

Perceptions of the natural environment from a rural African perspective: A case of *Cylindropuntia fulgida* var. *fulgida* in Gwanda district, Zimbabwe

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ABSTRACT

*Community environmental perceptions are instrumental in environmental management programmes given that perspectives govern human-environment relations. Despite numerous studies on environmental perceptions, little is known about how the rural poor particularly in Africa conceptualize, live with, and respond to pressing environmental issues facing them. As such, this paper uses the case of an invasive alien plant (IAP) (*Cylindropuntia fulgida* var. *fulgida* (Cff)) in a rural community (Gwanda district, Zimbabwe) to unveil the conceptualisation of the natural environment from a rural African perspective. This paper discloses the environmental worldview of the community and explains the formulation of the attitudes by the local households towards species in the environment. The study uses two horizontal dimensions of environmental attitudes formulation (New Environmental Paradigm (NEP) Scale and Kellet's (1996) classification of environmental values). Data was collected using a questionnaire survey, group discussions and key informant interviews. A sample of 156 individuals comprised the study respondents. Results showed the residents of rural Gwanda district to hold both a conservation and utilisation conviction (syncretic view) towards the environment. However, utilisation outweighs conservation. Furthermore, older residents are more inclined to conservation in comparison to the youth. The study also divulged that the origin of a species in the natural environment was insignificant to the host community. However, the livelihood effects that species had (regardless of origins) were the major determinants of attitudes developed towards it.*

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INTRODUCTION

The New Environmental Paradigm (NEP) (Dunlap and Van Liere, 1978) showed environmental perceptions to be instrumental in environmental management programmes given that individual and community perspectives govern human relations with the environment (Maloney and Ward 1973; Halpenny, 2010; Milfont and Duckitt, 2010; Gray, *et al.*, 2010; Cheng and Monroe, 2012). Natural environment attachment in individuals can lead to pro-environmental behaviour (Vaske and Kobrin, 2001). Similarly, Lee (2011) asserted that sustainable use of the environment increased when its users had positive attitudes about its conservation. Sirivongs and Tsuchiya (2012) further disclosed that attitudes and perceptions could affect stakeholders' intent to engage in environmental conservation. As such, understanding the individual attitudes that shape environmental behaviour is of fundamental importance in the amelioration of environmental problems rooted in complexities of ecological behaviour (Milfont and Duckitt, 2010). Moreover, the multifarious interactions of people with the natural environment make it crucial to examine the link between environmental issues and people's perceptions of the environment (Gray, *et al.*, 2010).

Milfont (2007) defined environmental attitudes as a psychological tendency expressed by evaluating the natural environment with some degree of favour or disfavour. From a similar perspective, Schultz *et al.* (2004:31) defined environmental attitudes as "the collection of beliefs, affect, and behavioural intentions a person holds regarding environmentally related activities or issues". According to Himmelfarb (1993), attitudes are a latent construct and as such, not observed directly but inferred from overt responses. Krosnick, Judd and Wittenbrink (2005) broadly organised techniques of attitude measurement into direct self-report methods and implicit measurement techniques. These techniques include Kellet's (1996) classification of environmental values; the Ecology Scale (Maloney and Ward, 1973; Maloney, Ward, and Braucht, 1975); the Ecocentric and Anthropocentric Environmental Attitude Scales (Thompson and Barton, 1994); the Environmental Concern Scale (Weigel and Weigel, 1978); the Ecological World View Scale (Blaikie, 1992) and the New Environmental Paradigm (NEP) Scale (Dunlap and Van Liere, 1978; Dunlap, Van Liere, Mertig, and Jones, 2000).

In an attempt to structure environmental attitudes and perceptions, studies have suggested a structure with two higher order vertical dimensions (Preservation and Utilization) and multiple explanatory horizontal lower order dimensions (Milfont and Duckitt, 2004, 2006; Milfont and Gouveia, 2006; Wiseman and Bogner, 2003). In the higher order, preservation expresses the general belief that preserving nature in its original state and protecting it from human use and alteration is the priority. Utilization, in contrast, expresses the general belief that it is right, appropriate and necessary to use and alter nature and all natural phenomena and species for human objectives. The broad vertical dimensions of preservation and utilization are evident in other theoretical perspectives such as the spiritual and the instrumental views of people-environment relations (Stokols, 1990); the moral/altruistic and utilitarian values (Kaiser and Scheuthle, 2003); the ecocentric and the anthropocentric view of the environment (Thompson and Barton, 1994) and the self (Egoistic), other people (Altruistic), biosphere (Biospheric) perspective Schultz (2000, 2001).

