



# The effectiveness of economic incentives for sustaining community based natural resource management

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## ABSTRACT

Incentives are key to attracting and maintaining participation in community based natural resource management (CBNRM) initiatives. However, incentives cannot work if people do not know about them, if they are inappropriate or if they are delivered in insufficient quantities. In southern African CBNRM initiatives, many incentives are offered, particularly jobs and community income from hunting and photographic tourism activities. There is a need to assess – jointly – residents' knowledge and perceptions of these incentives and their actual delivery to determine whether they are likely to be effective in sustaining participation in CBNRM activities over the long run. This paper reports the results of just such an assessment at two CBNRM sites, the Tchuma Tchato project in Mozambique and Kwandu Conservancy in Namibia. While different types of benefits were delivered at both sites, they were largely of low value and low in volume. It appears that the incentives offered are not inappropriate, but are insufficient – too few people benefit directly and the level of benefits is generally too small. Further, a large minority of households feel benefits have been inequitably distributed and that the direct costs of living with wildlife have been ineffectively addressed. These issues should be viewed as potentially serious challenges to maintaining local participation in CBNRM activities in the long run.

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## Introduction

Community based natural resource management (CBNRM) schemes aim to achieve the dual goals of biodiversity conservation and poverty alleviation. The use of incentives to encourage communities to participate in sustainably managing their natural resources is a critical design element of CBNRM.

The literature suggests that incentives to participate in CBNRM must – at worst – contribute at least as much to livelihoods as the returns that could be generated from an alternative use of the resource (Jones and Murphree, 2001; Muir et al., 1996). They must also be sufficient and appropriate to align the individual and social costs and benefits of natural resource management. This does not suggest that financial incentives are the only valid incentives to offer (Rasker et al., 1992; Sommerville et al., 2010). Cultural, social and aesthetic factors have been identified as reasons for becoming involved in conservation initiatives, and some communities continue to participate despite the economic benefits of doing so being in doubt (Wyman and Stein, 2010).

It is essential to determine whether the assumptions made about incentives in the design and implementation of CBNRM programmes actually meet the needs and wishes of residents, and

therefore encourages such participation. The attitudes and knowledge of CBNRM area residents is crucial – if they are unaware of incentives, or their attitudes reduce the likelihood of responding to them (e.g., because they are inappropriate or insufficient), then such incentives will be ineffective (Stern, 1992).

It has been recognised that if residents' perceptions of costs and benefits are vastly different to those of programme implementers and designers (Barrow and Murphree, 1998; Salafsky and Wollenberg, 2000), programmes are highly unlikely to achieve their objectives. However, the examination of residents' perceptions of incentives is rarely undertaken. The purpose of this research was, therefore, to examine CBNRM-area residents' perceptions of the incentives and delivered benefits associated with CBNRM activities, to determine whether they were appropriate and sufficient. Such evaluations are important. If implementers (including communities) do not know whether incentives have been delivered, or whether they are appropriate or sufficient, they cannot know whether CBNRM programmes will sustain participation and therefore achieve their conservation objectives in the long run.

The initial incentive of CBNRM was the devolution of property rights over wildlife to communities, entitling communities to a claim over the stream of benefits generated by the utilisation of wildlife (Bromley, 1989), which could change the balance of costs and benefits associated with wildlife management. These benefits would encourage participation in CBNRM initiatives and sustainable resource utilisation was expected to result (Bond, 2001;

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Emerton, 2001; Murphree, 1993). Indeed, the rapid spread of CBNRM across southern Africa indicates this incentive for instigating the collective action necessary for CBNRM has been appropriate and sufficient in many communities.

However, if participation<sup>1</sup> is to be maintained over the long term, incentive design and delivery must change over time with changing economic circumstances (Sanchirico and Springborn, 2011; Weible, 2008). This aspect of incentive design has been given limited attention in the literature, though evidence suggests that communities will eventually drop out if realised benefits are inadequate over time (Fischer et al., 2011; Songorwa, 1999). This research therefore seeks to increase the understanding of community perceptions of incentives associated with CBNRM, how they change over time, and whether they are likely to be appropriate and sufficient to maintain participation into the future.

## Methods

### Case study sites

To understand how different contexts (of implementation) may affect expectations and or perceptions, the research was conducted across two sites in different countries – the Tchuma Tchato project in Tete Province, Mozambique and the Kwandu Conservancy in the Caprivi Region of Namibia. These sites were also selected because of the longevity of their CBNRM activities which allowed for the examination of lagged effects and changes over time.

### Tchuma Tchato

The Tchuma Tchato project was the first CBNRM project implemented in Mozambique, starting with the Bawa community in the early 1990s. Project activities spread to other communities in Tete Province at the request of these communities. Activities began in the Daque area (Mágoè District), the focus of this research, in 1994/95.

Specific legislative reform was required to enable central government taxes on trophy hunting to be shared with the project (and local government). Additionally, to maximise revenues, special trophy hunting prices were set for Tchuma Tchato project areas, approximately three times higher than those for hunting elsewhere in the country. Project design and implementation received technical and financial inputs from various external agencies, including non government organisations (NGOs) and academic institutions.

The project developed in the Daque area to increase local control over resource extraction (not just wildlife), with a later focus on developing tourism initiatives; though the latter has been broadly unsuccessful to date. Project activities have had a strong focus on wildlife management, with few economic or community development activities implemented, though elected village councils were established to take environmental and revenue management decisions.

Following the withdrawal of external (financial and technical) support in 2005, project activities have continued, though at a reduced scale due to financial constraints. Revenues, though small,

**Table 1**

Sample size of households by category, Tchuma Tchato (Mozambique) and Kwandu Conservancy (Namibia).

