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Towards Bridging Worldviews in Biodiversity Conservation: Exploring the Tsonga Concept of *Ntumbuloko* in South Africa

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1. Introduction

Many scholars and managers now question the traditional top-down, and often hegemonic, approaches of excluding local participation and ignoring local interests in management of biodiversity both within and outside formal protected areas (Johnston, 1995; Kiss, 1990). Greater participatory planning is believed to enhance local support for biodiversity conservation goals and decrease conflicts between local people and conservation authorities (Happold, 1995; Heinen, 1996; Manfredo et al., 2004).

Efforts worldwide to integrate biodiversity conservation and rural development objectives have had mixed results, indicating that synergies between the two are not inherent, and they are not a panacea (Alpert, 1996; Barrett et al., 2005; Hughes & Flintan, 2001; Newmark & Hough, 2000). We argue here that they must more fully incorporate local worldviews in their design and implementation if they ever hope to succeed. For institutions responsible for conservation, detailed knowledge of the people whose lives are affected by conservation policies can be as important as information about the biodiversity to be conserved (Anthony & Bellinger, 2007; Brechin et al., 2002; Veech, 2003). Moreover, it has been noted that in addition to playing a key role in human-environment interactions (Nietschmann, 1992; Smith, 2001), cultural elements of nature protection can be a resource providing insight into development of conservation plans (Kuriyan, 2002; Stevens, 1997) while also reinforcing community identity and, promoting community cohesion and adaptability (Goodland, 1991; Kleymeyer, 1992; Robinson & Redford, 1994). Thus, recognition and understanding of different local cultural systems permits a broader, more appropriate overall policy toward natural resource use (Maffi, 2004).

We report here on research that included a focus on conflicts and synergies between local Tsonga people and conservation authorities in and around the boundaries of Kruger National Park (KNP) in Limpopo Province, South Africa. We begin below with a brief description of official conservation in Limpopo Province, followed by an introduction to *ntumboloko*, the Tsonga worldview that shapes the perspectives on the environment and conservation that was the focus of the research we report on here. We subsequently outline our theoretical approach, and our methods. Our results present perspectives on conservation and its context in the *ntumbuloko* worldview of the Tsonga. In our discussion we identify potential conservation synergies and conflicts between the two worldviews: that of 'western science', which predominantly influences official conservation management and practices in Limpopo Province, and that of Tsonga communities bordering the KNP. We conclude with some thoughts about the importance for conservation agencies to philosophically and practically understand and integrate local worldviews into their biodiversity conservation and socio-economic objectives.

1.1 Official conservation in Limpopo Province

1.1.1 Within protected areas: Kruger National Park

The Kruger National Park (KNP), situated in the Republic of South Africa (Figure 1), is approximately 350 km from north to south and covers nearly 2 million ha (Mabunda et al., 2003). Established in 1926, KNP is home to an unparalleled diversity of wildlife and maintained by a very sophisticated management system (Braack, 2000). Internationally, KNP functions as a major tourism destination with up to one million visitors annually, and serves as an important socioeconomic and ecological component of the Great Limpopo Transfrontier Park. Traditionally, KNP management has strictly followed 'western' scientific principles, often dismissing other forms of knowledge systems (see Wolpert, 1993), with the aim of single species management and manipulating ecosystems to meet prescribed goals (Carruthers, 1995). Following the dynamic economic and political transformations within South Africa since 1994, South African National Parks, including KNP, has witnessed a transformation in its policies which seek to integrate conservation and socioeconomic objectives of neighboring communities, including community resource use policies and the establishment of community fora (Mabunda et al., 2003).

1.1.2 Outside protected areas

Outside protected areas in Limpopo Province, environmental management is primarily the responsibility of the Department of Finance and Economic Development – Environmental Affairs (DFED) (Limpopo Provincial Government, 2005). DFED is operationally sub-divided into municipal districts which provide conservation extension services, control damage-causing animals outside KNP, and monitor and regulate the use of natural resources. DFED activities are largely governed by the *Limpopo Environmental Management Act* (LEMA) No. 7 of 2003, which is analogous with national legislation. DFED is also mandated to promote sustainable development by creating partnerships with communities, NGOs, the private sector, and other government departments. The DFED was created by the post-Apartheid regime as a part of new provisional governmental structures intended to introduce greater democracy to South Africa. Until that time, traditional authorities (TAs), based on chieftanship, were the effective representatives of communities. The legal competences of the TAs are ambiguous because, while they are recognized in the constitution as legitimate

centers of authority, their actual rights and responsibilities are not clearly spelled out (Ntsebeza & Hendricks, 1998).

1.2 The people of Limpopo Province

1.2.1 Tsonga

Communities in the study area comprise almost exclusively (96.2 – 99.1%) people from the Tsonga people group (Statistics South Africa 2003). Tsonga are a diverse population, and in the mid-1990s numbered about 1.5 million in South Africa, and at least 4.5 million in southern Mozambique and Zimbabwe (1UpInfo, 1996). In the 18th century, ancestors of the Tsonga lived in small, independent chiefdoms. Most Tsonga relied on fishing for subsistence, although goats, chickens, and crop cultivation were also important. Because their coastal lowland habitat was tsetse-fly infested, cattle were rare in their economies (1UpInfo, 1996).

During the *mfecane*¹ and subsequent turmoil of the 19th century the history of the Tsonga was dominated by invasions of Zulu conquerors who left Chaka and enslaved the Ama-Thonga of the coast (Junod, 1912). Many Tsonga emigrated inland to the Transvaal from 1835 to 1840. Some successfully maintained their independence from the Zulu, while others were conquered by Zulu warriors even after they had fled. One Zulu military leader, Soshangane, established his authority over a large Tsonga population in the northern Transvaal in the mid-19th century (1UpInfo, 1996). The descendants of some of the conquered populations are known as the Shangaan, or Tsonga-Shangaan.