Despite the numerous highlighted measures of environmental perceptions and multiple studies in various parts of the planet, very little is known about how the rural poor particularly in Africa conceptualize, live with, and respond to pressing environmental issues facing them (Adeola, 1996; Aerni, 2005; Allsopp *et al.*, 2007; Ogunbode, 2013; Lombard and Ferreira, 2014). In this regard, this paper uses the case of an invasive alien plant (IAP) (*Cylindropuntia fulgida var. fulgida* (Cff)) in a rural community (Gwanda district, Zimbabwe) unveil the conceptualisation of the natural environment from a rural African perspective. Cff has invaded Gwanda district in the Matabeleland South province (Masocha, 2010) compromising local household capital assets that contribute to livelihood strategies and altering the ecosystem. Cff is native to North America where it is commonly known as the chain-fruit *cholla* or the jumping *cholla*. This paper aims at disclosing the environmental worldview of the community in question and explaining the formulation of the attitudes by the local households towards species in the environment using the case of Cff.

IAP AND ENVIRONMENTAL PERCEPTIONS

When defining IAPs, Colautti and MacIsaac (2004) argued that ecological ambiguity and tautology had ensnared the meaning of the term 'Invasive Alien Plant'. The ambiguity in definition has resulted in a lack of consensus amongst scholars and the subjective interpretation of many important terms associated with IAPs theory such as invasive/transient/sleeper weeds (Selge, Fischer and van der Wal, 2011). Humans have increasingly defined IAPs based on their interactions 'with' and perceptions 'of' the plant (Colautti and MacIsaac, 2004). Morton (1996) showed that human based definitions were associated with weaknesses such as, considering species a nuisance/weedy/invasive in areas where they have little or no impact simply because they were identified as a nuisance elsewhere. This is evidently a form internationalisation of perceptions regarding the natural environment and species found in it.

These definition criticisms may seem merely semantic in nature at first glance; nonetheless, varied definitions can cloud theoretical issues, lump together different phenomena and split similar issues thereby generalizing difficult or impossible (Colautti and MacIsaac, 2004). Thus, consensus in defining of IAPs would reduce confusion among researchers, facilitate generalisation and contribute towards a better understanding of the subject matter (Richardson *et al.*, 2000). Despite the highlighted lack of a consensus and the ambiguity of certain terms, this study uses the IAPs definition by Sharp, Larson and Green (2011: 2) that defined IAPs as "species that are not native to a particular region and aggressively compete with native species, are considered to be a major threat to biodiversity and ecosystems".

In rural Africa, the importance of perceptions, attitudes and ecological views is most evident in cases where public opposition causes delay or even cessation of control efforts targeted at IAPs (Shackleton *et al.*, 2007; Marshall *et al.*, 2011; McNeely, 2011). According to Fischer *et al.* (2011), this conflict of interests led to explicit calls from both science and policy for research on environmental perceptions in order to garner public support for environmentally beneficial IAPs control programmes. Therefore, to foster public buy-in on policies regarding IAPs, there is a need to understand how the public formulate perceptions, attitudes and ecological views about plant species around them (Czech, Krausman and Borkhataria, 1998; Schlegel and Rupf, 2010, Fischer *et al.*, 2011).

STUDY AREA

Gwanda district (shown in Figure 1) is located in the Matabeleland South province of Zimbabwe. According to ZIMSTATS (2012), the district covers approximately 14015 km² and has an estimated population of 116 357 people, a population density of 12 people/km² and 26773 households with an average 4.3 members per households. Gwanda is largely a rural district with Gwanda town the only notable urban settlement. Gwanda district hosts the provincial capital of Matabeleland South Province, the District Administrator's and Rural District Council offices. The district has 24 administrative wards characterised by multiple livelihood strategies that include small businesses, communal farms, small-scale mines and irrigation schemes, amongst others (ZIMSTATS, 2012). The entire district lies within Natural Regions IV and V characterised by low and periodic rainfall, severe dry spells during the rainy season (Vincent and Tomas, 1960). Crop production in these regions is limited to drought resistant crops (Vincent and Tomas, 1960).

The study was carried out in the villages of Nhwali, Seboza, Sengezani and Tshongwe (Shown in Figure 1). The majority of the population in the villages belong to the Babirwa clan and speak Sotho as a first language (GDDMP, 2010). Segezani village falls under the Guyu rural centre. It is located in ward 14 (Population 5865; Households, 1389; Average household size, 4.2 (ZIMSTATS, 2012)) and is the most modern of the villages in the sample. According to pilot study findings (2013) and Sidange (Pers comm., 2013), the farm pinpointed as the source of Cff is located in this village. Nhwali village is located in ward 24 (Population 2698; Households, 673; Average household size, 4.0 (ZIMSTATS, 2012)). According to EMA (2012), Nhwali is a village that has been exemplary in the fight against Cff, which has been almost eradicated from the village. Seboza village is also located in Nhwali rural centre but falls under the administrative ward 20 (Population 4618; Households, 968; Average household size, 4.8 (ZIMSTATS, 2012)). Tshongwe village falls under the Ntalale rural centre and is located in administrative ward 11 (Population 4593; Households, 1079; Average household size, 4.3 (ZIMSTATS, 2012)).