	Tchuma Tchato	Kwandu Conservancy
Purposive	50	46
Random	69	68
Total	119	114
Total population	n/a	4300

have been repeatedly disbursed to villages and have been used to purchase a variety of goods (discussed in more detail below).

### Kwandu Conservancy

Kwandu Conservancy in the Caprivi Region was developed within the Namibian national CBNRM programme. In 1996 it started to receive financial and technical support from NGOs and government, and it was formally recognised by government in 1998.

The purpose of the conservancy is to 'alleviate poverty and give employment to people by conserving wildlife ... [and] through benefit sharing from tourism revenues<sup>2</sup> and to 'conserve natural resources and wildlife for future generations, to benefit the members of Kwandu Conservancy in a fair way so that their quality of life is increased.' (Kwandu Conservancy, nd). The conservancy is managed by a 14 member committee.

In addition to many wildlife and forest management activities, the conservancy supports conservation agricultural extension, craft production and sales, chilli cultivation (for income and use in human-wildlife conflict mitigation measures) and fruit tree cultivation. The conservancy has also been trialling the human animal conflict compensation (self-insurance) scheme (HACCSIS), initially to compensate farmers for livestock losses to predators, and more recently for crop losses to elephants.

Revenue is generated by a community-run campsite and a trophy hunting concession shared with three neighbouring community conservation initiatives. The conservancy has distributed benefits numerous times, including game meat and other goods, as well as revenue distributions. The conservancy is financially self-sustaining, though it continues to receive technical inputs from NGOs and government.

### Data collection and analysis

Data were collected using household surveys, focus group discussions and key informant interviews. For the household survey, two samples were selected from within each site (Table 1) to allow an examination of the distribution of impacts amongst households with different levels of involvement with the programme. For the purposive sample, households were selected because they were known to be currently (or formerly) closely involved in the management of the CBNRM initiative, and/or were known to have received direct benefits from the programme. For the random sample, households were randomly selected from households residing in the CBNRM area.

Both open-ended and closed questions were included in the household survey. The open-ended format was utilised to determine the range of respondent-identified perceptions, to allow for unanticipated results to emerge and to increase the understanding of the relative importance of different issues. Closed questions were incorporated to determine whether CBNRM-area residents

<sup>1</sup> Participation is understood here to mean – at the least – a tacit agreement to follow the rules relating to wildlife utilisation – that is, to not hunt illegally. This is a similar understanding as the passive beneficiaries described by Wells et al. (1992). While participation typically implies a much more active role, it was beyond the scope of this research to determine the actual extent and intensity of participation in CBNRM activities.

<sup>2</sup> Cordelia Muyoba, Manager, Kwandu Conservancy. Interviewed 23 November 2007.

recognised and valued the same benefits derived from CBNRM activities as are often identified in the literature, in case these factors were not self-identified by the respondents. The closed questions were asked after the open ended questions so as not to prompt responses. Statistical significance between random and purposive households was tested for using Fisher's exact test, which is appropriate for categorical data with small expected frequencies in two by two contingency tables (Agresti, 2002). Where no Fisher's exact test (FE) is reported, the differences between the groups was not statistically significant.

Focus groups and key informant interviews pursued discussions of those issues raised in the household survey. Focus group discussions (FGDs) were held in five of the six villages in the Daque area involved in the Tchuma Tchato project and four of 15 villages within the Kwandu Conservancy. The villages in Kwandu Conservancy were selected to represent the range of conditions within the conservancy, in terms of size, remoteness, access to services and proximity to the conservancy office.

FGDs were facilitated to extract the range of views of the participants, not with the aim of achieving a consensus view on the topics discussed. Where information from FGDs is reported, there is no presumption that views stated are the opinion of all residents in that village. Where household survey data is supplemented by that from the FGDs or key informant interviews, it is described as being so.

## Results

It makes sense to interpret the results presented below in the context of whether these CBNRM programmes are achieving their primary objectives – biodiversity conservation and poverty alleviation.

Perhaps surprisingly for projects aiming to conserve biodiversity, CBNRM programmes rarely publish systematically collected and analysed wildlife monitoring data. Evidence from this research suggests that both of these initiatives have been relatively successful in achieving conservation objectives. In both locations, focus groups reported that wildlife numbers are increasing in terms of numbers and species diversity. These results fit with reports of increasing wildlife numbers in Tchuma Tchato (Jackson, 2007; Johnson, 2004; Jones, 2002), and in conservancies in Namibia (NACSO, 2007).

There has also been little systematic analysis of the impacts of CBNRM activities at the household level. This research on perceptions was part of a wider study that also examined the poverty impacts of CBNRM at these two case study sites. Using the household survey data, indices representing five dimensions of poverty were constructed (financial, human, natural, physical and social) and used in propensity score matching to estimate the impact of CBNRM activities on these dimensions of poverty. The random sample of CBNRM area households were compared with randomly sampled comparison households, living in villages carefully selected to be very similar to those in the CBNRM area, but outside the influence of CBNRM activities. Comparisons were also made between the two samples (random and purposive) within the CBNRM area.

This analysis showed that no positive impacts on the multiple dimensions of poverty could be found arising from CBNRM initiatives in Tchuma Tchato or on the random sample of households within Kwandu Conservancy, though positive impacts on purposive households were found to have occurred, particularly with respect to financial capital (Suich, 2010). At both sites, these results can be understood in the context of the relatively low level of benefits returned to communities, and because in Kwandu Conservancy some activities may have been implemented too recently for any impact to be detected.