Tsonga who migrated inland brought new sources of food into the Transvaal, including cassava, certain kinds of groundnuts, potatoes and sorghum. Particularly important were the maize and fowls introduced in their new settlement areas. Agricultural work was performed almost exclusively by women, except for initial land clearing which was the men's responsibility (Magubane, 1998). Even today, labour division along gender lines still exists: men are traditionally hunters, herdsmen, fishermen, housing constructors, as well as traders; women are agriculturalists, gatherers, and collect water and fuelwood (Ombe, 2003). Crop harvesting was usually cooperative, done on a rotational basis, with area communities gathering to harvest each family's crop in turn.

By the early 1920s, the Tsonga-speakers constituted about 4% of the total South African population (Magubane, 1998). In the north, large chiefdoms, including Xikunda, Mhinga, Xigalo, and Makuleke occupied distinct reserves adjacent to the KNP. The Tsonga-Shangaan homeland, Gazankulu, was carved out of northern Transvaal Province during the 1960s and granted self-governing status in 1973. In the 1980s, the government of Gazankulu established a legislative assembly made up mostly of traditional chiefs. The chiefs opposed homeland independence but favored a federal arrangement with South Africa (1UpInfo, 1996).

Communities were torn apart as families were moved to the Tsonga homeland, and the resulting taxation and overpopulation made people increasingly dependent on migrant labour. This caused men to leave their families for long periods, and today even women in rural areas seek seasonal work on nearby citrus farms (Mathebula, pers. comm.).

¹ 'The Crushing' - a series of Zulu and other Nguni wars and forced migrations in the early 19th century that changed the demographic, social, and political configuration of southern and central Africa.

However, traditional Tsonga homesteads (*muti*) still exist: a typical settlement consists of a man, his wife or wives, their children and the families of their married sons (Magubane, 1998). Cylindrical houses with earth walls and conical thatched or reed roofs constitute the generally circular homestead, bordered with a perimeter wall or fence, made from branches and tree stumps. At the homestead center is the cattle kraal (*xivaya* or *tshanga*). A special meeting area (*huvo*), usually enclosed by branches and situated under a tree, exists within the community, as does the *gandzelo* for sacrificial purposes, which may be anywhere in the *muti*. The *vandal*, which may be inside or outside the *muti*, is where the men meet to discuss the administration and the affairs of the *muti*. No woman or child is allowed in this area.

Family authority rests with the father, who is traditionally treated with great respect by the wife and children. Within an extended family, the ranking and status of wives and their children is determined by the order in which they were married (Magubane, 1998). A typical Tsonga-Shangaan Traditional Authority is composed of a chief (*hosi*), under which a hierarchy exists to serve the community at large (Hartman et al., 1993). Junod (1912, pp. 367) states that the role of the chief is tantamount to tribal life as 'the [chief] forms the center of national life. It is through him that the clan becomes conscious of its own unity. Without him, it loses its bearings and it has lost its head'. Chieftainship is hereditary and falls to the most senior member of the oldest lineage in the strongest clan in the group. The new chief must be approved by the council and formally inducted into office.

In the past the *hosi* yielded supreme power. He allocated land and sanctioned the start of initiation rites, harvest ceremonies and rain dances; he mediated between members of the group and ancestral spirits; he made all decisions relating to war and the army; he was also responsible for the administration of the group, and tried serious cases and those on appeal from headmen (*tindhuna*) (Magubane, 1998).

1.2.2 Tsonga and *ntumbuloko*

The concept of *ntumbuloko* dominates the Tsonga worldview and has been defined by Chitlango & Balcomb (2004:183) as 'cultural and social norms, customs, traditions, and institutions that constitute the basis for existence, self-understanding and identity in Tsonga society.' Traditional Tsonga cosmology includes that man has a physical body (*miri*) and a spiritual body with two attributes, *moya* and *ndzuti*. The *moya* (associated with the spirit) enters the body at birth, and on death is released to join the ancestors. According to Magubane (1998) the *ndzuti* is linked to a person's shadow, reflects human characteristics, and on death, leaves the body for the spirit world. The spirit of the dead (*swikwembu*) is imbued with the individual and human characteristics of the person and can hold much power with respect to causing rain to fall or trees to bear fruit (Junod, 1912). Not only is there life after death, but on entering the world of the dead the individual retains links with the living. Thus, for many Tsonga today, 'society' implies a concept including both the living and the dead.

1.3 Theoretical approach: a space for consideration of Tsonga and official views of environment and conservation

Our research primarily draws from Firey's (1960) resource use theory as it provides a comprehensive approach to understanding human dimensions of resource management.

Resource use theory recognizes that ecological, economic, and ethnological/cultural frames of reference all interact with each other in a form of negotiation and trade-offs to optimize each of these frames and, thus, play a role in shaping perceptions of the use and fate of a resource system. This system is socially constructed and viewed differently by different social groups from their own frame of reference, based on personal needs, perceptions, and attitudes regarding a natural resource system (see Gergen, 1994; Hannigan, 1995). According to Firey, *any resource process, to be adopted, must first be accorded some worth by people in terms of their own system of activities* (emphasis ours). Thus, there are some resource complexes² which are not valued by a given people and which, consequently, will not be adopted (no matter how superior they may be by other criteria). Resource conservation or sustainability depends on maintenance of a particular social order, because social order provides common expectations and values that make it possible for a group of people to set limits on environmental change by limiting destructive economic opportunism or 'gain-seeking' (Firey, 1978).

2. Data collection methods and analyses

2.1 Face-to-face questionnaire

Household face-to-face questionnaires were administered to 240 randomly selected households of 38 villages (C.I.=6.28; C.L.=95%) within 15 km of KNP in Limpopo Province (Figure 1). Data on socio-demographic variables including age, sex, household income, household size, education level and years family has resided in village were collected by trained local field assistants. Following the Firey framework, a series of questions concerning (i) community needs, (ii) the components and value of *ntumbuloko*, and (iii) costs and benefits of the KNP to local communities were also incorporated. The questionnaires integrated both closed- and open-ended questions, and were manifest (content) coded using a contextual method based on positive/negative or topical classifications (c.f. Weisberg et al., 1996).

