Wildlife Management on Communal Land in Namibia

-An Economic Approach

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Wildlife Management on Communal Land in Namibia
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Förvaltning av vilda djur på kommunal mark i Nambia
-Ett nationalekonomiskt angreppssätt

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Abstract

In this paper the anti-poaching effects achieved under the actual implementation of the economically-based system for management and utilization of wildlife (Community Based Natural Resource Management, CBNRM) initiated in Namibia in 1995, is theoretically contrasted to the intended policy design. By contrasting a Nash equilibrium, where the park agency and the local community act like competitors rather than companions, to a collusive equilibrium, where the two actors work together as a united entity, more local anti-poaching activities is found in the latter case. Negative externalities, such as illegal hunting, could be understood as better internalized and, thus, a more preferable economically-based system for the management and utilization of wildlife appears. Despite great success in terms of increased wildlife number following the economic incentive approach, the model implications suggest conservation incentives to be even better realized if the implemented CBNRM policy in Namibia could re-establish the intended policy design. That is not to be understood as criticim of the approach as such. Rather it should be viewd as a contribution for further development and success.

Key terms: Wildlife management, Common Property Resource Management, Collective Property Rights, Economic incentives, Human-Wildlife Conflicts (HWC)

Sammanfattning

År 1995 implementerades ett nytt program i Namibia med det överordnade syftet att på lokal nivå skapa förutsättningar för bevarande och förvaltning av vilda djur på statligt ägd mark (communal land). Systemet kallas för CBNRM och är förkortning av engelskans *Community Based Natural Resource Management*. Programidén vilar i hög utsträckning på teorin om att kollektiva äganderätter och ekonomiska incitament kan användas för att uppmuntra människor att bevara vilda djur. Med andra ord, ett system som direkt eller indirekt genererar ekonomisk kompensation till de människor som bär kostnaderna för att leva i djurrika områden (exempelvis i form skadegörelse), kan verka mildrande på så kallade människa-djur konflikter.

I den här studien görs en teoretisk jämförelse avseende effekterna av jaktbrottsmotverkande åtgärder mellan, å ena sidan, den faktiska utformningen av CBNRM-programmet och, å andra sidan, det ursprungliga CBNRM-förslaget. Genom att använda en modell bestående av två aktörer: (*i*) en stalig och (*ii*) en lokal, där den förra styr över jaktkvoter och jakttillstånd, och den senare ansvarar för jaktbrottsmotverkande åtgärder, kan en jämförelse avseende effekterna av jaktmotverkande åtgärder under två olika jämvikter göras. I studien jämförs en Nash-jämvikt, där den statliga aktören och den lokala aktören agerar som konkurrenter istället för kompanjoner (programmets faktiska utformning), med en avtalad jämvikt (Collusive Equlibrium) där de två aktörerna samarbetar (programförslaget). Teoretiskt visar studien att mer jaktbrottsmotverkande åtgärder genereras i det alternativ där samarbete äger rum. Negativa externa effekter, så som illgal jakt, kan alltså förstås som mer internaliserade i det senare fallet.

Trots att CBNRM-programmets faktiska utformning är att förstå som en stor succé i termer av jaktbrottsmotverkande åtgärder och ökat antal vilda djur, visar studien att en utformning mer i linje med det bakomliggande förslaget skulle kunna generera än bättre resultat. Det är emellertid viktigt att påminna sig om att CBNRM-programmet är under ständig utveckling. Därför skall studiens resultat inte förstås som kritik mot system som sådant, utan istället som ett underlag för fortsatt framgång.

Nyckelord: Förvaltning av vilda djur, Kollektiva äganderättssystem, Ekonomiska incitament, Människa-Djur konflikter

Abbreviatons

ADMADE	Administration Management Design
CAMPFIRE	Communal Areas Management Programme for Indigenous Resources
CBNRM	Community Based Natural Resource Management
HWC	Human Wildlife Conflicts
MET	Ministry of Environment of Tourism (in Namibia)

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1 Introduction

Influenced by common property resource management theory[1] and feature stories from neighboring countries[2], an economically-based system for the management and utilization of wildlife was implemented in Namibia in 1995. This was formally done through the ntroduction of the Community Based Natural Resource Management (CBNRM) policy and legislation, ultimately allowing people residing on communal land to benefit from wildlife according to the same legal principles as freehold farmers. Despite sound policy planning, a policy-implementation is also a result of negotiation, lobbying and log rolling among groups with various agendas. From a natural resource conservation perspective the economically-based system approach has earned good results concerning wildlife numbers. Yet, from an economic incentives perspective, the design of an actual policy implementation could be relevant for how well people engage with respect to stated policy objectives.

The purpose of this study is threefold; Firstly, to describe the evolution of the common property resource management and utilization regime in Namibia. Secondly, make use of economic theory to portray the system fundamentals, and thirdly, to theoretically contrast and analyze the prevailing system to the original policy intent. The hypothesis is that differences between policy intent and implementation disturb management and utilization incentives, ultimately affecting conservation efforts in Namibia.

Most previous reference and a related analysis is found in Fisher et al (2005). Focusing on the benefit-sharing programme in Zimbabwe[3], the authors find that the programme outcomes depend on programme design, communal trade-offs between wildlife benefits and agricultural losses, and on how hunting licenses are set. The thesis topic also touches upon a literature focusing on optimal management of multiuse species, comprising species that are simultaneously resources and pests (see Zivin et al (2000); Rondeau (2001); Horan and Bulte (2004)). Related, however, with a contrasting point of departure, is the wildlife conservation literature under open-access. In Bulte et al (2003) the scope of economic incentives in the conservation of wildlife is explored. The authors finds that the conservation gains of economic incentives varies between various types of open-access harvesting techniques and among species.

The theoretical model applied in this study draws heavily on the model presented by Fisher et al (2005). Despite close points of similarities this analysis contributes to the existing literature in that it modifies an existing model to better picture the policy and economic realities in Namibia. In addition it uses the model framework to contrast the outcomes of a CBNRM approach based on a Nash-equilibrium (i.e. policy implementation), to outcomes generated by a collusive equilibrium (i.e. policy intent). Valuable information for this study was achieved during a SIDA-financed Minor Field Study (MFS) conducted in Nambia during the fall of 2004.

The essay is structured as follows: After a short country context in section 2, the CBNRM evolution is presented in section 3. Section 4 descriptively contrasts the policy intent to its actual implementation and relates it to prevailing wildlife use. The model specification is

[1] For more on common property resource management see Ostrom (1990) and Murphree (1993).
[2] Similar applied common property management programs in southern Africa are for instance CAMPFIRE in Zimbabwe and ADMADE in Zambia (Corbett & Jones, 2000).
[3] The resource sharing programme in Zimbabwe is called Communal Areas Management Programme For Indigenous REsources (CAMPFIRE). For more on CAMPFIRE see Muchapondwa, E (2001).

presented in section 5. In section 6 a Nash equilibrium is constructed to describe the prevailing policy implication, subsequently contrasted to a collusive equilibrium offered in section 7. The findings are finally stated in the concluding section 8.

2 Country context

Namibia is a large country covering about 830 000 km² of the south-western African coastal land surface. The climate is very dry ranging 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 therefore 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 and southern borders. Neighbouring countries are South Africa, Angola, Botswana and Zambia. (Mendelsohn et al, 2003)

Compared to the huge land surface the size of the population is rather small. Of the 1.7 million citizens, 30 percent live in urban areas. While mining, fishing, and tourism fuel the economy, the majority of the people live from subsistence agriculture and what amounts to the utilization of natural resources (Stefanova, 2005). The rural economy has two different tenure systems where 43 percent of the country – mostly in drier parts – contains private, medium scale commercial ranches (Barnes et al, 2001). In the less dry north the communal land amounts to 45 percent. Communal land is state owned, but occupied by rural tribal communities constituting the majority of the Namibian population. Communities practise traditional systems of pastoralism in the south and west, and agro-pastoralism in the north and north east. 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 areas. Of conservation importance in the north east are elephants as well as buffalo, hippo, sable, roan, lechwe, sitatunga, lion, leopard and wild dog. In the north-west, desert adapted wildlife species such as elephant, black rhino, mountain zebra, spring book, kudu and oryx occur (Barnes et al, 2001). Attractive scenery of value for tourism exists in both places. The number of international tourist arrivals has been steadily increasing over the past 15 years (MET, 2004; Stubenrauch Planning Consultants, 2004, cited in Turpie et al, 2005). Surveys have shown nature-based tourism to be the number one reason for visiting Namibia (SIAPAC, 2003, cited in ibid). Thus, sound wildlife- and nature conservation is essential for the country's economic growth.

3 The history of Poaching and the Development of CBNRM

In this section relevant institutional background for understanding the development of the economically based system in Namibia is provided. The bulk of the information originates from Long (2004), comprising analyses from the socio-economic research project Wildlife Integration for Livelihood Diversification (WILD) active from 2000 to 2003. Additional sources are referred to in the text.