**Table 2**  
Expected benefits (%).

	Tchuma Tchato		Kwandu Conservancy	
	Purposive	Random	Purposive	Random
Employment	25	24	32	24
Development/job creation	21	19	12	10
Better quality of life	13	7	–	–
Scholarships	9	1	–	–
Access to transport	9	0	–	–
Protection from HWC	6	24	5	8
Training	3	0	6	0
Money	3	5	21	11
NRM and other knowledge	1	5	3	1
Meat	1	6	12	26
Protection of animals	0	1	4	3
Grinding mill	0	2	–	–
HWC compensation	–	–	5	5
Other	9	7	1	13
Total (%) <sup>a</sup>	100	101	101	101
n=	65	85	117	141

– not applicable.

<sup>a</sup> May not add to 100 due to rounding.

## Knowledge of CBNRM

Amongst Tchuma Tchato residents, there was almost universal knowledge (92%) of the project as a local natural resource management organisation. While Kwandu Conservancy was equally well-known amongst purposive households (93%), 29% of random households were unable to identify Kwandu Conservancy as a local natural resource management organisation (FE < 0.01).

When asked about the most successful and important activities undertaken in the village over the previous 10 years, Tchuma Tchato activities were ranked by both purposive and random households as one of the three most successful activities carried out in those villages, though quite far behind church-based activities. In contrast, Kwandu residents consistently identified activities related to the care of HIV/AIDS patients as being most important, and few households identified conservancy activities as such.

## Expected and received benefits

In Tchuma Tchato, 56% of random households and 44% of purposive households stated that they had expected no benefits from CBNRM activities. In Kwandu Conservancy, just 10% of random households had not expected benefits and all purposive households expected some form of benefit.

Of the respondents that identified an expected benefit from CBNRM activities, those most frequently identified were very similar in both Tchuma Tchato and Kwandu Conservancy – employment, development opportunities, revenue (money), improved quality of life and protection from human–wildlife conflict (HWC) (Table 2).

Quite a different range of benefits were delivered than had been anticipated, and the value of benefits distributed to purposive and random households in both countries was remarkably different (Table 3). It is possible that the disparities between the expectations of purposive and random households may reflect recall problems, as memories may have been influenced by activities undertaken over the previous 10 years and/or by current benefits expected.

Few households received high value benefits such as employment and, especially in Kwandu Conservancy, a large proportion of households received comparatively low value benefits, mainly game meat. These data suggest tangible and direct benefits arising from wildlife utilisation are far more important to householders than less tangible benefits arising from improved knowledge about

**Table 3**  
Benefits received at the household or community level (%).

	Tchuma Tchato		Kwandu Conservancy	
	Purposive	Random	Purposive	Random
Employment (incl. salaries)	35	3	30	2
Grinding mill	14	14	–	–
Protection from HWC	8	23	0	5
Money <sup>a</sup>	5	15	33	3
Cattle/oxen	5	5	–	–
Donkey and cart	5	4	–	–
Market building	3	16	–	–
Meat	3	10	22	87
Scholarship	3	0	–	–
Better quality of life	0	2	–	–
Training	–	–	7	0
Crop/livestock compensation	–	–	1	3
NRM and other knowledge	–	–	1	0
Protection of animals	–	–	1	0
Other	19	10	4	0
Total (%) <sup>b</sup>	100	102	99	100
n=	37	102	81	60

– not applicable.

<sup>a</sup> This includes money received as compensation through the HACCSIS scheme, and possibly also as wages for casual or piecework conducted for the conservancy.

<sup>b</sup> May not add to 100 due to rounding.

natural resource management or intrinsic values associated with protecting wildlife.

Tchuma Tchato appears to have delivered a wider range of community benefits than Kwandu Conservancy (Table 3). FGDs noted that in Tchuma Tchato, village committees generally chose how to spend their money, and had opted to purchase community-level benefits, such as grinding mills, cattle, oxen, carts or irrigation equipment. Cash had been distributed twice, but this was no longer done as government felt that ‘community benefits were more effective than payments to individuals’.<sup>3</sup> In Kwandu Conservancy, the distributions of revenues were directed through the *Khutas* (local traditional authority), with only a few benefits being directed toward households (a small cash distribution in one village, and a celebration in another), though game meat has been distributed numerous times at the household level.

Benefits were reportedly shared inequitably in Tchuma Tchato, with 56% of purposive households and 29% of random households stating that they had not received any benefit. However, benefits were relatively more equitably shared in Kwandu Conservancy, with 93% of purposive households and 85% of random households stating that they had received at least one benefit. At both sites, if a household received one benefit, it was likely to have received multiple benefits.

When asked specifically about the process of benefit distribution, large proportions of households in both countries believed that the distribution of benefits and opportunities was not equitable (Table 4).

Overall, Kwandu Conservancy had a much greater ability to meet expectations than the Tchuma Tchato project (Table 5). More conservancy residents than Tchuma Tchato residents perceived an improvement over the prior decade, and many purposive households in Mozambique believed the ability of Tchuma Tchato to meet their expectations had deteriorated over this time.

#### Expansion of economic development opportunities

A number of questions were asked about how the CBNRM initiative had expanded economic opportunities, and contributed to

<sup>3</sup> Luis Namanha, Director, *Direcção Provincial do Turismo*, Tete. Interviewed 1 November 2007.