Questionnaires were first written in English, translated into Tsonga-Shangaan by a linguist, and then translated back into English by a field assistant. Inconsistencies and/or clarifications in the text were then modified based on pre-testing and discussions with the field assistants (c.f. Sudman, 1983). Whenever possible, household heads were surveyed and were defined as being the individual who assumed responsibility for the household (Budlender, 2003). Before administering the questionnaire, cultural norms were followed, i.e. an introduction of the administrators, the form and rationale of the questionnaire and an explanation of its intended purpose(s).

2.2 Interviews

Semi-structured interviews were conducted with KNP, DFED, TAs and other community representatives. Where necessary, follow-up interviews were carried out to clarify issues and explore further avenues of interest. Fieldwork was conducted from January-November 2004.

² 'Resource complexes' are man-mind-land structures which show stability and resilience to external influences, and that impose constraints upon humans such that they willingly conform their behavior to the practices which comprise that resource system. These contrast with 'resource congeries', which show little stability and vary widely to external changes.

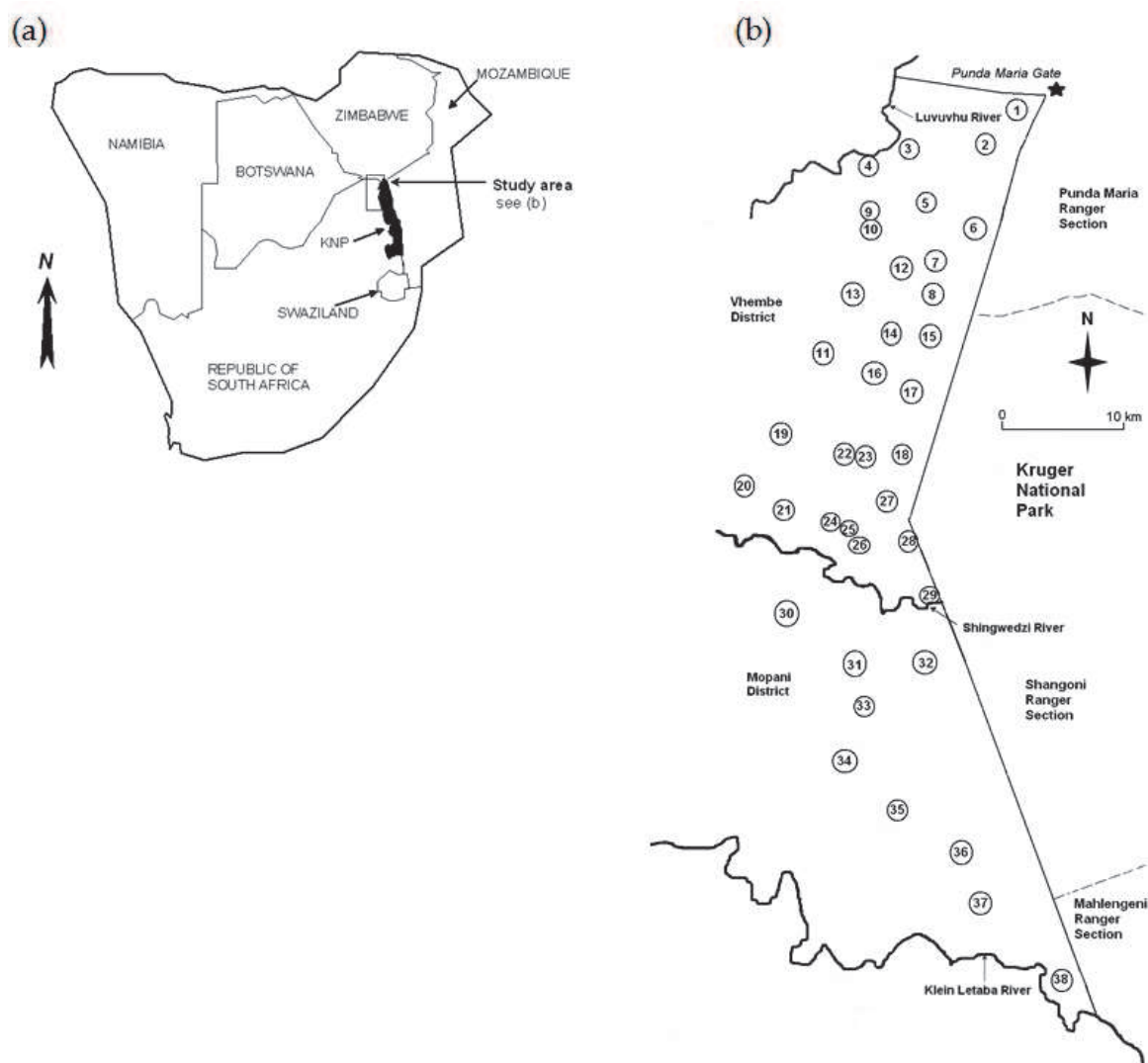


Fig. 1. (a) The location of Kruger National Park in Southern Africa. (b) Expanded view illustrates study area with location of 38 villages (listed below with associated *de jure* Traditional Authorities). **Mhinga TA:** Matiyani (1), Josepha (2), Mhinga (3), Botsoleni (4), Maphophe (5), Maviligwe (6), Makuleke (7), Makahlule (8); **Shikundu TA:** Ximixoni (9), Saseleman (10), Nkovani (11); **Bevhula TA:** Ntlhaveni D (12), Nkavela (13), Makhubele (14), Bevhula (15); **Magona TA:** Nghomunghomu (16), Mashobye (17), Magona (18); **Madonsi TA:** Gijamhandzeni (19), Matsakali (20), Halahala (21), Peninghotsa (22), Govhu (23), Merwe A (24), Shisasi (25), Jilongo (26); **Mtiti TA:** Lombaard (27), Plange (28), Altein (29); **Xiviti TA:** Mininginisi Block 3 (30), Mininginisi Block 2 (31), Muyexe (32), Shitshamayoshe (33), Khakhala (34), Gawula (35), Mahlathi (36), Ndindani (37), Hlomela (38).