3.1 The history of Poaching

Historically, natural resource conservation in Namibia (former South West Africa) focused on protected areas, game reserves and wildlife management on commercial farms. Communal areas, on the other hand, were distanced from regulatory policies. As of 1967 the Nature Conservation Ordinance was implemented allowing private farmers to utilise game in a controlled manner. That is, farmers on freehold land were allowed to hunt, sell, capture and relocate wildlife according to their own economic interests. This approach subsequently led to a substantial increase in wildlife numbers on the freehold farms. According to Barnes and de Jager (1996) the total wildlife numbers on freehold land showed an 80 percent increase between 1972 and 1992. On the communal land, on the other hand, wildlife numbers were declining.

During the former wildlife management panacea wildlife use in the communal areas was regulated in the sense that permits to hunt, i.e. legal harvest, were issued by authorities in South West Africa (now South Africa). Locals' hunting for subsistence and for limited sale hardly ever had a permit, and their hunt was, thus, regarded illegal (Owen-Smith, 2002). Wildlife use among local people was – and often still is – rooted in the culture, providing food, income and status as well as medicinal items. Instead of centrally regulated and issued permits, hunting activities were, more or less, controlled by influential traditional leaders and informal rules. Despite "illegal" subsistence hunting, it was not until the Angola war in the mid 1970s, that the significant changes in the wildlife stock on communal lands were observed. The wildlife stock dropped from estimated 160 000 to 15 000. Most targeted were charismatic species such as elephant, rhino and zebra. The devastating change was to a large extent explained by the utilization of firearms, brought in both by Angolans for purchasing reasons (i.e. skins and ivory) and by South African Defense Force (SADF), for defense reasons. Beginning of the 1980s one single researcher recorded 120 elephant cadaver, primarily shot and with tusks removed (Owen-Smith, 2002). Throughout the western area of Kunene
(north-western Namibia), elephant numbers decreased from 300 in 1970 to less than 70 in 1982.

The serious damage, both in regard to wildlife conservation and the socio-economic development within the communal areas in Namibia, was not emphasized until the Namibian independence from South Africa in 1990. Pioneering ideas and refreshed rhetoric finally boosted an authorial shift away from resource management, led by the heavy hand of the state, to a cooperation between the local (i.e. communities represented by NGO's) and the revitalized central level (i.e. Ministry of Environment and Tourism, MET). Of significant importance for local involvement in conservation efforts in Namibia was the establishment of

the Namibia Wildlife Trust (NWT)[4]. With the main objective to bring poaching to an end the NGO in collaboration with communal leaders initiated the Community Game Guard Programme (CGG). In practice local guards were part-timers patrolling their areas at least once a month (Jones, 1999). Their primary purpose was, however, not to detain poachers, but to monitor wildlife and suspicious activities. The guards subsequently reported to the headmen who would decide upon appropriate measures. In the case of a serious poaching incident, the headmen would hand over the case to the responsible government agency. Based on an anti-poaching agenda, the CGG enhanced local conservation involvement, and the illegal hunting in the area was close to eliminated.

3.2 The development of CBNRM

Influenced by common property resource management theory and feature stories from neighboring countries such as Zimbabwe and South Africa, an economically-based system for the management and utilization paved the way for the implementation of the CBNRM policy and legislation.

Community Based Natural Resource Management, CBNRM, is defined in Jones (1996) as "something that takes place where a specific group of people have clearly defined rights over a resource and collectively take decisions over the use and management of the resource. By implication this defined group of people are able to retain any financial benefits that might accrue from the use of the resource and are able to decide how they will use the benefits" (p. 3).[5] The CBNRM policy and legislation[6] was approved by the Namibian Cabinet in March 1995. From then on the residents of communal areas are entitled– in the same manner as freeholds farmers – to form a common property resource management institution called a 'conservancy' (Corbett & Jones, 2000).[7] A conservancy on communal land can be defined as "a community or group of communities within a defined geographical area who jointly manage, conserve and utilise the wildlife and other natural resources within the defined area" (Jones, 1995). Ultimately the formation of conservancies allows the residents to have these registered and hence, acquire from the state (i.e. MET), exclusive use rights over game and commercial tourism within a defined area. The conservancy boundaries will have to be negotiated and agreed upon with neighboring communities and conservancies. Additionally, a conservancy committee representing the people (i.e. members) residing the conservancy must be established. The committee must include a traditional leader to uphold linkages and collaboration with traditional authorities. In that way the conservancies will have a constitution and legal status and so be considered as a corporate body that can sue or be sued. The selection of members is generally left to the community itself. A conservancy, no matter if it is located in a private or communal area, can then be managed as a unit and the landowner/members of the conservancy can share the benefits or returns produced from their

[4] Namibia Wildlife Trust (NWT) is a non governmental organization (NGO) established in 1981. For brief history and more on the organizational work and efforts see Owen-Smith (2002).
[5] The CBNRM policy design draws heavily on common property resource management theory (See Ostrom (1990).
[6] For a more comprehensive overview of what is stated in i) the policy document and ii) the legislation, see Appendix 2 and 3.
[7] As concluded by Murphree & Metcalfe (1997) the concervancy concept must be understood and analysed in the light of the prevailing policy and legislative setting. A conservancy is a management institution. That is, depending the policy design and implementation a conservancy can differ both between and within counties, Hence, from now on the conservancy model – as designed and implemented in Nambia – will be referred to as the CBNRM policy and legislation and/or the CBNRM approach.

joint efforts. Table 1 provides descriptive statistics on current registered conservancies. As shown the biomes, woodland, desert, and savanna, are all represented in the conservancy fauna. The number of total registered members per km² varies from 0,02 to 17,4, implying concervancy differentiation both in regard to number of registered members, and acreage. In addition the percent of registered members of total area population varies from 1 to 50. The immense difference between the share of registered members of area population among the conservancies has boosted an already on-going discussion in Namibia on whether the registration procedure should remain or not. To prevent exclusion and discrimination opponents to current procedure hold that residents in a conservancy area automatically should be regarded as members. Proponents, on the other hand, see the registration procedure as the foundation upon which collective property rights and economic incentives rest. That is, without active engagement and possibility to exclude, economic incentive regimes becomes somewhat flawed. Furthermore, the Table 1 shows that the first four conservancies were registered in 1998. In 2003 the conservancies covered about 7.1 million hectares amounting to 28 percent of the communal land in Namibia. In late 2004 (not shown in the table) about 31 conservancies were up and running.

Table 1 Registered communal area conservancies

	Name	Region	Biome	Date Registered	Total registered members per km²	Percent registered members of area population
1	Nyae Nyae	Otjondjupa	Woodland	Feb -98	0,08	50
2	Salambala	Caprivi	Woodland	Jun -98	3,76	50
3	Torra	Kunene	Desert	Jun -98	0,13	38
4	Khoadi //Hôas	Kunene	Desert/Savanna	Jun -98	0,48	46
5	Uibasen-Twyfelfontein	Kunene	Desert/Savanna	Dec -99	0,21	31
6	Doro!Nawas	Kunene	Desert/Savanna		0,11	7
7	Kwandu	Caprivi	Woodland	Dec -99	9,47	30
8	Mayuni	Caprivi	Woodland	Dec -99	-	-
9	Wapuro	Caprivi	Woodland	Dec -99	11,49	40
10	Purros	Kunene	Desert	May -00	0,02	33
11	Tsiseb	Erongo	Desert	Jan -01	0,12	38
12	Ehirovipuka	Kunene	Savanna	Jan -01	0,25	-
13	Marienflüss	Kunene	Desert	Jan -01	0,04	40
14	Oskop	Hardap	Shrub/Savanna	Feb -01	0,21	17
15	Sorris Sorris	Erongo	Desert/Savanna	Oct -01	0,13	48
16	Mashi	Caprivi	Woodland	Mar -03	2,42	18
17	Omatendeka	Kunene	Savanna	Mar -03	0,23	5
18	Otjimboyo	Erongo	Desert/Savanna	Mar -03	0,33	5
19	Uukwaluudhi	Omushati	Savanna	Mar -03	17,40	83
20	!Khob-!Naub (Kalk Plateau)	Hardap	Shrub/Savanna	Jul -03	0,16	3
21	//Gamaseb	Karas	Shrub/Savanna	Jul -03	0,28	4
22	//Huab	Kunene	Desert/Savanna	Jul -03	0,20	4
23	Orupembe	Kunene	Desert	Jul -03	0,04	1
24	Sanitatas	Kunene	Desert	Jul -03	0,05	-
25	Anabeb	Kunene	Savanna	Jul -03	0,21	5
26	Sesfontein	Kunene	Savanna	Jul -03	0,17	6
27	Okongundumba	Kunene	Savanna	Jul -03	0,40	2
28	N#a Jaqna	Otjozondjupa	Woodland	Jul -03	0,09	10
29	Ozondundu	Kunene	Savanna	Jul -03	0,23	1
Total					**0,08**	**37 163**

Source: MET/CSD (2003) cited in Long (2004)

4 Policy Intent versus Policy Implication and the Use of Wildlife

In the creation of good institutions and relevant policies, economics can be used to create incentives that could minimize negative external effects on the environment. For these incentives to work, however, policy and legislative flaws, potentially increasing the "market failures", need to be addressed. It is important to keep in mind that the CBNRM reality is still in its infancy. Hence, discrepancies between policy intent and policy implementation on the one hand, and legal provision and policy implementation on the other hand, should be understood as challenges rather than problems.