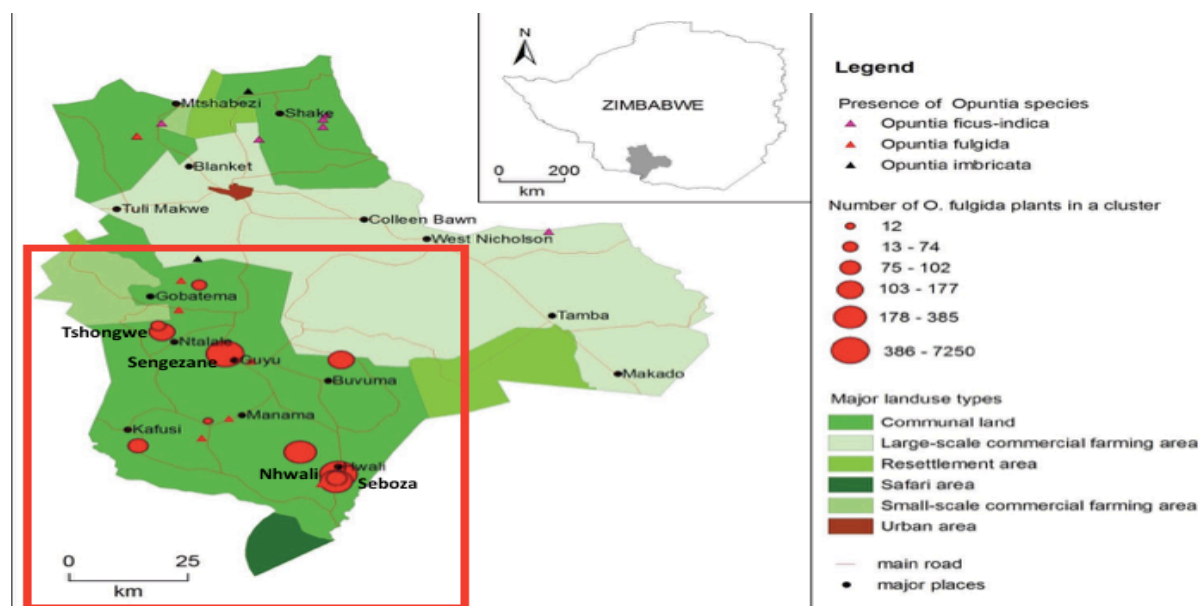


Figure 1: Map of Gwanda district and the case study villages
Source Masocha (2010)

METHOD

The study used a predominantly qualitative approach in line with other studies that investigated similar phenomena (Henwood and Pidgeon, 2001; Fischer and Young, 2007; Selge, Fischer and Van der Wal, 2011). The choice of a predominantly qualitative approach in this regard was due to the internal and personal nature of individual perceptions. Correspondingly, literature states that members of the public may hold rich mental conceptions of the natural environment but lack familiarity with terminology. Hence, qualitative methods allow for alternative expression (Elder, Coffin and Farrior, 1998; Holl, 2005; Fischer and Young, 2007). Qualitative methods in such a case also enabled the researcher to avoid the subliminal inception of ideas through confronting study participants with a pre-defined problem. Selge, Fischer and Van der Wal (2011) argued that subliminal inception did not allow the researcher to see if the participant saw the problem in the first place.

The attributes of IAPs form the fundamental base for the attitudes towards IAPs and their management (Selge, Fischer and Van der Wal, 2011). Therefore, the research used the attributes (characteristics associated with species) and the attitudes (individual's evaluation with some degree of favour or disfavour) to analyse the overall perceptions towards IAPs and the natural environment in general.

The study used multistage sampling techniques. First, the rural centres and key informants were purposively sampled based on secondary data. Second, stratified random sampling was used to determine the household survey and group discussion participants. The four rural communities gave the four strata for the survey. One hundred and sixty four (164) respondents in Gwanda district who were either key informants or community residents formed the study sample. Data collection was done using questionnaires, Focus Group Discussion (FGDs), Key Informant Interviews (KII) and document analysis. Data collection was conducted in the respondent's language of choice (predominantly Ndebele, Sotho and English), with the help of research assistants based in Gwanda district. The key informants comprised eight purposively selected individuals from EMA, the RDC, the Forestry Department, the Provincial Livestock Department, the Veterinary Department and the traditional leadership. In comparison to other data sets in qualitative research on people's views regarding the natural environment (for example, Hunter and Brehm, 2004, n = 20; Fischer and Young, 2007, n = 43; Schüttler, Rozzi and Jax, 2011, n = 37, Selge, Fischer and Van der Wal, 2011, n=79) this sample constitutes a rather extensive data set.