**Table 4**  
Perceptions of the distribution of benefits (% of households that agree).

	At the time of the survey	
	Purposive	Random
Tchuma Tchato		
Distributed opportunities fairly across the community	40	46
Distributed game meat fairly across the community	53	43
Distributed income fairly across the community <sup>a</sup>	34	54
Kwandu conservancy		
Distributed opportunities fairly across the community	63	65
Distributed game meat fairly across the community	60	66
Distributed income fairly across the community	58	53

<sup>a</sup> FE < 0.05.

general development objectives locally (see Appendix A). These results demonstrate changes in perceptions over time. Broadly, these results show improving perceptions in Kwandu (as the range of activities implemented increases) and declines in Tchuma Tchato (as financial constraints impact negatively on the level of activities and the presence of project staff). In the FGDs Tchuma Tchato residents recognised that staff faced increasing resource constraints, though the reasons were relatively unimportant to them and the results negatively affected their opinions of the project.

#### Disadvantages

The disadvantages of the CBNRM initiatives identified by householders (Table 6) were related primarily to the lack of benefits and the direct costs imposed on households by successful wildlife management activities (i.e. HWC). These two factors were also identified as the most important disadvantages during the FGDs, the latter particularly in Kwandu Conservancy.

The extent of concerns about HWC can be understood in the context of high levels of reported HWC. In Tchuma Tchato, household survey data showed that in the year prior to the survey, of the 92% of cultivating households, 81% reportedly suffered some damage to crops by elephant, and 68% suffered crop damage attributable to other wild animals. Of the 57% of livestock owning households, 9% lost stock to predators. In Kwandu Conservancy, of the 90% of cultivating households, 73% lost crops to elephant and 54% suffered crop damage from other wild animals. Of the 60% of households that owned livestock, 31% lost livestock to predators. Kwandu Conservancy is acknowledged to have the highest levels of HWC in Namibia (NACSO, 2005).

Further, factors impacting on agricultural productivity were identified during the FGDs as the most important contributors to household vulnerability in both locations. HWC could dramatically affect the poverty status of the household through its impacts on household food security and the ability to generate agricultural surplus for sale; effects exacerbated in drought and flood years.

#### Overall impact on households

Approximately half of households in Tchuma Tchato and Kwandu Conservancy believed that the project or conservancy had had a positive impact on their life over the previous 10 years. In Tchuma Tchato, despite the lower value of direct benefits received, 56% of random households believed this to be true, compared to 39% of purposive households (FE < 0.05). These households largely overlapped with the households that reported having received a benefit from the project.

In Kwandu Conservancy, 59% of purposive households believed in this positive impact compared to 44% of random households. These households were much less likely to overlap with households receiving benefits than in Tchuma Tchato. However, a relatively

**Table 5**  
Ability to meet expectations (% of households that agree).

	At the time of the survey				10 years earlier			
	Very high	High	Low	Very low	Better	Same	Worse	D/k
Ability of Tchuma Tchato to meet your expectations								
Purposive	10	18	47	24	41	29	31	0
Random	0	22	48	30	20	53	27	0
Ability of Kwandu Conservancy to meet your expectations								
Random	43	32	23	2	2	26	63	9
Purposive	58	30	7	4	6	21	54	19

indicates the highest frequency response.

**Table 6**  
Disadvantages of CBNRM activities (%).

	Tchuma Tchato	Kwandu Conservancy
Delayed or no benefits	50	13
Human–wildlife conflict <sup>a</sup>	15	42
Have to stick to the rules	9	8
Requires too much time	9	11
Activities changed over time	6	0
Inequitable benefit sharing	0	3
Does not help members	0	13
Other	9	11
Total <sup>b</sup>	98	101
n =	33	36

<sup>a</sup> Including a lack of or insufficient compensation in Namibia.

<sup>b</sup> May not add to 100 due to rounding.

high proportion of random households who had received game meat did not think the conservancy had made a positive contribution to their livelihood; likely due to the low value of the benefit received.

By far the most frequently identified reason (81% in Tchuma Tchato and 77% in Kwandu) for the positive impact was the receipt of some form of benefit, or the potential of CBNRM activities to generate benefits. Other reasons (identified by fewer than 10% each) were the community management of resources, the equitable distribution of benefits and improved natural resource management.

In purposive households in both locations, the benefit identified as contributing to the positive household impact was typically a direct household benefit. In contrast, random households (particularly in Kwandu) were more likely to reflect the recognition of more general, community-wide benefits than the receipt of a direct household benefit.

Similar reasons in both locations were identified for the lack of a positive impact over the prior 10 years, but the relative importance of the various reasons was quite different (Table 7). Despite fewer community and economic development activities taking place in the Tchuma Tchato project area, householders were less focussed on the lack of benefits delivered by project activities than conservancy households.

## Discussion

There are many positive perceptions in both Tchuma Tchato and Kwandu Conservancy about the CBNRM initiatives, despite the quite different types of activities being undertaken and the way in which they are being implemented.

A majority of households in both countries believed that Tchuma Tchato and Kwandu Conservancy had increased access to income earned legally from wildlife and other natural resources and had increased access to legal game meat. However, perceptions about the opportunities created by Tchuma Tchato and Kwandu Conservancy were remarkably different. Many households believed that Kwandu Conservancy had created an increasing range of economic

and income-earning opportunities over the previous 10 years. Relatively few households believed that such opportunities had been created by Tchuma Tchato, and few believed that the range of opportunities had increased over time.

It is likely that the more positive opinions of Kwandu Conservancy are the result of relatively better access to information about conservancy activities, and relatively more interaction between conservancy staff, intermediary organisations and residents than occurs in Tchuma Tchato.