4.1 Intent versus Implication

The actual rights given to registered conservancies through the CBNRM policy and legislation are the following (Jones 2003 (cited in Long, 2004)):

- ✓ Registered conservancies have unlimited rights over species represented on the schedule of huntable game.
- ✓ Registered conservancies can enter into a contract with trophy hunting companies and earn income by selling the conservancy trophy hunting quota to them.
- ✓ To enable the development of commercial tourism facilities, registered conservancies can enter into a contract with tourism companies.
- ✓ Registered conservancies are free to do whatever they like with income earned from various contracts.
- ✓ Conditional upon wildlife monitoring, acknowledge of wildlife number and trends, registered conservancies can suggest trophy hunting and other quotas to the MET.
- ✓ Individuals within registered conservancies have the right to shoot most problem animals if needed. This includes protected and specially protected species. Incidents involving specially protected species must be reported to the MET.
- ✓ In time of drought registered conservancies can hinder competition between wildlife and livestock by harvesting huntable game. Additionally, permits to remove other species can be applied for at the MET.
- ✓ Applications by registered conservancies for other game utilization (e.g. live capture, sale of wildlife or other use of protected species) can be made to the MET.

Despite the fast countrywide development of conservancy formations on communal land, the policy rhetoric is not always as clear-cut as it seems. For instance the CBNRM-legislation is not particularly straight-forward on conservancies' rights to tourism. The amended legislation definition of "non-consumptive utilization over wildlife" tries to acquire rights to conservancies to benefit from commercial tourism activities within conservancy boarders. As long as concessionary rights over commercial tourism are commonly uphold by private actors the legislative intent could, however, be understood as somewhat blurred. Furthermore, the policy and legislative framework does not take land-use planning undertaken by the conservancies into consideration. Land-use planning is when land within conservancies is divided into activity specific zones. Some zones are for wildlife and tourism, whereas other are devoted for farming etc (Brereton-Stiles, 2004). From an economic standpoint the zoning system could reduce the negative external effect associated with collective good attributes

(i.e. non-excludability and non-rivalty). Yet, the lack of legislative framework leads to enforcement flaws, in turn limiting the aim of zoning.

An additional management activity not provided for in the legislation is the community anti-poaching activities. That is, communities can employ game guards to deter poaching and to monitor wildlife. Although community game guards are there to address and curtail illegal hunting, they have no mandate in law to do so.

Table 2 presents a comparison between policy intentions, legal provisions and implementation of the CBNRM policy and legislation is provided.

Table 2 Policy Intention vs. Legal provision and Implementation

Policy Intention	Legal provision	Implementation
Communal area conservancies should gain the same rights as freehold farmers especially the right to use huntable game* for own use without permits or restrictions on numbers.	Nature Conservation Amendment Act of 1996 makes provision for communal area conservancies to have same rights as freehold farmers.	MET officials insist on communal area conservancies receiving quotas that include huntable game for own use and that permits must be acquired**.
Conservancies expected to develop management plans once they have been registered.	No legal provision for conservancies to develop management plans.	Government officials starting to demand a management plan before a quota (for trophy hunting and own use) will be issued.
Conservancies expects to set own quotas to be endorsed by MET.	No legal requirement for quotas to be set for own use; legal requirement for quotas for trophy hunting.	Government officials decide quota often arbitrary – in at least one case the official quota far excided that requested.
Conservancies should receive concessionary rights to commercial tourism.	Nature Conservation Amendment Act of 1996 gives weak tourism rights (gives rights to 'non-consumptive' use of wildlife which includes for recreational purposes. No relevant tourism legislation.)	Government officials have issued new hunting private sector concessions where there are registered and emerging conservancies.
Hunting concessions previously held on communal land by private sector should be transferred to conservancies.	Nature conservation Amendment Act of 1996 gives conservancies trophy hunting rights.	Government officials have issued new private business sector concessions where there are registered and emerging conservancies.
Conservancies should be able to enter into joint venture partnership and other business arrangements with private sector.	Policy on Promotion of Community-based Tourism of 1995 promotes joint venture approaches and aims to create a "supportive and enabling legal framework".	Tendency by government to interpret policy as giving it the right to approve joint venture agreement.
Conservancies should take over greater role in managing wildlife including problem animals.	Nature Conservation Ordinance of 1975 enables citizen to shoot a predator that threatens the lives of people or livestock. Shooting of lions has to be reported within 24 hours; elephants may only be shot by special permits.	Officials recently refused to allow a problem lion to be shot by trophy hunters in a conservancy denying residents compensation for stock losses.

* Huntable game refers to oryx, springbok, kudu, warthog, buffalo and bushpig [8].
** MET has now acknowledged that quotas and permits are not required for own use of huntable game.
Source: Corbett and Jones (2000)

As notified by Corbett and Jones (2000) the information in Table 2 highlights the fact that the right to utilize and benefit from wildlife on communal land is both conditional and limited. It is conditional in the sense that communities need to form a conservancy in order to legally

[8] MET has suggested the latter two to be removed from the schedule of huntabel game (Long, 2004).

obtain the use right, and limited do to that 'ownership' over wildlife only confers to a limited number of defined species. That is, for any other utilization than of huntable game a permit and/or a quota are required from the MET.

4.2 The Use of Wildlife

Ideally conservancies increase local responsibility and useright over wildlife. Long et al (2004 p 8) write: "Not only has there been demonstrable growth in the establishment of conservancies, there has also been considerable success in contributing to the recovery of wildlife species." The statement is backed up by wildlife numbers from sightings recorded for the Kunene region in north-western Namibia (see Table 3). Although the table shows increased sightings for almost all recorded species, national count data would be necessary for a more far-reaching conclusion. On the assumption that the table results would be valid for the whole Namibia wildlife stock, policy implications for a future conservation perspective could be understood as twofold and somewhat contradictive. On the one hand, more wildlife is likely to increase the tourism potential. Considering the larger part of the total conservancy income to be generated from community-based tourism enterprises and trophy hunting, a frequent occurrence of big game such as elephants, rhinos, lions and cheetahs is likely to boost conservancy benefits. Both consumptive (e.g. trophy hunting) and non-consumptive (e.g. viewing safaris) value adding are likely to generate benefits. On the other hand, increased wildlife numbers forces people to compete for scarce water and land resources. Economically this could mean increased opportunity costs of living with wildlife and potentially amplified motives for human-wildlife conflicts.

Table 3 Wildlife sightings recorded for Kunene 2001-2003[9]

Species	2001	2002	2003
Baboon	144	116	203
Duiker	13	6	3
Elephant	38	24	44
Gemsbok	1 589	2 616	3 484
Giraffe	216	212	189
Hyena	1		
Jackal	45	79	60
Klipspringer	4	14	20
Kudu	261	297	241
Ortrich	570	659	815
Rhino	1	1	6
Springbok	11 662	14 470	16 733
Steenbok	54	85	114
Zebra	1 200	1 274	1 416
Total	**15 798**	**19 853**	**23 328**

The cost of living with wildlife in Namibia involves both direct costs (e.g. stock losses, crop and water point damage, deterrent costs, and threat and loss of human lives), and indirect costs (e.g. opportunity costs of time and labor, and nuisance of living with wildlife) (see Sutton, 2001). In lack of human-wildlife conflict data on the national level, regional data serve as example here. Data from the Caprivi region (north-eastern Namibia) in 2001 shows bushpig to be the only huntable game reported as causing damage. The most common species reported to MET as reason for nuisances was instead elephant (≈230 incidents), hyena (≈210 incidents), crocodile (≈75 incidents), hippo (≈70 incidents), lion (≈50 incidents) and baboon (60 incidents). Between 1996 and 2001 the total number of reported incidents involving damage to crops by wildlife in Caprivi amounted to 384. Approximately 75 percent of the incidents were caused by elephants. From a household survey in Kunene elephants were reported to represent 81 percent of the species causing damage to gardens (Suich, 2003, cited in Long et al 2004). Other problem species in regard to damage to crop and gardens are warthog, monkeys, porcupine, springhare, antelopes, baboon, hippo and birds.

[9] The table is collected from Long (2004) who refers to Annual game count data from the NASCO NRM working group.

In regard to livestock predation, MET data from Caprivi for the same period involved 246 predator incidents. Lions counted for 64 percent of the reported incidents involving stock death, crocodiles for 20 percent, and hyenas for 11 percent. In Kunene the black jackal are reviewed as posing the greatest threat to livestock.

One conclusion to be drawn from the above presented data is that, the most frequently reported species are protected or specially protected species according to national and international treaties. Hence hunting is restricted. That is, to "use" protected or specially protected species applications to the MET must be made. Furthermore, to enable trophy hunting on communal land, the conservancy must be registered as a hunting farm.

Despite prevailing human wildlife conflicts, the conservancy legislation rests upon the belief that engaged and empowered people can manage resources sustainably, as long as the generated benefits exceed the costs. In other words, with the right incentives the local community is believed to "protect what is theirs". If that implies to agricultural activities or wildlife conservation is, thus, a relevant policy consideration.

5 Model specification

As mentioned in the introductory section, the theoretical model applied here draws heavily on the model presented in Fisher et al (2005). The following model section uses economic terminology to describe the prevailing resource management and utilization principles in Namibia. The model framework subsequently allows economic incentive outcomes under the policy implementation to be contrasted to the policy intent.