Fusion of the NEP and Kellert's taxonomy

The study limited the horizontal dimensions of environmental attitudes formulation to the New Environmental Paradigm (NEP) Scale and Kellert's (1996) classification of environmental values due to the nature of the population under study⁵. The NEP Scale measures an ecocentric system of beliefs (i.e., humans as just one component of nature) as opposed to an anthropocentric system of beliefs (i.e., humans as independent from, and superior to, other organisms in nature) (Dunlap and Van Liere, 1978; Bechtel *et al.*, 2006; Dunlap *et al.*, 2000). The revised NEP scale (Dunlap *et al.*, 2000) contains 15 balanced items (Shown in Table 1) designed to tap each of the opposing worldviews of nature.

⁵ The population was unfamiliar with most of the methods of assessing the horizontal dimensions of formulating attitudes regarding the natural environment.

Similar to the NEP horizontal dimensions are Kellert’s (1996) nine perspectives of human affiliation to nature (Shown in the Table 1). These aspects have been increasingly used to analyse human perceptions towards various plant and animal species (Kellert, 1981, 1984; Schüttler, Rozzi and Jax, 2011). These categories may be thought of as reflections of universal and functional expressions of the human perspective of nature (Kellert, 1996). The Biophilia hypothesis formed the foundation of Kellert’s (1996) classification. The Biophilia hypothesis states that humans have an inherent need to affiliate with nature and human personal fulfilment is dependent on our relationship with nature (Wilson, 1984). Based on the Biophilia hypothesis Kellert (1996) asserted that nature influenced human material exploitation, emotions, aesthetic appreciation and spiritual perspectives.

The discussed perspectives by Kellert (1996) and Dunlap and Van Liere (1978) attempt to capture the general perspective of society regarding the environment. These perspectives may however be reduced to the two major higher-level dimensions previously discussed as shown in the Table 1. Thus, for the purposes of the study, the individual perceptions were grouped according to Kellert’s (1996) classifications then linked to the NEP and the higher order dimensions of preservation and utilisation. This fusion allowed for simplicity and ease of understanding within the rural population who often explained those aspects they thought were significant in the natural environment.

Table 1: Relationship amongst methods of analysing environmental perceptions

KELLERT (1996)	THE NEP, DUNLAP AND VAN LIERE (1978)	HIGHER ORDER DIMENSIONS
i. Naturalistic perspective	i. We are approaching the limit of the number of people the Earth can support	Preservation
ii. Aesthetic perspective	ii. When humans interfere with nature it often produces disastrous consequences.	
iii. Ecologicistic –scientific perspective	iii. Humans are seriously abusing the environment.	
iv. Symbolic perspective	iv. Despite our special abilities, humans are still subject to the laws of nature.	
v. Humanistic perspective	v. If things continue on their present course, we will soon experience a major ecological catastrophe	
	vi. The Earth is like a spaceship with very limited room and resources.	
i. Utilitarian perspective	i. Humans have the right to modify the natural environment to suit their needs.	Utilisation
ii. Dominionistic perspective	ii. The Earth has plenty of natural resources if we just learn how to develop them.	
iii. Negativistic perspective	iii. The balance of nature is strong enough to cope with the impacts of modern industrial nations.	
	iv. The so-called “ecological crisis” facing humankind has been greatly exaggerated.	
	v. Humans were meant to rule over the rest of nature.	
	vi. Humans will eventually learn enough about how nature works to be able to control it.	
	vii. Human ingenuity will insure that we do not make the Earth unlivable	

FINDINGS: DEMOGRAPHICS

Six FGDs were held in Nhwali, Seboza, Sengezani and Tshongwe villages. Village heads organised group discussions conducted at the convenience of the villagers. Seventy-five participants (see Table 2) participated in the FGDs that were either composed of males or females only to guard against biases created by patriarchal societies and dominant member syndrome (explained in Mikkelsen, 1995).

The topic under debate was not divulged before the discussion in an attempt to avoid subliminal inception of perspectives before the discussion. Additionally, following Selge, Fischer and Van der Wal (2011), all discussions started with a general question to which,

every participant responded. This question was, ‘what comes to mind when you think of the environment’?

Table 2: Group discussion participants by village

VILLAGE	GENDER COMPOSITION	NUMBER OF PARTICIPANTS BY GENDER		TOTAL NUMBER OF PARTICIPANTS
		Men	Women	
Nhwali	Unisex FGD	Men	11	18
		Women	7	
Seboza	Unisex FGD	Men	9	14
		Women	5	
Sengezani	Males only FGD	11		11
	Females only FGD	15		15
Tshongwe	Males only FGD	8		8
	Females only FGD	9		9
Total				75

This broad question allowed the participants to express themselves with respect to their perceptions of nature without restriction. The discussions then proceeded to deal with issues of environmental management institutions, IAPs, livelihood strategies and the environmental management methods the communities had employed. The conversations were recorded verbatim and quotes that represented majority and minority perspective are presented in this section. The group discussions supported data collected from the survey and for triangulation purposes.