As noted, the purpose of this analysis was to improve the incomplete understanding of the incentives necessary to encourage continued participation of individuals in CBNRM over the medium to long term. There are three main conclusions can be drawn from this analysis of the perceptions of CBNRM area residents that have potentially significant implications for the continued participation in CBNRM activities in the future:

1. Too few benefits are generated and distributed to impact positively on poverty of residents (with few exceptions), which is likely to negatively affect the credibility of CBNRM organisations in the eyes of residents.
2. A large minority of households believe that the costs imposed by the reported success of conservation objectives (in terms of increased wildlife), which are borne directly by households, are not being dealt with effectively, specifically in terms of HWC. The effects of HWC can dramatically increase household vulnerability, and it is a considerable source of discontent amongst residents, which may be partly explained by loss aversion.
3. The perception that benefits in both Kwandu Conservancy and Tchuma Tchato have been distributed inequitably – whether accurate or not – is held by a large minority of households in both sites. These perceptions may partly be explained by inequity aversion and will need to be addressed if participation is to be maintained in the long run.

### Insufficient benefit levels

Once natural resource management institutions have been established, incentives must subsequently be sufficient and appropriate to maintain participation (and therefore sustainable natural resource management) over the medium to long term.

To date, neither Kwandu Conservancy nor Tchuma Tchato has been able to deliver the volume of high value benefits that would transform local economies, and in neither location did most households receive the benefits they had expected. Revenues generated from wildlife utilisation were insufficient to generate the scale of employment and economic development benefits that residents had hoped for, implying that the expectations of many householders remain unfulfilled.<sup>4</sup> Large numbers of householders

<sup>4</sup> This is not to imply that all expectations were realistic or reasonable.

**Table 7**  
Respondent-identified reasons for the lack of positive impact on households (%).

	Tchuma Tchato	Kwandu Conservancy
Insufficient or no benefits	28	57
Do not fulfil promises, meet expectations/people's needs	22	9
Insufficient community consultation	18	4
Inequitable distribution of benefits	13	6
Activities no longer take place	5	0
Reduce access to (wildlife) resources	5	6
Do not want to live in the same area as wildlife	2	4
Other	7	13
Total <sup>a</sup>	100	100
n =	110	96

<sup>a</sup> May not add to 100 due to rounding.

have reportedly received no benefits, and large proportions have received only low value benefits (e.g. game meat in Kwandu) or benefits that are no longer functional (in Tchuma Tchato).<sup>5</sup>

Given these unfulfilled expectations, existing levels of benefits alone are unlikely to be sufficient to maintain participation over the long run (particularly in Tchuma Tchato), a question raised elsewhere, even in areas where the district or ward benefits are significant (Bond, 2001; Frost and Bond, 2008; Sullivan, 2003).

The lack of benefits delivered to householders may threaten the credibility of CBNRM organisations over the long term. Collective action for the management of common pool resources is often formalised using game theory, with individuals (players) facing repeated collective action problems. It has been shown that cooperation can arise from individuals' knowledge that their behaviour and decisions now can affect the future decisions of other players of the game – an effect known as 'the shadow of the future' (Seabright, 1993).

For the shadow of the future to effectively encourage cooperation, the benefits of future cooperation must outweigh the benefits of current non-cooperation and be sufficiently probable, other players must have credible retaliatory strategies and each players behaviour must be observable by the other players (Lesorogol, 2005; Seabright, 1993). That is, credible commitments – of abiding by the rules and punishing those who do not – help to achieve cooperation (North and Weingast, 1989; Ostrom, 1990; Robertson and Tang, 1995).

In a wildlife-based CBNRM setting, the credible commitment of residents could be interpreted as their commitment to abide by the rules (i.e. not hunt), while that of the resource management organisations (Kwandu Conservancy committee, Tchuma Tchato village committees and project staff) is to manage wildlife and return the benefits generated by its utilisation to residents.

The reported low levels of benefit distribution, high level of direct costs and unmet expectations imply that both Tchuma Tchato and Kwandu Conservancy may lose credibility in the eyes of residents. This may eventually result in non-cooperation strategies (passive non-participation or sabotage) being exercised if the approaches to managing wildlife and delivering benefits remains unchanged.

Given that the knowledge of the existence and nature of incentives is critical to their potential effectiveness, two results suggest the need for further research. First, it would seem prudent for Kwandu Conservancy to investigate why almost 30% of random households were unable to identify the conservancy as a local resource management institution. This lack of awareness implies that these same households are also unaware of the incentives

<sup>5</sup> Given that many of these benefits distributed to Tchuma Tchato villages are no longer functional, this analysis points also to the necessity of providing support to villages (and village committees) in how to choose the most appropriate use of funds, and how to manage investments in businesses or equipment over the medium term.

offered to participate in CBNRM activities, which makes these incentives ineffective for this group of households. Further, if a large number of households are unaware of the conservancy, they are almost certainly not receiving benefits distributed by it, pointing to the probable inequitable distribution of benefits.

The sizeable minorities of households in both countries that do not believe that the CBNRM initiatives had been successful in creating opportunities (and therefore delivering on incentives) should not be ignored by programme implementers. Further research is necessary to determine whether these perceptions are based on insufficient information about the CBNRM initiative, or because of opposition to conservation activities. This distinction is important because a lack of information could be addressed by improved communication, while a disagreement with the implementation of conservation activities implies the associated incentives are inappropriate. The latter could have potentially significant implications for programme design.

#### Loss aversion

Negative impacts such as HWC are often understated in assessing wildlife-based livelihood opportunities (DFID, 2002), and the psychological cost of the anxiety of potential damage arising from living in close proximity to wildlife may be underestimated, even where studies indicate that the conflict is not as severe or as frequent as complaints suggest (DeMotts and Hoon, 2012).