To capture the interaction between a local and a central level the model comprises two agents; a park agency and a local community[10]. The park agency sets the hunting quotas and offers hunting permits, while the local community controls (for) anti-poaching activities. Both agents generate economic benefits from wildlife. Benefits accrue from tourism involving both consumptive wildlife use (e.g. trophy hunting) and non-consumptive wildlife use (e.g. viewing safaris). The park agency primarily collects revenue through trophy hunting permit fees and game parks entrance fees. The community generates economic benefits from wildlife through joint ventures with private entrepreneurs or community campsites. As opposed to the park agency, the community also generates benefits from agriculture, forming a trade-off situation between wildlife conservation and agricultural production.

The two agents in the model are set with a fixed amount of land. In Namibia each square kilometer is populated by an average of just over two people. However, the diverse availability of natural resources cause an unevenly population spread (Mendelsohn et al 2003). Population clusters are primarily found around sites with favorable environmental conditions. Not surprisingly, the same goes for wildlife. Despite the 14 percent of the state protected land, wildlife roam in and out of national parks, not rarely causing nuances to adjacent people. Subsequent to the CBNRM policy and legislation the park agency should no longer generate economic benefits from hunting permit fees on communal land. Thus, some economic revenues will be transferred from the state to specific communities on communal land. In the model the issuing of hunting quotas and permits to a community implies giving the locals "a share of" hunting profits captured by the α. Further, the share of benefits generated by non-consumptive tourism is expressed by β. Assuming the profit shares to be fixed over time and to satisfy $0 \leq \alpha \leq 1$ and $0 \leq \beta \leq 1$, the remaining benefits accrue to the park agency.

To delimit misunderstandings and confusions on how the parameters α and β are to be interpreted, a short clarification is worthwhile. In reality the "benefit-shares" are not limited to a revenue share between resource authorities and communities adjacent to national parks (e.g. "park and neighbor" or co-management approaches). More specifically, α and β refer to a wider interpretation of benefit-sharing, involving community-based power and control, defined rights, and collective decision over the use and management of the resources at hand. That is, after a conservancy is registered it is up to the conservancy itself to manage its resources within the limits of the national law (Jones, 1996).

[10] Throughout the model section the expressions local community, registered conservancy and specific community are used inter-changeably.

5.1 The wildlife constraint

In the model presented here all wildlife is regarded as one entity, ignoring the wildlife divergences across various species. No account is taken to wildlife stock growth; hence, the initial wildlife stock is taken as given and is expressed as $\overline{W}$. To control stock size the control variables H and Q are applied. The former, H, represents legal hunting/harvest of wildlife, i.e. permitted trophy hunting, own-use hunting and problem animal harvesting. The latter, Q, is the quantity of poaching, i.e. all hunting performed without permission. Irrespectively of the historic or prevailing resource management panacea in Namibia, the net wildlife stock is expressed as the gross stock minus legal and illegal hunting activities:

$$W = \overline{W} - H - Q \tag{1}$$

The circumstances and motives to engage in illegal hunting are, however, expected to vary between different management schemes. That is, the functions H and Q are likely to depend on the various built-in incentives in the resource management regime.

5.2 Poaching

As mentioned earlier poaching skyrocketed in the 1970s. The devastating big game losses were primarily caused by foreign intruders equipped with firearms (Owen-Smith, 2002). Today few people residing communal land have own access to weapons required for big game hunt (Brereton-Stiles, 2004). That is, the greater part of present poaching activities among locals refers primarily to small-scale subsistence hunting of relatively less relevance for conservation management. Furthermore, early collaborative anti-poaching efforts, such as introduction of community game guards, boosted a willingness among locals to protect "their" wildlife, ultimately affecting poaching engagement negatively.

Hence, based on historic examples, the model relies on the assumption that i) big-scale poaching in Namibia is primarily organized and mannered by outsiders, and that ii) policy instruments could be applied to motivate locals to combat illegal hunting. This analysis should derive a poacher's decision to engage in illegal hunting from an optimization problem, where a function comprising control variables for benefits and costs obtained from the activities, is maximized. To address the focal point in this paper, i.e. a community's incentive to combat or collaborate with conservation efforts provided by the CBNRM approach, the poacher's optimization is subsumed in a behavioral function. The total quantity of illegally hunted wildlife is expressed as a function of anti-poaching activities, A, such that

$$Q = Q(A) \tag{2}$$

As illustrated in Figure 1, it is assumed that $Q'(A) < 0$ and $Q''(A) > 0$. Hence, the higher the A, the lower the level of poaching activities. If, however, policy instruments are ineffective or insufficient A could be negative, implying that some people from the community are cooperating with the poachers.

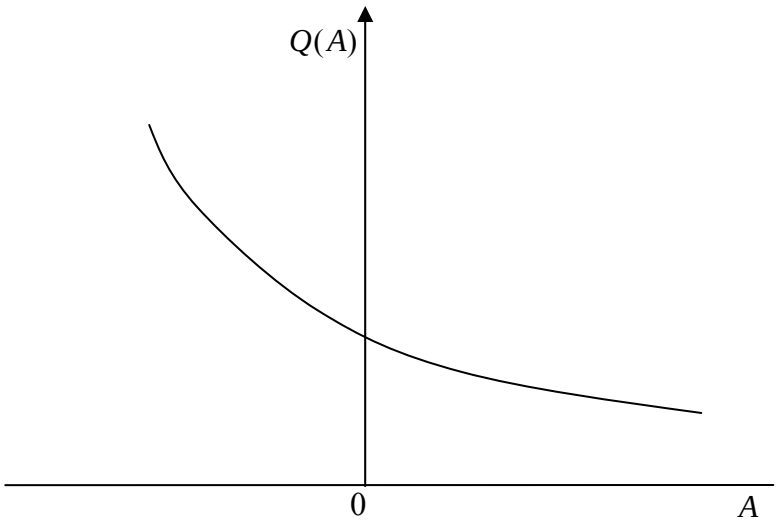

Figure 1 *The quantity of poached wildlife depends on anti-poaching activities.*

Allowing the quantity of illegal hunting to be set by the level of anti-poaching engagement, an explanation of how the community chooses the level of A is still required. This will be further explored in section 5.4.

5.3 Park Agency

5.3.1 Objective Function and First Order Condition

While the implementation of the CBNRM policy and legislation provides use rights over wildlife to specific communities, the MET can be understood as having the legal responsibility for the nation's wildlife. In the model the MET is represented by the park agency. In reality the commercial wildlife sector involves more agents than the two represented in the model. However, considering the MET as the overall commander over hunting concessions and concessionary rights to commercial tourism, additional operators such as private businesses are included in the park agency. Understanding private businesses and park agency as one body also explains why the park agency will be modeled as a profit maximizer although some hunting permits are, more or less, freely transferred from the state to the communities on communal land.

The park agency gains revenues through hunting permit fees generated from operations on hunting concessions. In the model the park agency revenue, pH, comprises the price of a permit, p, and the total number of issued hunting permits, H. The permit price is assumed to be fixed. This is a valid hypothesis considering the high number of registered hunting operators in Namibia. In 2004 trophy hunting was permitted on approximately 500 registered hunting farms (Damm, 2005). Additionally, several countries in eastern and southern Africa compete within the hunting tourism sector, further strengthening the price-taker assumption (Fisher et al, 2005).

Parallel to revenue from consumptive hunting activities, the park agency also benefits from non-consumptive tourism, e.g. parks entrance fees.[11] As illustrated in Figure 2 the non-consumptive gains in the model is expressed as a function of the wildlife stock, $T(W)$. Revenues are assumed to be increasing with the wildlife stock at a decreasing rate, i.e. $T'(W) > 0$ and $T''(W) < 0$. The assumption is valid since limited possibilities to accommodate tourists, parks limited carrying capacity etc rule out the wildlife tourism revenues to increase at the same rate as the wildlife stock.

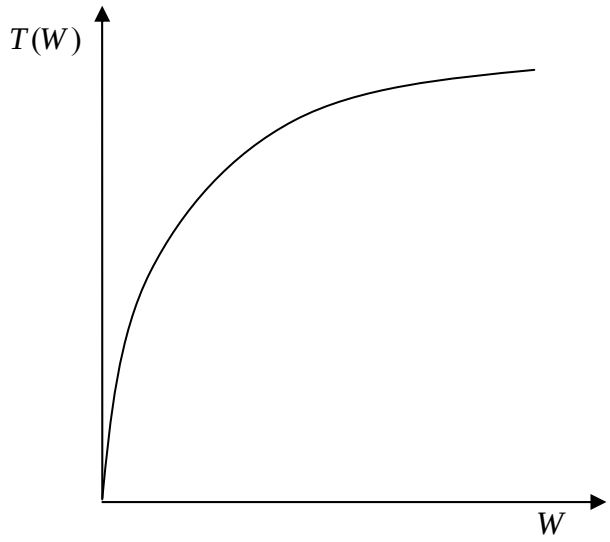

Figure 2 *The revenues increase with the wildlife stock at a decreasing rate.*

The CBNRM policy and legislation provides for community residents to form conservancies and have them registered as commercial tourism concessions and/or hunting concessions that enable trophy hunting on communal land. In practice this means a transfer of wildlife revenue from the park agency to the community agent. Hence, the issuing of hunting quotas and permits to specific communities ultimately implies giving the conservancy members a share of hunting profits. In the model this share is represented by α.