Source: Anthony (2007); reproduced with permission from Cambridge University Press.

2.3 Archival research

Limpopo Province DFED records were compiled from both Mopani District, which extends from the Shingwedzi River south through the study area, and Vhembe District, which includes the northern section of the study area. Moreover, relevant records of the KNP and monthly meeting minutes were reviewed of the Hlanganani Forum, which has been the

primary liaison between KNP and neighbouring communities in the northern part of the park since 1994. During analyses, we initially utilized a grounded coding process to identify themes in interview and archival data, followed by a more explicit coding process that incorporated Firey’s concepts.

3. Results

3.1 Demographic and socio-economic factors

The questionnaire sample consisted of 83 males (34.6%) and 157 females (65.4%), ranging in age from 18 to 102 (mean=39.3±17.63). Household sizes ranged from 1 to 18 persons (mean=5.8±2.65), and families had resided in their village from 1 to 52 years (mean=23.2±12.60).

Respondents were also asked to list the ages and sex of all household members. Men (N=662, mean age=22.1±17.102) represented 47.52% of the sampled households, while women (N=731, mean age=26.5±19.716) constituted 52.48%. The population structure is broad-based with over half of the population <20 yrs of age, and comprises a higher proportion of women compared to men, especially in age classes above 29 yrs.

3.2 Community needs

Survey respondents were asked to rank the five most important community needs from a predefined list, based on interviews with community members and municipal government staff (Table 1). A weighted score was calculated for each need and used as an indicator of its importance. Employment was ranked as the most important community need overall, followed by health, school, electricity and drinking water facilities. Of least importance to respondents were protecting forests and wild animals which, in contrast, are of primary concern for conservation agencies.

Overall Rank	Community need	<i>n</i>	mean score
1	Employment	185	3.10
2	Health facilities	164	2.37
3	School facilities	182	2.34
4	Electricity facilities	144	1.95
5	Drinking water facilities	111	1.26
6	Road improvement	81	0.80
7	Training opportunities	86	0.74
8	Protection of crops/livestock	61	0.73
9	Housing	52	0.60
10	Preserving traditional culture	36	0.33
11	Tourism development	27	0.29
12	Protection of forest	29	0.26
13	Protection of wild animals	32	0.26

Table 1. Overall ranking of community needs by community survey respondents (N=238). Mean scores range from 0 (no importance) to 5 (most important).

3.3 Beliefs and attitudes

Respondents were asked what they believed to be components of *ntumbuloko*; responses are summarized in Figure 2. Chi-square and correlation tests were conducted for gender, age, household income and education level but no significant associations were found, suggesting that beliefs in the sampled households regarding the different parts of *ntumbuloko* are independent of these variables.

Based on their concept of *ntumbuloko*, almost all (98.7%) respondents believed that they ‘need’ *ntumbuloko*, for a variety of reasons which we classified according to McNeely et al. (1990) (Table 2). In addition to more direct utilitarian values, respondents indicated that *ntumbuloko* is highly valued for its socio-cultural, educational, spiritual and historical attributes. When respondents were asked whether they believed they needed to protect *ntumbuloko*, a majority (85.4%) agreed. The need to maintain and enhance utilitarian use values ranked highest for those responding positively to this question, although socio-cultural and spiritual aspects were also noted, including the following: ‘it is life’; ‘to lose *ntumbuloko* is to lose ourselves’; ‘*ntumbuloko* dictates that we should continue initiation school ³’.

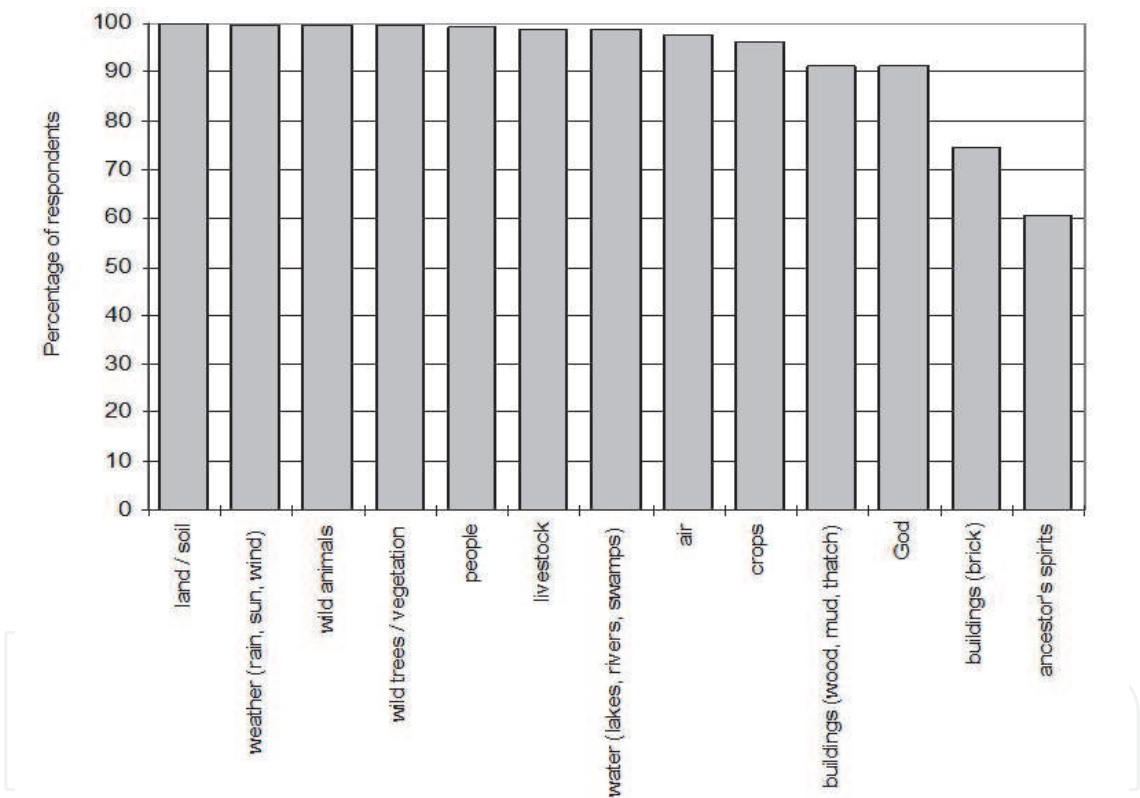


Fig. 2. Frequency of belief about components of *ntumbuloko* (N=240)