Eleven KIIs were held in the rural villages with representatives of organisations thought to influence environmental management in the district. The interviews were organized through the appropriate offices and at the convenience of the key informant. Organisations were therefore purposively sampled and key individuals referred by senior management or a senior traditional leader. However, in most cases, the senior manager/leader was available to give data on the subject of interest. KII participants are summarised in the Table 3. As in the FGDs, all KIIs began with the same general question as that of the group discussions to which, every key informant responded. This broad question allowed unrestricted responses from the key informants.

Table 3: KII Participants

ORGANISATION/VILLAGE	POSITION	NUMBER OF PARTICIPANTS
NHWALI	Councillor and Village head	2
SEBOZA	Village head	1
SENGEZANI	Councillor	1
TSHONGWE	Village head	1
RURAL DISTRICT COUCIL (RDC)	Chief Executive Officer	1
LIVESTOCK DEPARTMENT	Provincial Head	1

ENVIRONMENTAL MANAGEMENT AGENCY (EMA)	Provincial Head & Research officer	2
VETERINARY DEPARTMENT	Provincial Head	1
FORESTRY DEPARTMENT	Provincial Head	1
TOTAL		11

The survey was carried out in four villages located in wards 20, 11, 14 and 24 of Gwanda district. Eighty households gave data through the household head regarding their perceptions of the environment.

FINDINGS: ENVIRONMENTAL PERCEPTIONS IN RURAL GWANDA DISTRICT

The study community gave their perceptions of the environment through the survey, KIIs and FGDs discussions. These perceptions were analysed and categorised using Kellert’s (1996) classification of natural environment perceptions. Figure 2 shows the distribution of the community’s responses along Kellert’s (1996) classifications. The response YES indicated that the natural environment was considered in the particular Kellert (1996) perspective while NO indicated that it was not considered in the particular Kellert (1996) perspective. The Side labelled ‘A’ in the diagram represents the factors in Kellert’s (1996) classification associated with the higher dimension of conservation of the natural environment while the side labelled ‘B’ represents those factors associated with the utilisation dimension of the natural environment.

The information in the Figure 2 shows that the communities have a concern for both the conservation and utilisation of the natural environment. The naturalistic, symbolic and moralistic perspectives of the environment dominate the conservatory conviction while the utilitarian perspective dominates the utilisation conviction. The rural communities of Gwanda district therefore are spiritual and instrumental / anthropocentric and ecocentric/ altruistic and utilitarian in their perception of the natural environment.

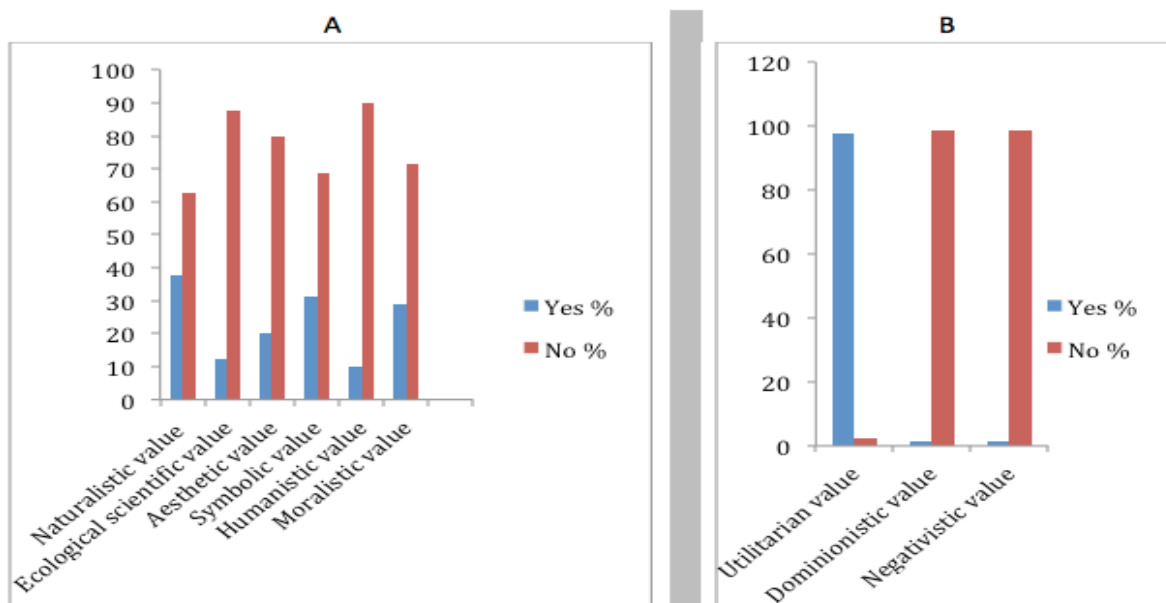


Figure 2: community responses according to Kellert’s (1996) classifications

This revelation is to an extent in line findings by Corral-verdugo and Armendáriz (2000). Corral-verdugo and Armendáriz (2000) revealed that the environmental perceptions of a rural Mexican community were syncretic (holding both a preservation and utilisation perspective) rather than dichotomous (holding either a preservation or utilisation perspective) persistent in literature that investigated American and western European perspectives of the natural environment (Van Liere and Dunlap; 1980; Mohai and Twight, 1987). Thus, the communities of rural Gwanda district have a syncretic view of the natural environment and this perspective is further captured by qualitative results presented in the Box 1 that displays two divergent responses from members of the same village during a group discussion.