Analogously to the hunting "benefit-sharing" argument, revenues generated by the exclusive use rights over game for commercial tourism, provided by the CBNRM policy and legislation, is expressed by β.

In sum, by allocating quotas and permits for trophy hunting and non-consumptive use rights of wildlife for recreational purposes (i.e. tourism) on communal land, the park agency gives the share α of pH, and a share β of $T(W)$ to the local community. The remaining benefits accrue the park agency. Using equations (1) and (2) the remaining sum of profit is expressed as,

$$\prod = p(1-\alpha)H + (1-\beta)T(\overline{W} - H - Q(A)) \qquad (3)$$

[11] Understanding private businesses and park agency as one body "parks" refers both to national parks as well as private game parks or likewise.

There are two endogenous variables in this model: H and A. The park agency takes A as given, whereas H is chosen optimally. Equation (3) reveals a trade-off situation for the park agency between the two sources of revenue. A higher H increases pH but decreases $T(W)$.

The park agency maximizes profit with respect to H such that

$$p(1-\alpha) = (1-\beta)'(\overline{W} - H - Q(A)) \tag{4}$$

Notably, for an increase in issued hunting quotas and permits, H, the park agency reduces revenues from tourism as the wildlife stock decreases. Condition (4) implicitly defines the park agency's reaction function, which can be expressed as

$$H = R_p(A) \tag{5}$$

For any chosen A by the local community, the reaction function (5) expresses the park agency's optimal choice of H. To develop a further understanding of this function, the slope is first determined, and thereafter an examination of potential shifts caused by changes in the exogenous parameters will follow.

5.3.2 Slope of the Reaction Curve

Figure 3 depicts the two terms comprised in Equation (4). As shown, the park agency profit maximizing hunting H^* occurs where the marginal revenues from hunting quotas and permits (i.e. the left side of Equation (4)) are equal to the marginal revenues generated from tourism activities (i.e. the right side of Equation (4)).

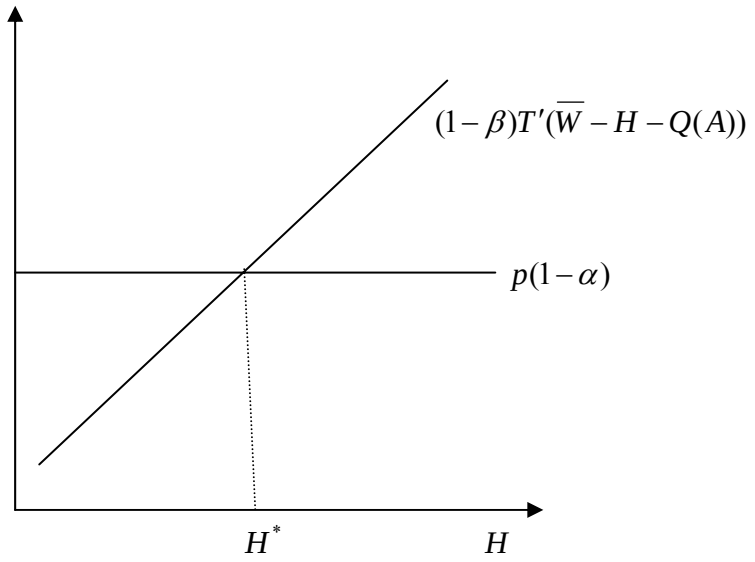

Figure 3 *To maximize profit the park agency will set the legal hunting at* H^***.**

To strengthen the understanding of a positively sloped T' it is advisable to first note that the assumption of $T'' < 0$ means that T' declines as its argument grows. Analogously, T' grows

as its argument shrinks. Now, consider an increase in H. This would cause the argument of T' to decline, and so it can be argued that the higher values of H, the higher values of T'.

Next, consider an increase in A. The immediate effect is that Q falls. As a consequence the argument of T' increases, implying a lower T' value for every H. As illustrated in Figure 4 the curve shifts down, generating a higher optimal H, H^{**}.

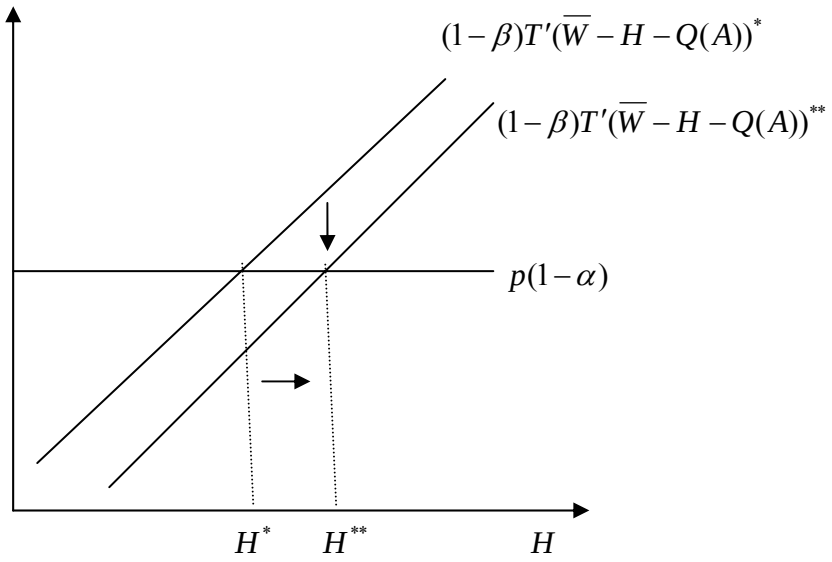

Figure 4 *An increase in anti poaching activities lead the park agency to increase the level of issued permits and quotas.*

Based on the above argumentation a higher A leads to a higher optimal H for the park agency. Thus, the positively sloped reaction function (5) is now determined and illustrated in Figure 5.

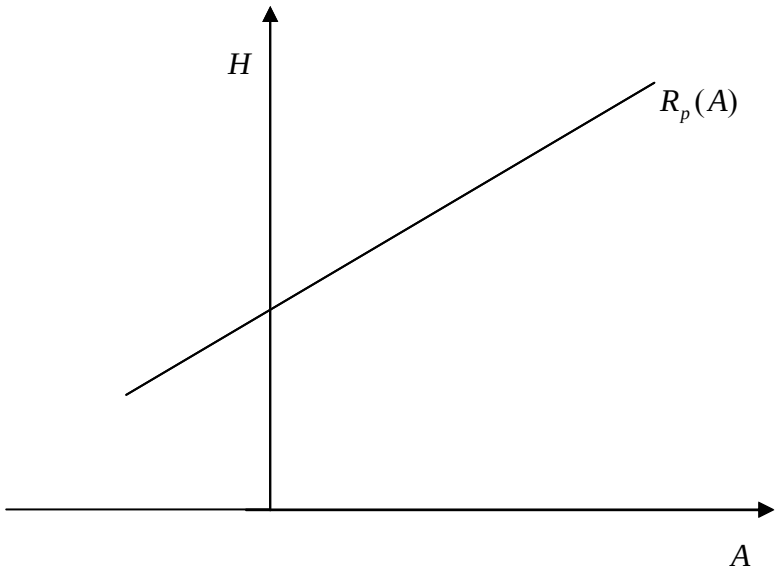

Figure 5 *The park agency response given the community anti-poaching actions.*

The interpretation of the above findings goes as follows: As communities raise their efforts to combat illegal hunting, A, the park agency meets a larger wildlife population without facing any costs. The marginal revenues from tourism then fall ($T'(W) < 0$). Hence, from the park agency perspective revenue rendering from consumptive wildlife use (i.e. trophy hunting permit fees) becomes relatively more attractive than revenue from non-consumptive wildlife use (i.e. park entrance fees).

5.3.3 Shifts in the Reaction Curve

Having discussed the slope, an examination of potential shifts caused by changes in any of the exogenous parameters comes next in turn.

Looking back on Figure 4, one can see how an increase in tourism share, β, initial wildlife stock, $\overline{W}$, and anti-poaching activities, A, shift of the "tourism-curve" downward. Consequently, the park agency increases the level of issued permits and quotas, since hunting operations are relatively more "attractive" than tourism activities.

According to Figure 6, however, the rational agency response to a fall in the permit price, p, and/or an increase in the level of hunting permit share α, is to offer fever hunting permits.