Loss aversion may help to explain the emphasis that residents of both Tchuma Tchato and Kwandu Conservancy placed on the negative impacts of HWC, even though both areas face different levels of such conflict.

Loss aversion is the larger subjective effect on an individual of a loss than the benefit an equivalent gain would provide. That is, 'the value of a good to an individual appears to be higher when the good is viewed as something that could be lost or given up than when the same good is evaluated as a potential gain' (Kahneman, 2003, p. 1457).

The potentially large differences in the magnitude of responses to gains and losses (Kahneman et al., 1991) indicates that CBNRM designers may need to emphasise cost mitigation activities more in the future than they have in the past. This may also help to counter perceptions of inequity, as the costs of crop damage disproportionately affect poorer households, which have fewer resources available to help cope with such events.

It is possible – if not probable – that the mitigation of HWC would improve the perceived impact of CBNRM activities amongst residents, and may compensate to some extent for the low level of direct benefits at the household level. The means of addressing HWC more effectively (including prevention and mitigation) is unquestionably one of the most difficult issues associated with wildlife management and will require a combination of measures.

### Inequity aversion

Equity has long been recognised as an issue of major importance to the success of CBNRM (Mahanty et al., 2006; Nabane, 1995; Thomas, 1995) and is explicitly considered in the principle that differential inputs should reap differential rewards (Dietz et al., 2002). This research shows that inequitable distribution of benefits is of concern to many CBNRM area residents in both locations. These results appear to confirm why many households hold opinions about inequitable distribution of benefits, though the situation in Kwandu Conservancy was much better than in Tchuma Tchato.

Inequity aversion – the resistance of an outcome perceived to be inequitable (Fehr and Schmidt, 1999) – is likely to influence individuals' choices of continued participation or non-cooperation over the long term. The latter choice would have the potential to significantly impact on the success of CBNRM, depending on the proportion of households choosing such a strategy.

As noted, it can be very difficult to determine how equity is judged or measured by individuals (Falk et al., 2002), and perceptions do not always accurately reflect reality, but may reflect a lack of information, misinformation or misunderstanding. However, improved communication strategies have been found to contribute to improved cooperation in common property resource management situations (Falk et al., 2002; Kopelman et al., 2002), and may help to counter perceptions based on misinformation or misunderstanding.

Elite capture has often been identified as an issue of concern with respect to equity and with the power to limit the poverty alleviation outcomes of CBNRM and entrench power differentials within communities. In the poverty analysis of these households, with few exceptions, there were no statistically significant differences in human or other dimensions of poverty, providing little evidence that elites had captured the benefits of these initiatives.

### Change over time

This research demonstrates how changes in CBNRM management and the delivery of benefits can change the incentives to participate. The most stark example is the description given by Tchuma Tchato residents of the diminution of benefit distributions and the usurpation (by project staff) of the community's power over decision making as largely responsible for the decline in their overall satisfaction with Tchuma Tchato. As a result, the project is likely to struggle to maintain support and participation in the long run, unless fairly dramatic change is implemented. This is not to suggest that many residents are not interested in reviving the fortunes of the project. Many residents recognised that Tchuma Tchato had earlier implemented activities and delivered benefits more effectively than it was able to at the time of the fieldwork, and many

wished it would improve once again; it is uncertain how long this good will can linger.

Conversely, in Kwandu Conservancy, many residents recognised the increase in the range of activities implemented, and the improving ability of the conservancy to meet expectations. These positive opinions likely indicate a willingness to continue participating in CBNRM over the short to medium term. However, it would be unwise to ignore the large minority of households that did not hold such positive opinions, as their incentives for continued participation appear much weaker.

### Conclusion

In southern Africa, it can be concluded that the devolution of property rights or proprietorship over wildlife has been sufficient to incentivise collective action for resource management within many communities. The wide spread of CBNRM activities across the sub-continent is indicative of this. However, maintaining participation is difficult, and must take account of the changing context in which programmes are being implemented.

These results indicate that the incentives associated with CBNRM activities in Tchuma Tchato and Kwandu Conservancy are not inappropriate for many householders. However, the low value of benefits delivered at the household or individual level raises questions about whether CBNRM can be sustained in the long run on the basis of these incentives, particularly in locations where the direct costs (related primarily to HWC) are high. The implications of this research is that the current level of incentives associated with CBNRM activities are unlikely to continue to be sufficient, or sufficiently equitably delivered, to maintain interest in participating in these activities over the long term. Additionally, the relatively large proportion of households in both countries that believed benefits to have been distributed inequitably and direct costs of living with wildlife to have been ineffectively addressed is likely to significantly and negatively impact on the decision to continue participating in CBNRM activities over the long term.