Box 1: Syncretic view of the environment evidence from group discussions

“We love the beauty of the environment and we see God’s awesomeness in the environment. The oneness of human life with the animals is evident in the environment and we have to of make sure it stays with us by conserving it. The environment is also valuable for its linkage with cultural ceremonies in most local community traditions.” **Group discussion participant.**

“When I think of the environment I think of the things it gives us like food (Meat and fruits), things we need (wood, medicine, livestock feed, refuge from danger for us and animals, etc.,) we can’t go hungry when there is food and material in the environment it is there for us to use”. **Group discussion participant.**

“Our forefathers had great conservation ethic and left us a great planet but we have begun to destroy it to the detriment of our future as a species. We have hunted animals to extinction in the forests, cut down revered trees and cleared sacred. The continuous disrespect of sacred ground like the Matopo hills and the *Njelele* area has brought adverse weather that has exacerbated poverty and turned people towards plundering the environment. Today Some of the youth in the community today have never seen an Impala which was a very common animal in this area in the recent past”. **Group discussion participant.**

Source: Group discussion Nhwali village (2014)

Nonetheless, the presence of syncretic standpoint in the rural community does not imply that both the conservation and the utilisation convictions of the natural environment have the same weightings in the view of the local communities. To give the general direction of the local community view regarding natural environment perspectives, the means and standard deviation of responses to Kellert’s (1996) classifications were computed and are presented in the Table 4.

Table 4: The general view of the community

Conservatory conviction of the community		
Perspective	N	Mean
Naturalistic value	80	1.63
Symbolic value	80	1.69
Moralistic value	80	1.71
Aesthetic value	80	1.80
Ecological scientific value	80	1.88
Humanistic value	80	1.90
Valid N (listwise)	80	
Utilisation conviction of the community		
Perspective	N	Mean
Utilitarian value	80	1.02

Dominionistic value	80	1.99
Negativistic value	80	1.99
Valid N (listwise)	80	

The two possible responses (YES/NO) were given the values 1 for YES and 2 for NO. Thus, according to the means of the responses shown in the Tables 10 a mean close to 1 indicates general acceptance of a perspective while close to 2 represents dis-agreement with the particular perspective. According to the means in the Tables 4, none of the natural environment conservation perspectives have a mean value less than 1.5. This implies that the general community view towards leans towards not conserving the natural environment. This general view is the case despite the presence of limited syncretic views highlighted in the Figure 2.

The utilisation perspective of the natural environment is dominated by utilitarian consumption with a mean of almost 1 that is in sharp contrast to the other two perspectives (negativistic and dominionistic) leaning towards a NO valuation. Basing on the utilitarian view (as representation of the utilisation view of the environment) it becomes clear that despite the presence of syncretic views regarding the natural environment in the study area, the general view leans towards utilisation rather than conservation. These findings hold common ground with conclusions made by Yu, (2014) exposing that in comparison to their urban counterparts, rural communities in China were generally less concerned about conserving the environment.

Various factors peculiar to the individuals prompt the less common syncretic general view held by certain members of the population of rural Gwanda district. Numerous scholars have postulated a number of hypotheses concerning environmental proclivity and social attributes such as age, gender, social status, education and political ideology have been analysed (Van Liere and Dunlap, 1980; Stern, Dietz and Guagnano, 1995; Lizuka, 2000; Mutalib, Fadzly and Foo, 2013; Yu, 2014).

Age is a significant determinant of environmental perspectives by several authors (Van Liere and Dunlap; 1980; Mohai and Twight, 1987; Mutalib, Fadzly and Foo, 2013). Mohai and Twight (1987) argued that as individuals age, they increase the accumulation of material and social resources; become more involved in religious, political economic and social subsystems ultimately shunning environmental conservation in favour of the status quo. Numerous studies conducted in developed western nations advance the argument that environmental issues have been generally viewed as a ‘threat’ to existing social order hence, younger generations are considered more open to the environmental issues than the older ones (Van Liere and Dunlap, 1980).