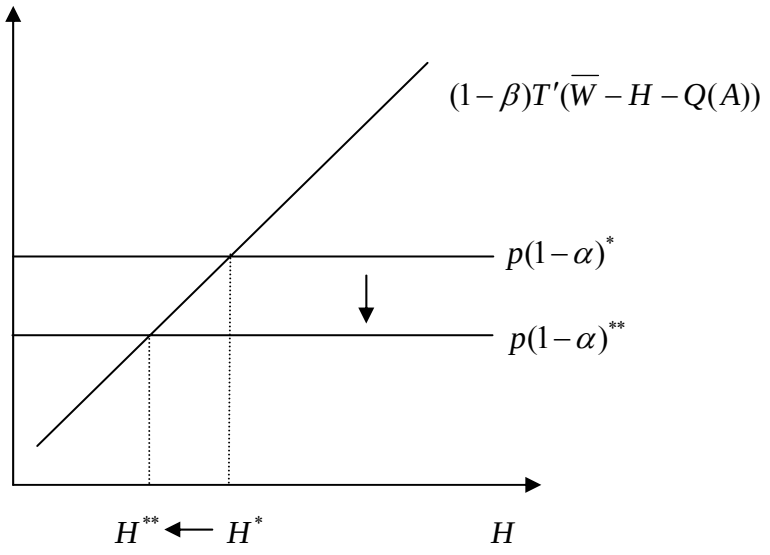

Figure 6 *A drop in permit price, and/or an increase in the level of hunting permits shares, leads the park agency to decrease the level of issued permits and quotas. Hence, the wildlife stock is reduced.*

Having showed the rational park agency response to changes in variables ultimately affecting, H, the implicit function and its variable relations could be summarized as

$$H = H(\overset{(+)}{A};\ \overset{(+)}{p},\overset{(-)}{\alpha},\overset{(+)}{\beta},\overset{(+)}{\overline{W}}) \qquad (6)$$

Before turning to the community-agent, it is interesting to note that a drop in price in this model, would lead to a relative advantage for the park agency to benefit from tourism activities (i.e. non-consumtive use) compared to hunting operations (i.e. consumptive use). On

the other hand, a drop in hunting shares, accompanied by an increase in the wildlife stock, increases the conflict between agriculture and wildlife conservation faced by people residing on communal land. The community could, thus, have reason to respond by reduced anti-poaching activities. That in turn could boost illegal hunting activities, Q, and consequently affect the wildlife stock negatively.

To enable a further description on conservation incentives in Namibia it is now time to turn attention towards the local community.

5.4 The Local Community

Before entering into the local community model specifics it is worthwhile notifying that, in reality, only part of the communal land residents are registered conservancy members. As the model, however, is set with only two agents, i.e. park and local community, the latter are interpreted as being representative for all local communities. In the case of Namibia this is a valid assumption, as Wildlife Councils are established to manage wildlife for the benefits of non-conservancy members (MET, 2005). Despite functional differences, both aim at creating economic incentives for wildlife conservation on communal land.

As mentioned in the introductory model section the community generates economic benefits both from wildlife and agriculture. Again, the issuing of hunting quotas and permits to a community implies giving the locals "a share of" hunting profits, α, and tourism profits, β.

The local community are also faced by costs in terms of wildlife damage to agriculture, and a cost for "anti-poaching" activities (e.g. time). A trade-off situation between wildlife conservation and agricultural production is thus prevalent.

In the model the community's revenue from agriculture is expressed as a net revenue, $R(W)$, where it is assumed that, revenue declines when wildlife increases $R'(W) < 0$ and $R'' < 0$.

The cost of anti-poaching activities, $C(A)$ takes the properties shown in Figure 7.

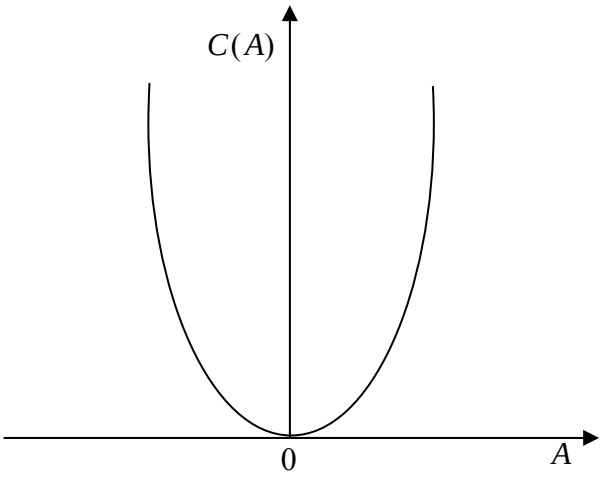

Figure 7 *The cost of anti-poaching activities.*

The interpretation is that both helping poachers and preventing them is costly.

Accounting for both benefits and costs, the local community's utility function is expressed as:

$$U = R(\overline{W} - H - Q(A)) + \alpha pH + \beta T(\overline{W} - H - Q(A)) - C(A) \quad (7)$$

Analogously to the park agency's problem of choosing H, the local community takes H as given and maximizes U with respect to A:

$$U' = -R'(W) \cdot Q'(A) - \beta T'(W) \cdot Q'(A) - C'(A) = 0 \Leftrightarrow -C'(A) = R'(W)Q'(A) + \beta T'(W) \cdot Q'(A) \quad (8)$$

This condition implicitly defines the optimal A for any given H. That is Equation (8) gives the reaction function:

$$A = R_{LC}(H) \quad (9)$$

As in the previous section, a further understanding of this function could be developed through determination of the slope and consequences of potential shifts caused by changes in the exogenous parameters. Compared to reaction function (5), it is however difficult to obtain this information. Thus, a mathematical rather than graphical approach is more suitable. In Appendix 3 Equation (8) is totally differentiated to get

$$dA = \frac{1}{\Delta}(Q'(\beta T'' + R'')dH - T'Q'd\beta) \quad (10)$$

where $\Delta > 0$ by the second order condition for utility maximization. Equation (10) defines the Local Community's best response of A, for a Park Agency change in the variables H and β.

The consequences of an increase in β can now be written as

$$\frac{dA}{d\beta} = \frac{-1}{\Delta}\overset{(+)}{T'} \cdot \overset{(-)}{Q'} > 0$$

The interpretation is that a bigger wildlife stock generates more community revenue. This implies the community members to have incentives to combat poachers in order to minimize the risk of reduced wildlife numbers.

Turning to the slope of the reaction function, the following expression is derived.

$$\frac{dA}{dH} = \frac{Q'(\beta \overset{(-)}{T''} + \overset{(-)}{R''})}{\Delta} > 0$$

In Figure 8 this positively sloping curve is depicted. The understanding is that higher level of legal harvest infers higher level of anti-poaching activities. As legal harvest increases, the community revenue from non-consumtive tourism decreases and, thus, the community is motivated to combat illegal hunting to safeguard their utility.

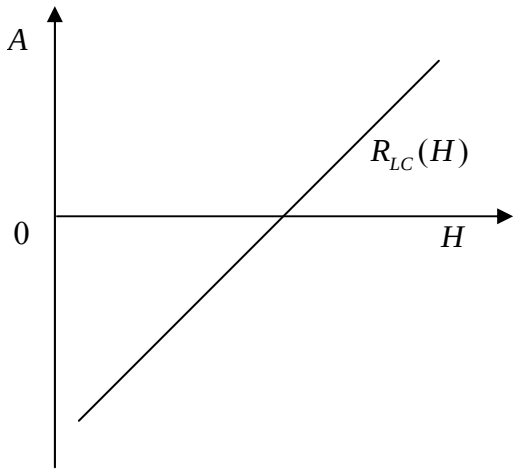

Figure 8 *The slope of the reaction curve if* $T'' < 0$ *and* $R'' < 0$.

The knowledge about the reaction function can thus be summarized as

$$A = A(\overset{+}{H}, \overset{+}{\beta})$$

where the effects of β and H on A have been showed to be positive.

6 Nash Equilibrium – An Attempt to Depict Actuality

Based on the model specifics presented in the preceding sections, the actual policy implementation can now be economically portrayed and subsequently analyzed.

Bringing together the reaction functions (5) and (9) a Nash equilibrium can be constructed. In such an equilibrium the park agency is set to choose the variable H strategically based on the local community's choice of A and vice versa. The gap between the CBNRM policy intention and its implementation is, hence, assumed to make park and community act like competitors rather than companions.

The Nash equilibrium is illustrated in Figure 9.

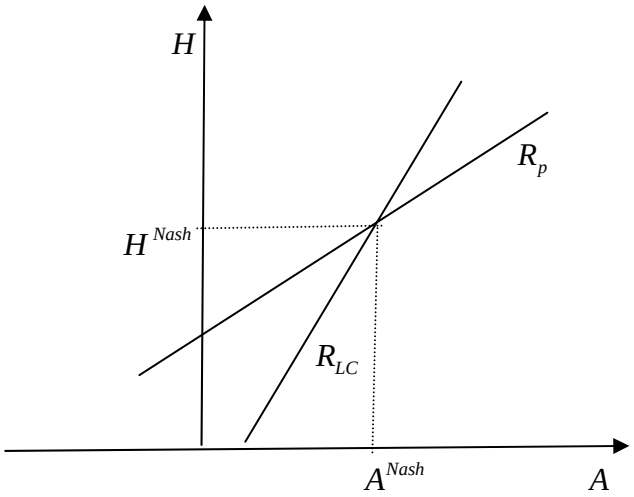

Figure 9 *The Park agency will choose H where its reaction curve intersects with the local community's reaction curve and vice versa.*

In Figure 10 attention is directed towards an increase in β, i.e. increased revenues from non-consumptive tourism for the local community ultimately leading the equilibrium to shift from E_1 to E_2. That is, both legal hunting and anti-poaching activities are positively affected. The interpretation is that as β increases the community accrues higher revenue from non-consumptive tourism relatively agricultural busines, and, hence, increases its anti-poaching activities. The park, on the other hand, faces higher marginal benefits from legal hunting, rather than non-consumptive tourism, and increases its issuing of hunting permits.