Ten percent of the respondents stated that they didn’t know whether they should protect *ntumbuloko*, claiming that they didn’t know how they could protect it. In contrast, 4.6% indicated that they did not believe they needed to protect *ntumbuloko*, citing that “it was created long ago”.

³ In traditional Tsonga culture, puberty marks the end of childhood and the beginning of adolescence. During this time young men and women enter initiation schools. Schools vary, but in principle they perform a similar social function, that of a ‘rite of passage’ marking the transition from adolescence to adulthood. This is much more than a physical change; it also represents a change in social status.

Direct value	Indirect value
<i>Consumptive/non-market (27.5%):</i> <ul style="list-style-type: none">• food• fodder for animals• fuelwood• traditional medicine• construction materials• traditional clothing	<i>Non-consumptive - ecological functions (19.5%):</i> <ul style="list-style-type: none">• storm protection• cleaning air• soil protection• sustains environment
<i>Productive/commercial (4.7%):</i> <ul style="list-style-type: none">• fodder for animals• traditional medicine• drawing tourists	<i>Non-consumptive – non-ecological functions (41.6%):</i> <ul style="list-style-type: none">• part of creation ('I belong to it'; 'makes us aware of God's creation')• education ('we can learn much from it'; 'children learn from it as they grow up')• historical heritage ('it serves as a reminder of the past')• aesthetic ('brings and brightens life for people')• cultural ('it is our culture to love <i>ntumbuloko</i>') <i>Option (6.7%):</i> <ul style="list-style-type: none">• for future generations, 'to build the future'.

Table 2. Categorized responses as to why community members ‘need’ *ntumbuloko*. Relative percentages of responses are included for each sub-category.

In an informal conversation, one high school teacher in the area stated that he believes the ancestors’ spirits can control rain and consequently crop production, therefore those who are still living must continue to honor them through dances, drums, and meetings. However, this cosmology is neither universal nor static amongst the Tsonga. According to one college teacher from the area, the Tsonga primarily define ‘beauty’ of plants and animals according to their use or utility. He reported that since he began teaching in 1989, his personal perception on nature has changed because ‘they [campus management] made it wrong for us to kill any animals on the campus’. He usually would kill a snake on site as is the Tsonga custom, but now he ‘tries to chase it away’. He now believes that this ‘has helped to keep snake bites down at the college where no one has been bitten in 3 years’.

3.4 Traditional Authorities

Respondents were asked to evaluate both their respective TA and the municipal government, in terms of how well it was doing in its role with respect to land-use, whatever they conceived that to be. More than half of the respondents (51.6%) couldn’t comment on the effectiveness of the municipal government, stating that they didn’t know of its activities. For those that did evaluate the institution, 23.8% assessed it positively and 24.6% negatively. Negative opinions of the effectiveness of the municipal government were largely governed by housing and water shortages, poor road maintenance, and the belief that it ‘does nothing in our area’ and ‘shows favoritism in its activities’. These data collectively suggest that the performance of municipal government is highly varied in the study area, with specific *de jure* TAs experiencing greater activity than others. In contrast, the roles and responsibilities of Traditional Authorities are much better recognized, with respondents stating that their functions are extensive, ranging from provision of residential and agricultural sites, to protecting forests/wild animals and

overseeing people's concerns. Considering that access to land for cultivation was secure for over 70% of respondents, and more than 85% felt their land was 'good', this suggests that *TAs are perceived as largely competent by local communities in securing access to good quality land for agriculture*. Moreover, *TAs have a much higher approval rating compared to local government by respondents*, with less than 12% of respondents reporting negatively overall.

In order to identify what variables might be influencing this evaluation, correlation analysis was used to compare responses with selected demographic and socio-economic variables. Although age ($r=0.14$, $p<0.05$, $N=240$) and level of education ($r=-0.13$, $p<0.05$, $N=240$) were significantly correlated with responses towards TA effectiveness, linear regression analysis revealed that they are very weak predictors of responses ($R^2=0.02$), suggesting that the selected variables do not play a decisive role in influencing opinions.

These functional distinctions were also confirmed during interviews with various community members and representatives of TAs. According to one *hosi* (chief), although all communal lands are owned by the state, TAs have authority to grant lands for garden plots and homesteads to their *muganga* (village(s)) members. Mtititi TA representatives stated that they are responsible for access to and control over a number of resources, including allocation of grazing and residential sites, and granting permission to collect fuelwood. They play a judicial role in fining any persons caught illegally collecting any resource that requires a permit, especially those persons who do not reside within the TA area, in which case guilty parties receive a stiffer penalty. They also play an important role in resource monitoring stating, 'In the event that the tribal police see that the amounts of resources are dwindling, they inform the *hosi* who would then inform the community to cease collecting that resource.'