Another hypothesis states that ‘environmental concern is positively associated with social class with respect to education, income and occupational prestige’ (Van Liere and Dunlap, 1980; Mainieri *et al.*, 1997; Muhammad *et al.*, 2014; Yu, 2014). According to Inglehart (1990), this hypothesis bases on the fact that once people are more educated and have obtained their basic material and physical needs, they opt for more aesthetic aspect of human existence or ‘quality of life’ such as a better environment. Economists often link this hypothesis to the discussion on Environmental Kuznets Curve (EKC) that argued for a

positive relationship between the levels of income and environmental concern (Grossman and Krueger, 1995).

The statistically significant relationships were sought from the data in order to validate claims in literature using results from the study population. The identification of relationships that exist between social attributes and the individual view of the natural environment in the Rural Gwanda population was done using correlations and Pearson Chi square tests. The significant relationships shown to have a bearing on the general view of the natural environment are those with a Pearson Chi-Square significance level of less than 0.05.

Table 5 shows that there was no correlation between the environmental perceptions defined by Kellert (1996) and selected variables from literature previously discussed. However, qualitative results from the group discussions suggested that age was a major determinant of the attitude that one had towards the natural environment. In this regard, respondents argued that the younger members of the population in the study area did not subscribe to African traditional belief systems and knowledge (see Box 2) that Mapenza (2007) showed to be associated environmental conservation through indigenous knowledge systems. According to key informant interviews with local traditional leaders, the modernisation in society, advent of western religion, lack of interest in traditional knowledge and religion explain the limited interest in conserving the natural environment within the majority of community members and especially the younger members of the population.

Box 2: community perspectives on the age-environment view relationship

“The young are now Christians and do not care about traditional environmental values mostly because they are linked to our African traditional religion. It is only the elderly who still observe sacred forests and place as this is in line with our African religion.” **Elderly group discussion participant.**

Source: Group discussion, Sengezane village (2014)

Table 6 Further sheds light on the qualitative results that highlighted age as a determinant of environmental perceptions. The table (6) shows that older members of society in the study area (36 years to more than 65 years) tend to view the environment more from a naturalistic, aesthetic, symbolic and moralistic perspective in comparison to the younger members (19 to 35 years) of the population. These findings suggest that the qualitative findings have a base in the study area despite the limited statistical evidence from the quantitative results shown in Table 6.2.2. However, the study did not ascertain if the non-youth members of the population practiced African traditional religion however, it is assumed that community member above 35 years lived through the colonial period when the practice of African traditional religion was common in comparison to the contemporary era (Mamdani, 1997). As such, these findings disagree with literature that associates conservation with the younger generation to a certain extent (Van Liere and Dunlap, 1980; Mainieri *et al.*, 1997; Mutalib, Fadzly and Foo, 2013).

Table 5: Correlations of Kellert (1996) perspectives and socio economic factors

KELLERT (1996) PERSPECTIVE		Age	WI Quartile	Occupation	Education	Kellert (1996) Perspective
UTILITARIAN VALUE	Pearson Correlation	-.006	.006	-.074	-.010	1
	Sig. (2-tailed)	.956	.958	.514	.930	
	N	80	80	80	80	80
ECOLOGICAL SCIENTIFIC VALUE	Pearson Correlation	.135	.282*	-.279*	.062	1
	Sig. (2-tailed)	.234	.011	.012	.586	
	N	80	80	80	80	80
NATURALISTIC VALUE	Pearson Correlation	.031	-.083	.049	.075	1
	Sig. (2-tailed)	.787	.466	.669	.510	
	N	80	80	80	80	80
AESTHETIC VALUE	Pearson Correlation	-.079	.098	-.031	-.082	1
	Sig. (2-tailed)	.485	.388	.783	.471	
	N	80	80	80	80	80
SYMBOLIC VALUE	Pearson Correlation	-.272*	.043	-.025	-.134	1
	Sig. (2-tailed)	.015	.704	.823	.236	
	N	80	80	80	80	80
MORALISTIC VALUE	Pearson Correlation	-.281*	-.099	.109	-.052	1
	Sig. (2-tailed)	.012	.381	.336	.648	
	N	80	80	80	80	80
HUMANISTIC VALUE	Pearson Correlation	.079	.036	-.063	-.013	1
	Sig. (2-tailed)	.485	.754	.581	.912	
	N	80	80	80	80	80
NEGATIVISTIC VALUE	Pearson Correlation	-.174	.052	.063	-.004	1
	Sig. (2-tailed)	.124	.647	.576	.970	

	N	80	80	80	80	80
DOMINIONISTIC VALUE	Pearson Correlation	.004	.212	-.275*	-.004	1
	Sig. (2-tailed)	.969	.059	.014	.970	
	N	80	80	80	80	80

** . Correlation is significant at the 0.01 level (2-tailed)

* . Correlation is significant at the 0.05 level (2-tailed).

