millet -- are introduced as additional options, rather than with the single-species, single-activity focus too typical of commercial approaches.

5: THE PROCESS OF REFORMING INCENTIVES

It is clear to many people in Namibia that a range of incentives need to be reformed to discourage overuse of natural resources and encourage activities more compatible with conservation. Furthermore, many changes are already underway, and have been mentioned above. Most of these policy reforms emerged within sector ministries, probably from technical experts who would not call themselves economists or use the jargon of incentives. Giving tenure and raising prices are common sense to anyone who assesses the causes of degradation.

However, given that the significance of economic incentives is not always clearly evident, further efforts have been made to encourage the process of reform. A few key principles of this approach include:

- *promoting the principle that costs and benefits (not just ignorance) determine resource use*

The need to "educate" people in how to manage resources is more commonly recognised than the need to change the costs and benefits they face, but education alone will be insufficient.

- *developing cross-sectoral linkages.*

Unintended environmental impacts generally occur outside the sector where a policy was made. e.g. livestock decisions affect wildlife; road decisions affect water courses; tariff decisions affect use of numerous natural resources etc. After Independence, the Directorate of Environmental Affairs was created in the MET with the mandate to take a national, not sectoral, look at environmental planning and policies. Institutional mechanisms for cross-sectoral interaction have been established, the most notable of

which is Namibia's Programme to Combat Desertification. NAPCOD is a joint initiative of the MET, Ministry of Agriculture, Water and Rural Development, and an NGO, the Desert Research Foundation, with other Ministries, such as Lands, on the Steering Committee.

· *incorporation of resource economics*

A resource economics programme was established within the DEA in 1993 with 4 broad functions: research and demonstrate the *value* of natural resources; assess and recommend *optimal* uses of resources; analyse the *impact* of economics and related policies on resource use; help Namibia(ns) increase and capture benefits of natural resources so that values are *internalised* by resource users. Much of the work to identify incentives affecting wildlife and to expand resource use rights, values and markets, falls within the latter two functions. In addition, specific pieces of research have been commissioned to highlight economic aspects of various conservation related programmes. Within NAPCOD, *A Preliminary Analysis of the Economic Costs of Desertification* was carried out in 1994, and an analysis of *Policy Factors Affecting Desertification* was completed this year. Within the Biodiversity Programme, *Economic Values of Biodiversity* was also completed this year to serve as one chapter of Namibia's Biodiversity Report. A programme to build natural resource accounts has begun and will for the first time provide detailed information on the rates and costs of resource use. The value of these projects rests on increasing the information base while also creating *interdisciplinary links*.

· *providing information and awareness raising of policy-makers*

Dissemination of information and recommendations to policy makers is a priority. Joint projects, reports, leaflets, seminars, comments on other Ministries chapters for the National Development Plan, videos, suggestions for politician's speeches ... all help share information and raise awareness of how policy decisions may be changing incentives over resource use. Such materials need to be purged of either economic or conservation jargon.

· *combining economic development and conservation*

Namibia cannot afford conservation at the expense of development. The focus is on finding and promoting development options that meet both of these national needs. The potential contribution of natural resources to equity and poverty alleviation, not just to gross national product, is emphasised in research and in practice.

It is essential to recognise that incentives are only part of the solution. Sometimes they cannot be redesigned to meet conservation and development objectives together. Some non-market benefits simply cannot be captured in prices. There are times when regulations, planning, or political priorities rightly take priority. Or even if incentives are sending the correct signals to resource managers, other constraints undermine sustainable resource management. Nevertheless, it is clear that there is still plenty of potential to improve incentives in Namibia to further encourage sustainable use of natural resources for the benefit of growth and conservation.

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