4. Discussion

4.1 Components of *ntumbuloko*

South Africa has undergone dramatic socio-political changes in the last decade, with enhanced opportunities for formal education in the rural areas. However, the extent to which formal education and exposure to alternative views has affected perceptions and attitudes of rural people towards nature and its conservation is still uncertain (see Els, 1994; Mabunda, 2004). *Ntumbuloko* permeates the Tsonga worldview, and our research supports previous work (Chitlango & Balcomb, 2004; Els, 2002; Junod, 1913; Terblanche, 1994) in that the Tsonga perceive *ntumbuloko* as more than just the biophysical environment: there is still strong belief that it also embraces people (*vanhu*), God (*Xikwembu*), ancestors' spirits (*swikembu*), and tradition, and this belief is independent of sex, age, household income and education level. These results are congruent with a study on perceptions regarding causes and treatment of diseases in Northern [now Limpopo] Province (Mabunda, 2001), which found that the notion of supernatural causality associated with many diseases predominated among all groups, but was highest among university students. In our study, supernatural causality still prevails and is manifested in the belief of many respondents, even amongst the young and more highly educated, that rain and associated harvests are strongly linked with appeasing ancestors' spirits, and not solely the product of environmental factors, which western science principles would prescribe.

4.2 Value of *ntumbuloko*

In addition to more direct utilitarian values, *ntumbuloko* is highly valued for its indirect non-consumptive attributes, including non-ecological functions embracing socio-cultural,

educational, spiritual and historical qualities (Anthony & Bellinger 2007). The need to maintain and enhance utilitarian use values ranked highest for those responding positively to the question whether they need to protect *ntumbuloko*, although socio-cultural and spiritual aspects were also noted. In addition to holding a broader view of nature, Tsonga also believe in a plethora of practices which they see as being essential for its protection. In addition to reduced consumption of resources, environmental education, and altering practices to protect flora and fauna (which one might expect in western societies), the need to maintain cultural and spiritual traditions which are embedded in the broader definition of nature held by the Tsonga were also noted.

4.3 Community needs

Opinions expressed on nature conservation, i.e. protecting trees and wild animals, lag far below more immediate development needs such as employment, health, education, and improving infrastructure. Employment needs were apparent as we noted male absence in the study area, which is likely attributable to outmigration (or cyclic migration) to larger urban centers or mines where employment opportunities are greater (Bryceson, 1999). Male absence in rural areas can create labor vacuums, especially in cases where domestic responsibilities are sharply divided amongst household members, and may disproportionately increase pressures on households with only women and children. In this research about one in eight households was comprised only of women and children. This constraint is exacerbated by time required for women and children carrying out domestic chores, including almost 20 hours per week for collecting fuelwood and drinking water alone in the study area (Figure 3) (Anthony, 2006). With water scarcity perceived to be widespread in the study area, and fuelwood becoming scarcer in some areas north of the



Fig. 3. Tsonga woman on route to collect drinking water from community tap. Reproduced with permission from Anthony (2006)

Shingwedzi River, the extent of these constraints appears to be worsening (Anthony, 2006). These constraints suggest that opportunities for women and children desiring to secure formal employment, training, and/or education are severely limited. For conservation agencies, recognizing these limitations is an important step in articulating any conservation and/or development programs that seek local relevance. *Time is a precious commodity that should be understood in its local context, and household members are unlikely to engage in activities making extensive demands on their time unless these are directly related to improving livelihoods.*

As we think further about the needs of communities, the question arises, *If local communities are so dependent on local wild resources, why is their protection ranked so low?* The answer may be found in two related concepts of Tsonga beliefs, i.e. values associated with *ntumbuloko*, and the role of humans in the environment.

First, the Tsonga value *ntumbuloko* more for its utilitarian rather than aesthetic qualities, believing that local resources were given by God, and it is their right to use them to maintain human survival (Eckert et al., 2001; Els, 2002). However, 'meaningful and judicious use is not always implied by this inherent right, and this difference in conceptual approach often leads to conflict with nature conservation authorities' (Els, 2002, p.655); thus resource use conflicts are often rooted deeply in culture. Hence, the negotiations of resource users as conceptualized in Firey's theory then become operational: the perceived *aesthetic values* of nature are 'traded off' for more imperative needs of human survival and development. Here, however, distinctions within and between Firey's three frames become blurred, limiting its application in these contexts. Western concepts of the 'ecological frame', developed mainly by ecologists and geographers, are based on the interactions between organisms and their biophysical environments. Conversely, the 'ethnological frame' to resource phenomena has principally been developed by anthropologists and sociologists and focuses on a people's culture. Firey's definition and explanation of these frames treats them as separate entities. However, the Tsonga concept of *ntumbuloko* embodies both ecological and cultural frames; decoupling it into two separate frames, at present, is irrational for most Tsonga. Therefore, *developing nature conservation activities in these contexts have a greater chance of being rejected if they do not incorporate the wider concept of ntumbuloko constructed by the Tsonga.* This also has implications for current stakeholders and future researchers in similar contexts: research findings may have lower relevance and/or be more difficult to communicate locally if these distinctions in conceptual definitions are not recognized.

Second, it is inconceivable and irrational for the Tsonga to believe that protection of forests and wild animals is man's responsibility (Els, 2002). On one hand, our research supports Els' view, as most respondents believe that it is God's (*Xikwembu*) responsibility to ultimately ensure the sustainability of resources. On the other hand, although God (*Xikwembu*) and ancestors' spirits (*swikwembu*) are still believed to be components of *ntumbuloko*, such beliefs may not be as widespread as they were in the past. For example, in a study of Tsonga communities in a more densely populated region adjacent to KNP to the south, Hunter et al. (2010) found that environmental concern was strongly related to material needs and livelihoods, and this was gendered and varied substantially by village. This transition may be the result of increasing exposure to Christianity, alternative views of nature in educational institutions (Millar, 2004), economic development opportunities or cultural taboos (Kuriyan, 2002), and/or restrictions on resource use imposed by government and TAs, although such causal relationships were beyond the scope of our research.