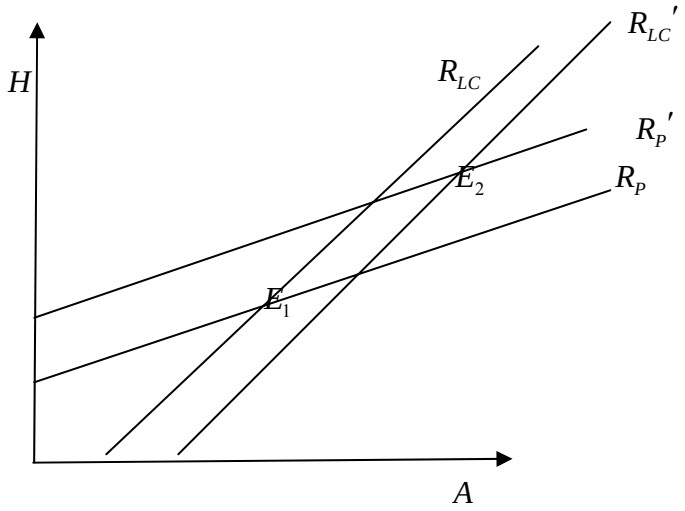

Figure 10 *An increase in revenues generated by non-consumptive tourism, leads to an increase both in legal off-take and more anti-poaching activities.*

Assuming the Nash Equilibrium presented here to be picturing the actual CBNRM policy at best, the outcomes are not to be regarded as bad. In terms of increased wildlife numbers the CBNRM approach is a tremendous success. Yet, from a policy perspective it could still be valuable to contrast the findings to an alternative equilibrium to see if a shift from "actuality to optimality" can be brought about.

7 Collusive Equilibrium – An Attemt to Depict Optimality

To address potential policy and legislative flaws that could boost undesired negative externalities such as less anti-poaching activities, the Nash equilibrium from the preceding section is here contrasted to a collusive equilibrium.

Contrary to the Nash equilibrium, where the one agent makes choices strategically based on the other agent's choice, a collusive equilibrium can be understood as a union of the park and the local community. To capture the implications of the CBNRM policy intent, a new objective function is expressed by summarizing the earlier presented equations (3) and (7) such that

$$V = R(\overline{W} - H - Q(A)) + pH + T(\overline{W} - H - Q(A)) - C(A)$$

The negative externalities at issue in this case, could thus be internalized. In other words, as park and local community work together, the local community is potentially more engaged in anti poaching activities. To see if this could be the case attention needs to be brought to the conservancy "benefit" maximization.

The community maximizes V with respect to H and A:

$$H: R' \cdot (-1) + p + T' \cdot (-1) = 0 \Leftrightarrow p = T'(\overline{W} - H - Q(A)) + R'(\overline{W} - H - Q(A)) \quad (11)$$

$$A: -R'Q' - T'Q' - C' = 0 \Leftrightarrow -C'(A) = R'(W) \cdot Q'(A) + T'(W) \cdot Q'(A) \quad (12)$$

Now the solution given by the Equations (11) and (12) could be compared to the Equations (4) and (8). In other words, the Nash equilibrium is contrasted to a collusive equilibrium approach.

A comparison between Equation (8) to (12) reveals that (12) is a special case of Equation (8) where β=1. Recall from Equation (8) that A increases as β grows. Therefore A should, for any given H, take on a higher value in Equation (12) relatively Equation (8). As the collusive equilibrium case indicates more anti-poaching, negative externalities could be understood as better internalized and, thus, an economically more ideal CBNRM approach appears.

Set out from Figure 8 the following Figure 11 illustrates how a higher A shifts previously presented curves upwards.

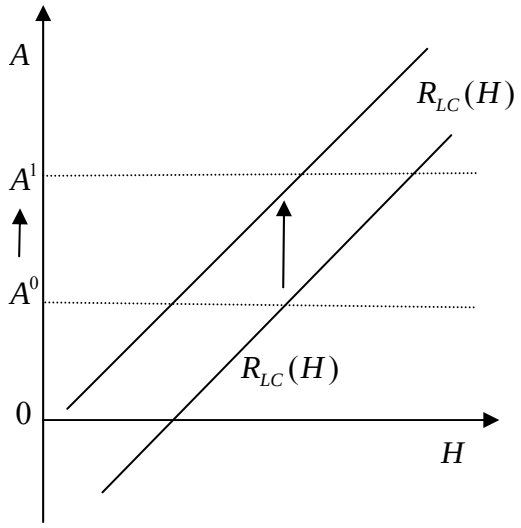

Figure 11 *More anti-poaching.activites shifts the reaction curve upwards.*

The variable H , on the other hand, can take on both higher and lower values. One way to interpret this somewhat contradictive information goes as follows:

In a collusive equilibrium, where park and community are both parts of a collective proprietorship, the latter feels more involved and hence, has more incentives to combat illegal hunting (i.e. more anti-poaching activities). Simultaneously, the park recognizes increased wildlife numbers, which in turn allows for more legal off-take.

Assuming $\alpha = \beta$ in Equation (4) then

$$p = T'(\overline{W} - H - Q(A)) \qquad (4')$$

Contrasting Equation $(4')$ to Equation (10), the latter involves an additional negative term compared to the former. That is, $\overline{W} - H - Q(A)$ takes on a lower value in Equation $(4')$. Thus, for any given A the variable H is higher in Equation (10) relatively Equation $(4')$ (see Figure 12).

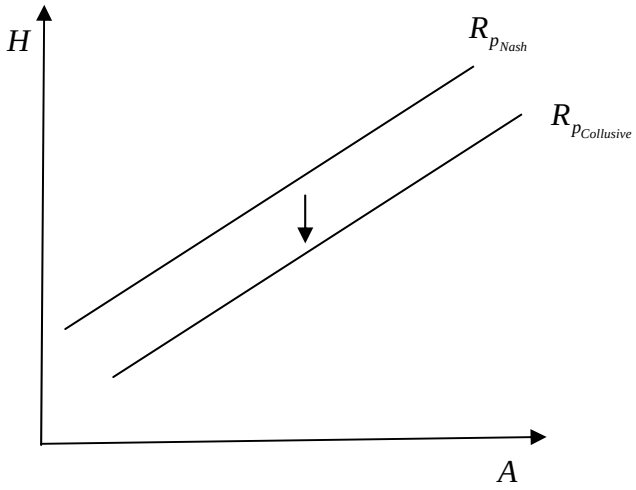

Figure 12 *In a collusive equilibrium the park agency reaction curve shifts downwards.*

Finally, the above presented equilibria can be illustrated to contrast the actual policy intent to the prevailing implementation. Figure 13 illustrates how the Nash equilibrium, where park and community act like competitors rather than companions, generates less anti-poaching activities compared to a collusive equilibrium, where the two actors work together as united entity.

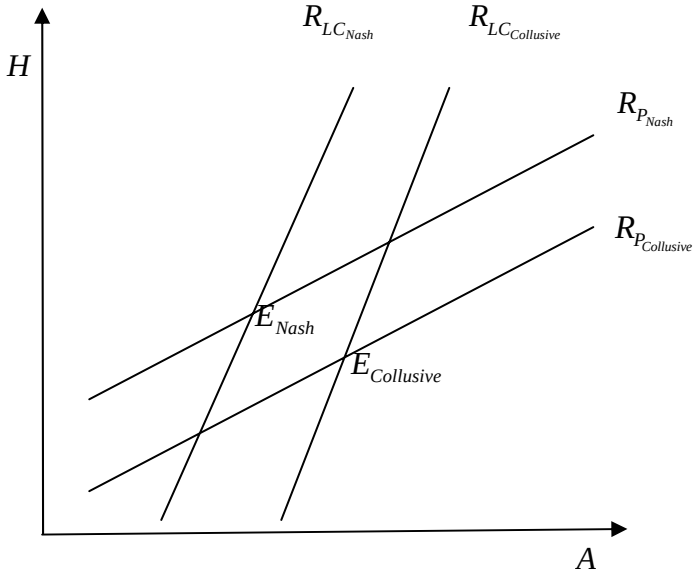

Figure 13 *Contrasting the equilibriums shows the collusive approach to be more ideal from a wildlife conservation perspective.*

Based on the above presented findings, the understanding is that as park and community are joint proprietors rather than competitors, the community feels more involved and has more

incentives to engage in anti-poaching. Simultaneously, park recognizes an increased wildlife stock making non-consumptive tourism relatively more profitable.

8 Conclusions

In 1995, an economically-based system for the management and utilization of wildlife was implemented in Namibia. This was formally done through the introduction of the Community Based Natural Resource Management (CBNRM) policy and legislation, ultimately allowing people residing on communal land to benefit from wildlife according to the same legal principles as freehold farmers.

In accordance with the underlying aim, this thesis uses valuable information achieved during a SIDA-financed Minor Field Study (MFS) conducted in Nambia fall 2004, to: Firstly, describe the evolution of the common property resource management and utilization regime in Namibia. Secondly, make use of economic theory to portray the system fundamentals, and thirdly, to theoretically contrast and analyze the prevailing system to the original policy intent.

Having done so, the introductory hypothesis, that differences between policy intent and implementation can disturb management and utilization incentives, ultimately affecting conservation efforts in Namibia, can not be rejected.