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### Appendix A. Perceptions of economic and development opportunities associated with CBNRM activities (%)

		At the time of the survey . . .					10 years earlier . . .			
		Excellent	Above average	Below average	Poor	N/a	Better	Same	Worse	Don't know
<b>Tchuma Tchato . . .</b>										
<b>Employment and increased opportunities</b>										
Opportunity to get employment with TT	Purposive	10	26	48	17		21	38	42	
	Random	0	12	47	41		15	42	42	
Opportunity to get employment with tourism business	Purposive	8	10	54	28		7	39	54	
	Random	0	10	47	43		8	45	47	
<b>Kwandu Conservancy . . .</b>										
<b>Employment and increased opportunities</b>										
Opportunity to get employment with KC	Purposive	33	24	20	22	0	9	14	72	5
	Random	23	9	16	39	13	14	24	58	5
Opportunity to get employment with tourism business	Purposive	20	26	33	22	0	2	18	73	7
	Random	23	3	14	45	15	15	22	55	7

## Appendix A (continued)

		At the time of the survey . . .		10 years earlier . . .	
		Yes (%)		Yes (%)	
<b>Tchuma Tchato . . .</b>					
TT increased legal access to game meat	Purposive	50		51	
	Random	43		33	
TT increased ability to earn income from employment	Purposive	27		32	
	Random	18		16	
TT increased ability to earn income from increased sales of goods	Purposive	20		20	
	Random	28		20	
TT increased employment locally	Purposive	18	*	34	
	Random	35		25	
TT increased employment by increasing tourism locally	Purposive	29		35	
	Random	34		15	
TT increased opportunities to sell goods to tourists and increase income	Purposive	36		18	
	Random	30		15	
TT increased income that can legally be earned from wildlife	Purposive	64		49	
	Random	53		39	
TT increased income that can legally be earned from other NRs	Purposive	66	*	45	*
	Random	42		21	
<b>Training</b>					
TT provides training for members	Purposive	26		33	
	Random	24		15	
This training is useful to meet our needs	Purposive	54		46	
	Random	52		39	
I have benefited from this training	Purposive	4		12	
	Random	4		6	
TT increased my ability to earn income from the training I received	Purposive	16	*	16	
	Random	1		10	
<b>Kwandu Conservancy . . .</b>					
KC increased legal access to game meat	Purposive	65		18	
	Random	60		7	
KC increased ability to earn income from employment	Purposive	73	**	16	*
	Random	12		3	
KC increased ability to earn income from increased sales of goods	Purposive	43	*	9	
	Random	22		3	
KC increased employment locally	Purposive	83	*	18	
	Random	62		19	
KC increased employment by increasing tourism locally	Purposive	65		13	
	Random	60		19	
KC increased opportunities to sell goods to tourists and increase income	Purposive	63		4	*
	Random	51		16	
KC increased income that can legally be earned from wildlife	Purposive	61		17	
	Random	54		10	
KC increased income that can legally be earned from other NRs	Purposive	59		13	
	Random	59		18	
<b>Training</b>					
KC provides training for members	Purposive	85		31	
	Random	60		35	
This training is useful to meet our needs	Purposive	72	*	18	
	Random	51		29	
I have benefited from this training	Purposive	54	**	18	*
	Random	10		3	
KC increased my ability to earn income from the training I received	Purposive	48	**	13	*
	Random	7		0	

■ indicates the highest frequency response.

\* FE < 0.05.

\*\* FE < 0.01.

## References

- Agresti, A., 2002. *Categorical Data Analysis*, second edition. Wiley InterScience, New Jersey, NJ.
- Barrow, E., Murphree, M., 1998. Community conservation from concept to practice: a practical framework, community conservation in Africa. In: *Principles and Comparative Practice Working Paper*. IDPM, Manchester.
- Bond, I., Hulme, D., Murphree, M. (Eds.), 2001. *The Promise and Performance of Community Conservation*. Heinemann, Oxford.
- Bromley, D.W., 1989. Property relations and economic development: the other land reform. *World Development* 17, 867–877.
- DeMotts, R., Hoon, P., 2012. Whose elephants? Conserving, compensating, and competing in northern Botswana. *Society and Natural Resources*, 1–15.
- D.F.I.D., 2002. *Wildlife and poverty study*. Prepared by the Livestock and Wildlife Advisory Group. DFID, London.
- Dietz, T., Dolšák, N., Ostrom, E., Stern, P.C., 2002. The drama of the commons. In: Ostrom, E., Dietz, T., Dolšák, N., Stern, P.C., Stonich, S., Weber, E.U. (Eds.), *The Drama of the Commons*. National Academy Press, Washington, DC.
- Emerton, L., 2001. The nature of benefits and the benefits of nature. Why wildlife conservation has not economically benefited communities in Africa. In: Hulme, D., Murphree, M. (Eds.), *African Wildlife and Livelihoods. The Promise and Performance of Community Conservation*. Heinemann, Oxford.
- Falk, A., Fehr, E., Fischbacher, U., 2002. Appropriating the commons: a theoretical explanation. In: Ostrom, E., Dietz, T., Dolšák, N., Stern, P.C., Stonich, S., Weber, E.U. (Eds.), *The Drama of the Commons*. National Academy Press, Washington, D.C.
- Fehr, E., Schmidt, K.M., 1999. A theory of fairness, competition, and cooperation. *The Quarterly Journal of Economics* 114, 817–868.
- Fischer, C., Muchapondwa, E., Sterner, T., 2011. A bio-economic model of community incentives for wildlife management under CAMPFIRE. *Environmental and Resource Economics* 48, 303–319.
- Frost, P.G.H., Bond, I., 2008. The CAMPFIRE programme in Zimbabwe: payments for wildlife services. *Ecological Economics* 65, 776–787.
- Jackson, J.J., 2007. Letter to Dale Hall, Director USF&WS: Appeal of PRT 040961, 072461, 074828, 088338 and 090854, available at:

- [http://www.conservationforce.org/pdf/Microsoft%20Word%20-%20letter\\_to\\_dale\\_hall.pdf](http://www.conservationforce.org/pdf/Microsoft%20Word%20-%20letter_to_dale_hall.pdf) [accessed on 03.03.09].
- Johnson, S., 2004. The Tchumo Tchato project in Mozambique: community-based natural resource management in transition. In: Fabricius, C., Koch, E., Turner, S., Magome, H. (Eds.), *Rights, Resources and Rural Development Community Based Natural Resource Management in Southern Africa*. Earthscan, London, pp. 210–222.
- Jones, B., 2002. Evaluation Report: Tchuma Tchato Programme, Tete Province, Mozambique. Unpublished Report.
- Jones, B., Murphree, M., 2001. The evolution of policy on community conservation in Namibia and Zimbabwe. In: Hulme, D., Murphree, M. (Eds.), *African Wildlife and Livelihoods. The Promise and Performance of Community Conservation*. James Currey, London.
- Kahneman, D., 2003. Maps of bounded rationality: psychology for behavioural economics. *The American Economic Review* 93, 1449–1475.
- Kahneman, D., Knetsch, J.L., Thaler, R.H., 1991. Anomalies: the endowment effect, loss aversion, and status quo bias. *The Journal of Economic Perspectives* 5, 193–206.
- Kopelman, S., Weber, J.M., Messick, D.M., 2002. Factors influencing cooperation in commons dilemmas: a review of experimental psychological research. In: Ostrom, E., Dietz, T., Dolšák, N., Stern, P.C., Stonich, S., Weber, E.U. (Eds.), *The Drama of the Commons*. National Academy Press, Washington, DC.
- Kwandu Conservancy nd, Kwandu Conservancy Management Plan. Unpublished Report.
- Lesorogol, C.K., 2005. Experiments and ethnography: combining methods for better understanding of behavior and change. *Current Anthropology* 46, 129–136.
- Mahanty, S., Fox, J., Nurse, M., Stephen, P., McLees, L., 2006. Hanging in the Balance: Equity in Community Based Natural Resource Management in Asia. RECOFTC, Bangkok.
- Muir, K., Bojō, J., Cunliffe, R., 1996. Economic policy wildlife and land use in Zimbabwe. In: Bojō, J. (Ed.), *The Economics of Wildlife: Case Studies from Ghana, Kenya, Namibia and Zimbabwe*. World Bank, Washington, DC.
- Murphree, M.W., 1993. Communities as resource management institutions. In: *Gatekeeper Series No. 36*. IIED, London, pp. 1–13.
- Nabane, N., 1995. Lacking confidence? A gender-sensitive analysis of CAMPFIRE in Masoka village. In: *Wildlife and Development Series*. IIED, London.
- NACSO, 2005. Namibia's Communal Conservancies. A Review of Progress and Challenges in 2005. NACSO, Windhoek.
- NACSO, 2007. Namibia's Communal Conservancies. A Review of Progress and Challenges in 2007. NACSO, Windhoek, p. 122.
- North, D.C., Weingast, B.R., 1989. Constitutions and commitment: the evolution of institutional governing public choice in seventeenth-century England. *The Journal of Economic History* 49, 803–832.
- Ostrom, E., 1990. *Governing the Commons. The Evolution of Institutions for Collective Action*. Cambridge University Press, New York, NY.
- Rasker, R., Martin, M., Johnson, R., 1992. Economics: theory versus practice in wildlife management. *Conservation Biology* 6, 228–249.
- Robertson, P.J., Tang, S.-Y., 1995. The role of commitment in collective action: comparing the organizational behavior and rational choice perspectives. *Public Administration Review* 55, 67–80.
- Salafsky, N., Wollenberg, E., 2000. Linking livelihoods and conservation: a conceptual framework and scale for assessing the integration of human needs and biodiversity. *World Development* 28, 1421–1438.
- Sanchirico, J., Springborn, M., 2011. How to get there from here: ecological and economic dynamics of ecosystem service provision. *Environmental and Resource Economics* 48, 243–267.
- Seabright, P., 1993. Managing local commons: theoretical issues in incentive design. *Journal of Economic Perspectives* 7, 113–134.
- Sommerville, M., Milner-Gulland, E.J., Rahajaharison, M., Jones, J.P.G., 2010. Impact of a community-based payment for environmental services intervention on forest use in Menabe, Madagascar. *Conservation Biology* 24, 1488–1498.
- Songorwa, A., 1999. Community-based wildlife management (CWM) in Tanzania: are the communities interested? *World Development* 27, 2061–2079.
- Stern, P.C., 1992. What psychology knows about energy conservation. *American Psychologist* 47, 1224–1232.
- Suich, H., 2010. The elephant in the room. The impacts on poverty of wildlife-focussed community based natural resource management. The Tchuma Tchato Project, Mozambique and Kwandu Conservancy, Namibia, Crawford School of Economics and Government. Australian National University, Canberra, p. 374.
- Sullivan, S., 2003. Protest, conflict and litigation. Dissent or libel in resistance to a conservancy in North-west Namibia. In: Berglund, E., Anderson, D. (Eds.), *Ethnographies of Conservation: Environmentalism and The Distribution of Privilege*. Berghahn Books, Oxford, pp. 69–86.
- Thomas, S., 1995. Share and share alike: equity in CAMPFIRE? In: *Wildlife and Development Series*. IIED, London, p. 22.
- Weible, C.M., 2008. A collective interest model approach to explain the benefit cost expectations of participating in a collaborative institution. *Environment and Behavior* 40, 24–45.
- Wells, M., Brandon, K. and Hannah, L., 1992. *People and parks: linking protected area management with local communities*. Washington, D.C., World Bank/World Wildlife Fund/US Agency for International Development.
- Wyman, M., Stein, T., 2010. Examining the linkages between community benefits, place-based meanings, and conservation program involvement: a study within the Community Baboon Sanctuary Belize. *Society and Natural Resources: An International Journal* 23, 542–556.