Embedded cultural and spiritual beliefs and practices hold value for the Tsonga and should be acknowledged when establishing partnerships in environmental protection. This includes the role that *ntumbuloko* has for the Tsonga in education, spiritual identity and as historical heritage. These beliefs, strongly held by many Tsonga, are thus very resistant to change and are likely to persist. It is these beliefs which have the greatest potential to conflict with western approaches to conservation, as they claim inherent differences with respect to *who* is responsible for protecting flora and fauna, and *how* they are to be used. Practically for conservation initiatives, the two concepts regarding Tsonga beliefs explained above translate into the recognition that *conservation programs are unlikely to be accepted in these contexts if they are based primarily on aesthetic values of nature, or if they do not acknowledge the belief by local communities of the role that God and ancestors' spirits play in nature.*

4.4 Traditional Authorities

The strong role that TAs play in land allocation and resource access and use has a number of far reaching implications. Chiefly authority is ascribed by lineage rather than achieved through elections, and its patriarchal principles ensure that major decisions on land allocation are almost invariably taken by men. However, this research shows that many people, irrespective of gender, still look to their chiefs for land allocation and are satisfied with it. Indeed, only 10.2% of women respondents felt that their TAs are not doing a good job, compared with 14.5% of men. These results concur with Campbell & Shackleton (2001) and Ntsebeza (1999), who showed that TAs still maintain strong positive influence in South Africa's communal areas.

The role of DFED in the study area is uncertain and ambiguous. Although the primary body responsible for implementing and enforcing LEMA 2003 regulations, its activities are limited. Indeed, TAs are *de facto* principally controlling access to natural resources and enforcing LEMA 2003 stipulations, with tribal courts functioning in part to fine transgressors. Perceptions of the DFED by local TAs are generally negative, as this agency is seen only within its role in enforcement. It is also criticized for its weakness in delivering much-needed environmental education and awareness to communities on the role of the provincial government. In addition, there is widespread criticism of the poor control of damage-causing animals by DFED and the withholding of compensation for damages caused by these animals (Anthony, 2007).

Similar to criticisms launched at the ineffectiveness of local government, weaknesses in co-operative governance between DFED and TAs are inhibiting resource conservation, leading to situations in which opportunities are established for 'gain-seekers' to exploit resources at unsustainable rates. DFED managerial staff acknowledge that discussion and co-operation regarding land use, including biodiversity conservation, between provincial and municipal governments and TAs is practically non-existent, and needs to be strengthened (Anthony, 2006). In light of the increasing pressures on natural resources and the aspirations of some communities to engage in conservation agreements with the KNP, it would be wise for these institutions to heed these trends and seek co-operative ways to halt resource over-exploitation before conditions render it practically impossible to effectively pursue any community-based conservation initiatives at all.

4.5 'Gain-seekers' and resource exploitation

The Firey model contends that resource conservation is possible only when people share expectations that others will forego opportunistic practices threatening sustainability.

Firey's predictions may indeed be materializing in South Africa. Political transformation processes have led in many cases to *de facto* open access systems with new forms of opportunism, manifested by perverse incentives for unsustainable resource extraction, especially by 'gain-seeking' outsiders (Figure 4). These are exacerbated by low capacities in the provincial government structures and fueled by the stripping of powers of legitimate TAs (Anthony et al., 2010). According to a KNP internal report, increasing rates and magnitude of *inter alia* deforestation has been observed in areas adjacent to KNP claiming that 'trucks transporting newly cut poles and wood are often observed along the roads in adjacent areas'. In its summary, this report emphasized that 'the rate at which the destruction and degeneration is taking place will render the area useless for future community-based conservation projects.'



Fig. 4. Illegally collected fuelwood (mostly *Colophospermum mopane*) confiscated by Magona Traditional Authority in August 2004. Reproduced with permission from Anthony (2006)

Concerns about increased extraction and use of fuelwood, sand and medicinal plants by 'outsiders' have been observed elsewhere in Limpopo Province (Kirkland et al., 2007; Twine et al., 2003). Similarly, there is widespread belief in our study area that new political freedoms and democracy, coupled with the disintegration of powers of TAs, imply an uncontrolled liberty in which people are allowed to access and use resources as they wish. As early as 1994, DFED staff had noted that with respect to hunting game in rural areas, '...with the current constitutional changes, many people think the old laws are no longer valid and that this is creating problems' (cited in Anthony, 2006). In addition to these misconceptions, one of the key issues in the increased exploitation of resources by external harvesters is the control of access to resources by TAs. Although believed to be imperfect by some government staff, and involving corruption by some current TA personnel, the previous permit and enforcement system under TAs was generally recognised as being

effective in limiting the impact of external harvesters. With national political changes, however, TAs no longer have the resources to control land as they previously did and, at best, can only work in co-operation with provincial departments. Juxtaposed with the decreasing power and ability of TAs to control resource use, local and provincial government is, at present, unable to fill this institutional vacuum, especially given other pressing priorities such as provision of water, sanitation and electricity.

The outcome is a situation where, at least in some parts of the study area, external gain-seekers have seized the opportunity to either hire locals or harvest resources themselves at convenient times so as to maximize profit and minimize risks of being caught in illegal activities. This includes sand removal, illegal commercial harvesting of trees and poaching game (Anthony, 2006). Firey posits that, in conditions where the social order begins to disintegrate, incentives to inhibit one's propensity for gainful resource processes may be removed, security will be exchanged for economic efficiency, and resource congeries in the form of calculating opportunism will become the norm. Of further concern is that this new agency, having no determinate structure, can offer little resistance to further change. Therefore, *if left unabated and where sanctions are relatively ineffective, unsustainable resource extraction will continue in these areas and may severely limit future opportunities and environments in which community-based conservation can be implemented or, in a worse scenario, will deplete natural resources from which local communities currently derive much of their livelihoods.* Moreover, this will likely have potential implications for ecological integrity, creating an 'edge effect' along the KNP boundary (Woodroffe & Ginsberg, 1998). The situation calls for returning social stability to the rural areas and the institutions that *de facto* govern resources within them. As Firey (1960, p. 238) reminds us, development that involves cultural stabilization brings about non-gainful-but-likely practices that 'insinuate themselves into people's thinking and, abetted by a stable environment, enter into behavior as elements of a resource complex...and become supports for social order, contributing to its maintenance and resisting its change.' Consequently, the solution we outline below involves working to improve management and helping it to meet the new challenges it faces.