By contrasting a Nash equilibrium, where park and community act like competitors rather than companions, to a collusive equilibrium, where the two actors work together as a united entity, the model reveals both more anti-poaching and less legal hunting in the latter case. As higher levels of anti-poaching can be achieved for lower level of legal hunting, negative externalities, such as poaching, could be understood as better internalized and, thus, a more preferable economically-based system for the management and utilization of wildlife appears. In accordance with Fisher et al (2005) the CBNRM outcomes depend on economic incentives programme design, communal trade-offs between wildlife benefits and agricultural losses, and on how hunting licenses are set (i.e. central-local level interactions).

Based on the model implications, the collusive equilibrium seems more desirable both from an economic incentives perspective, but also from a wildlife conservation perspective. Yet, as addressed in the introduction, a policy-implementation also results from negotiation, lobbying and log rolling among groups with various agendas. Despite great success in terms of increased wildlife number following the economic incentive approach, the model implications suggests conservation incentives to be even better realized if the implemented CBNRM policy in Namibia could re-establish the intended policy design.

Notably, the CBNRM policy and legislation is still under development. Therefore the results from the study should not be interpreted as a critic of the economic incentive regime as such. Rather it should be viewed as a contribution for further development and success. The wildlife management in Namibia is, and should continue to be, a prototype for thriving wildlife management approaches. This is a policy area where southern African countries should be vied as nothing else but booming pioneers and forerunners for future natural resources management.

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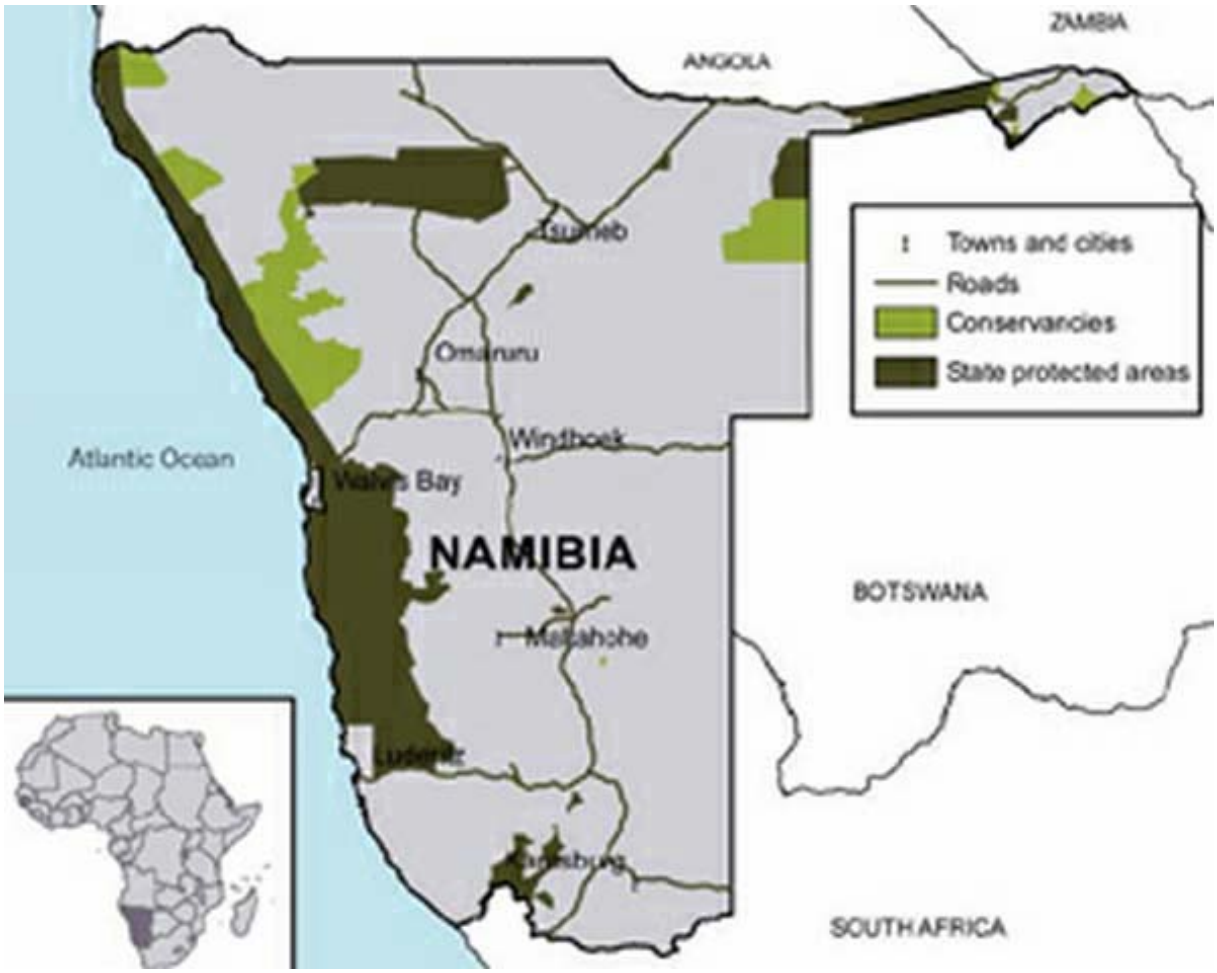
Appendix 1: Map of Namibia



Source: World Resources (2005)

Appendix 2: The CBNRM Policy and Legislation[12]

Wildlife Management, Utilisation and Tourism in Communal Area Policy of 1995 (i.e. the CBNRM policy)

The policy objectives are as follows:

i) To establish an economically-based system for the management and utilization of wildlife and other renewable living resources on communal land so that rural communities can:
- participate on a partnership basis with the Ministry of Environment and Tourism (MET) and other Ministries in the management of, and benefits from, natural resources;
- benefit from rural development based on wildlife, tourism and other natural resource management; and
- improve the conservation of natural resources by wise and sustainable resource management and the protection of biodiversity.

ii) To redress the past discriminatory policies and practices which gave substantial rights over wildlife to commercial farmers, but witch ignored communal farmers.

iii) To amend the Nature Conservation Ordinance of 1975 so that same principles that govern rights to wildlife utilization on commercial land are extended to communal land.

iv) To allow rural communities on state land to undertake tourism ventures, and to enter into cooperative agreements with commercial tourism organizations to develop tourism activities on state land.

The policy states:
- The right to utilize and benefit from wildlife on communal land should be developed to a rural community that forms a conservancy in terms of the Ministry's policy on the conservancies.
- Each conservancy should have the right to utilize wildlife within the bounds of the conservancy to the benefit of the community. Once a quota for each available species has been set, the conservancy members may decide how these animals may be utilized. They may decide to allow hunting by members of the conservancy, culling of game for meat, the sale of animals for trophy hunting, or the live sale of game.
- The conservancy should be able to enter into business arrangement with private companies to carry out some or all of these activities.
- The conservancy would also have the right to establish tourism facilities within boundaries or engage in a commercial arrangement with registered tourism operator to act on its behalf.

[12] MET (1995) cited in Long (2004)

Nature Conservation Amendment Act (i.e. the CBNRM legislation)

To match the rights over wildlife between residents on communal land to the ones enjoyed by private land owners, the Nature Conservations Amendment Act amends the Nature Conservation Ordinance from 1975.

The act provides legal provision for any group of persons residing on communal land to have, upon permission from the MET, the area they inhabit, declared a conservancy. The Minister is to declare a conservancy in the Government Gazette if:

- the applying community have provided the MET with the names of the elected representative committee listed.
- the conservancy boundaries are decided and agreed upon.
- the applying conservancy area is not subject to any lease or proclaimed a game or nature reserve.
- the community comply with to the legal constitution requiring sustainable management and utilization of game in the conservancy.
- the conservancy committee has the capacity to manage funds
- the conservancy committee has an appropriate method for equitable benefit distribution derived from consumptive and non-consumptive use of wildlife.

If the requirements are met the act confers on the conservancy committee similar rights, privileges, duties, and obligations that the Nature Conservation Ordinance from 1975 confers on commercial farmers.

Appendix 3: The CBNRM Policy and Legislation

The first order condition reads:

$$U' = -R'(\overline{W} - H - Q(A)) \cdot Q'(A) - \beta T'(\overline{W} - H - Q(A)) \cdot Q'(A) - C'(A) = 0 \qquad \text{(A3)}$$

Differentiated again with respect to A:

$$U'' = +R''(\overline{W} - H - Q(A)) \cdot [Q'(A)]^2 - R'(\overline{W} - H - Q(A)) \cdot Q''(A) + \beta T''(\overline{W} - H - Q(A)) \cdot [Q'(A)]^2$$
$$- \beta T'(\overline{W} - H - Q(A)) \cdot Q''(A) - C''(A)$$

Excluding the arguments gives

$$U'' = R''Q' \cdot Q' - R'Q'' + \beta T''Q' \cdot Q' - \beta T'Q'' - C''A < 0$$

To ensure Equation (8) to yield a maximum utility (rather than a minimum), the above expression must be negative. The expression is here called $-\Delta$.

A total differentiation of (A3) gives;

$$\Delta dA + (R'' + \beta T'')Q' \cdot dH - T' \cdot Q' d\beta = 0$$

an expression equivalent to Equation (10).

Pris: 100:- (exkl moms)

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