The problem of opportunistic exploitation can be resolved in our context through a number of means. Firstly, increasing capacity of provincial conservation structures to effectively enforce environmental legislation will likely lead to decreased opportunism, but will not adequately address the cultural conundrum. Resource conservation depends on the ability to obscure resource users' perception of private gain, to gratify their incentives for security in personal relationships, and to enlist the willing conformity of all resource users. Plans, including excessive coercion or rule enforcement, which do not win consent on these fronts will usually fail as they are often expensive and considered illegitimate. Indeed, by increasing powers only to municipal and provincial governments and ignoring local customs and traditions in these contexts, a reverse effect may result in which TAs and their devotees may see this as a return to the 'fences and fines' approach to conservation under Apartheid (this time outside the KNP), and further polarize themselves from government objectives (Gibson & Marks, 1995; Michaelidou et al., 2002). A second alternative, which may lead to cultural stabilization, involves devolving natural resource access and use powers to local TAs. The drawbacks here, however, are that not all TAs are considered legitimate, and may not have the required capacity to effectively handle these responsibilities (Anthony, 2006). Moreover, current and potential possibilities of corruption, misrepresentation and elitism are left unabated in devolving powers to this lower level, especially if there are weak mechanisms for accountability (Ribot, 2002).

Instead of these more extreme alternatives, we advocate a more co-operative approach which sees provincial structures striving to work more hand-in-hand with local TAs in both communicating, and enforcing, natural resource legislation. Similarly, *defining what resources should be conserved, and how and for whom they should be managed should be based on interactive dialogue between the DFED and local communities*. This has promise for at least three reasons. First, it would promote citizen involvement, through traditional structures, in government affairs and redistributing power and resources to enable local people to participate in decisions that directly affect their lives (Luckham et al., 2000). Second, by maintaining and utilizing traditional structures, which are largely believed to be 'good' and 'preferable' by local communities, anxiety may be minimized regarding proposed changes in natural resource management (Anthony, 2006). Finally, it would be one tangible avenue through which government could effectively harmonize the institution of traditional leadership within the new system of democratic governance as laid out in the *Traditional Leadership and Governance Framework Act No. 41 of 2003*. Provincial structures in this arrangement would continue to play an overseer role especially in managing external threats (Michaelidou et al., 2002), but would allow TAs (where considered legitimate by local communities) to continue to exercise traditional resource management powers and, where feasible, decentralize enforcement to TAs coupled with corresponding capacity-building. Areas of conflict (e.g. use of specific protected species) would ideally be mutually agreed upon through interactive dialogue, based on research investigating sustainable harvesting of resources, and supported by flexible policies.

5. Conclusion

At an international level it has been recognized that natural resources cannot be managed effectively without the co-operation and participation of resource users to make laws and regulations work (Baland & Platteau, 1996). This makes managing protected areas an even more complex and dynamic undertaking than the traditional 'fences and fines' approach. This is exacerbated in contexts where socio-economic and political forces are also experiencing dramatic transformation. The core of natural resource management in South Africa's communal areas, including the use and value of resources, often lies in deeply rooted and relatively stable concepts which are unlikely to change in the near future, and are often not obvious in their alignment with western conservation principles. For any degree of long-term resource sustainability, compatibility must be sought between western concepts of nature conservation and local worldviews of the intended beneficiaries of any conservation and/or development projects. Moreover, the knowledge system of any culture, including that of western science, is not static, but '[a]ssimilation of "outside" knowledge, and synthesis and hybridisation with existing knowledge, are continuing processes' (Howes & Chambers, 1979, p. 12). For PAs wishing to engage in extending management options to neighboring communities, it is critical to both develop an ongoing understanding of, and recognize, how communities conceptualize humankind's relationship to the environment, rights to resource access and use, and resource management principles.

Another feature indicative of South Africa's emerging democracy is the disintegration of TAs in the rural areas, exacerbated by institutional non-uniformity, and minimal capacity of provincial government in enforcing environmental legislation. This has created *de facto* open access systems exemplified by escalating opportunities for gain-seeking and perverse

incentives for illegal exploitation of resources, especially by external forces. If left unabated, these conditions will have increasingly adverse effects on local livelihoods and are likely to jeopardize future conservation initiatives. Where this is occurring, or is imminent, improving social cohesion and circumventing unsustainable resource practices through a more co-operative and adaptive approach to resource management by relevant institutions is needed. This principle applies not only to our study area, but also to conservation agencies elsewhere which face similar challenges, especially in cases characterized by dramatic transformations in institutional responsibilities and increasing financial constraints.

Conservation agencies have a formidable task, both philosophically and practically, in attempting to understand and integrate local worldviews into their biodiversity conservation and socio-economic objectives. Interactions with local people are complex, dynamic, and driven by economic as well as socio-political forces. We offer no single remedy or solution to address conflicts in the study area, but rather a suite of possibilities that should be explored. The question remains as to whether strategies developed by KNP to effectively involve local communities will gain normative weight so that local institutions will be able to meet their biodiversity conservation and socio-economic objectives, or whether these institutions will further lose control to pressures originating from within and from external sources. This research has shed light on these complexities and it is hoped that its findings will contribute to a more stable and sustainable future for both the KNP and its neighbors, and for those in similar contexts elsewhere.

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Research in Biodiversity - Models and Applications

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The book covers several topics of biodiversity researches and uses, containing 17 chapters grouped into 5 sections. It begins with an interesting chapter considering the ways in which the very biodiversity could be thought about. Noteworthy is the chapter expounding pretty original "creativity theory of ecosystem". There are several chapters concerning models describing relation between ecological niches and diversity maintenance, the factors underlying avian species imperilment, and diversity turnover rate of a local beetle group. Of special importance is the chapter outlining a theoretical model for morphological disparity in its most widened treatment. Several chapters consider regional aspects of biodiversity in Europe, Asia, Central and South America, among them an approach for monitoring conservation of the regional tropical phytodiversity in India is of special importance. Of interest is also a chapter considering the history of the very idea of biodiversity emergence in ecological researches.

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