Table 6: Age and the conservation dimension

Perspective	Response	From 19-35 years	From 36-44 years	From 45-65 years
Naturalistic	Yes	20%	60%	20%
Aesthetic	Yes	13%	63%	25%
Symbolic	Yes	4%	64%	32%
Moralistic	Yes	9%	52%	39%

The realised interest in the environment (naturalistic, aesthetic, symbolic and moralistic) amongst the non-youth members resonates with conclusions reached by Mapenza (2007) who showed that the African traditional religion was inseparable from the natural environment. In this regard, those with higher levels of exposure to African traditional religion (generations before 1980) are likelier to have an interest in environmental conservation in comparison to the youth (<35 years).

Education was not a significant determinant of environmental attitudes and views contrary to some perspectives in literature in literature (Van Liere and Dunlap, 1980; Lizuka, 2000). Additionally, higher levels of income in the study area do not influence environmental attitudes. The wealth and income related results may be due to the relatively high levels of poverty in the study area previously shown by the low income flows in the study area.

Species knowledge: A community perspective

The group discussion results showed that forests are the most revered component of the natural environment in rural Gwanda district. According to the group discussions, within the forest, the most important components are trees because they have supported life since time immemorial through the provision of food and medicine. Table 7 shows the major native tree species identified by the population. According to the group discussions, of the trees identified, uMtswili (Leadwood tree) is most revered because the numbers have declined, it takes long to grow and once fully mature it produces very fine wood.

Table 7: Tree species identified as native and prominent

Community	English name	Scientific name ⁶
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⁶ Scientific names obtained from flora of Zimbabwe (<http://www.zimbabweflora.co.zw/index.php>)

vernacular name	(if available)	
<i>uMstwili</i>	Leadwood tree	<i>Combretum imberbe</i>
<i>uMnyi</i>	Bird plum	<i>Berchemia discolor</i>
<i>uXakuxaku</i>	Snort apple	<i>Azanza garckeana</i>
<i>iPhane</i>	Mopani	<i>Colophospermum mopane</i>
<i>uMganu</i>	Marula	<i>Sclerocarya birrea</i>
<i>uMkhaya</i>	Monkey thorn	<i>Acacia galpinii</i>
<i>uMklampunzi</i>	Donkey berry	<i>Grewia monticola</i> Sond.
<i>iSihaqa</i>	Long-tail cassia	<i>Cassia abbreviata</i> Oliv. var. <i>granitica</i> (Baker f.) Baker f.
<i>iSinga</i>	Acacia	<i>Acacia penninervis</i>
<i>iChithamuzi</i>	Rain tree	<i>Lonchocarpus capassa/Philenoptera violacea</i>
<i>uMkhomo</i>	Baobab	<i>Adansonia digitata</i>

A number of tree and plant species were considered not from the area and these included Cff, gum trees, prickly pear (*Opuntia polyacantha*) and Cherry pie (*lantana camara*) amongst other species. Key informant interviews with the forestry department revealed that some of these foreign trees had been intentionally planted during the annual national tree planting day (first Saturday of December) due to their ability to grow fast (in comparison to indigenous species) and provide ecosystem goods and services to the community.

The community welcome any plant species so long as it will assist them from a livelihood perspective (Group discussion results). However, with particular reference to Invasive Alien Plants (IAPs), the group discussion participants indicated that numerous problems had emerged due to the presence of IAPs resulting in a level of caution when introducing new plant species in the community. Survey results showed that all respondents had knowledge of IAP particularly Cff. Table 8 summarises the common IAP names, period of time that the respondent has known about the plant and the knowledge of the origins of the plant.

Table 8: Knowledge of IAPs

Scientific name	Common village names	Period of time known	Knowledge of origins	
			Yes	No
Cff	Magnet, Majampela, Mutabosawa, Rosea, Sithababaloyi, Ugetsi, UMayeqela, Fulgida, Sihlalosabathakat hi, isiqababa	More than 10 years (80% of the population)	26%	74%
Striga Asiatica (Witch weed)	Isona, Ubudli	More than 5 years (75% of the population)	7%	93%
Dichapetalum cymosum (Poison leaf)	UMkhawuzane	More than 10 years (60% of the population)	21%	79%

Lantana camara (Cherry pie)	<i>Lantana</i>	More than 10 year (40% of the population)	11%	89%
Euphobia ingens (Euphorbia)	<i>UMhlonhlo</i>	More than 10 years (80% of the population)	32%	68%

Of the plant identified as invasive aliens by the rural community, only Cff and *Lantana camara* were alien plants. The rest of the plants are native and either invasive or dangerous to wildlife and humans. Trends within the rural community show that invasiveness or perceived danger posed by a plant species tend to invite the ‘alien’ tag regardless of actual facts pertaining to origins. The term ‘invasive alien plant’ has therefore become associated with any plant species that causes the community problems. This observation is synonymous with confusion in literature regarding the naming of biological invaders (e.g. Colautti and MacIsaac, 2004; Warren, 2007, 2011; Selge, Fischer and van der Wal 2011).

Formulation of attitudes towards Cff

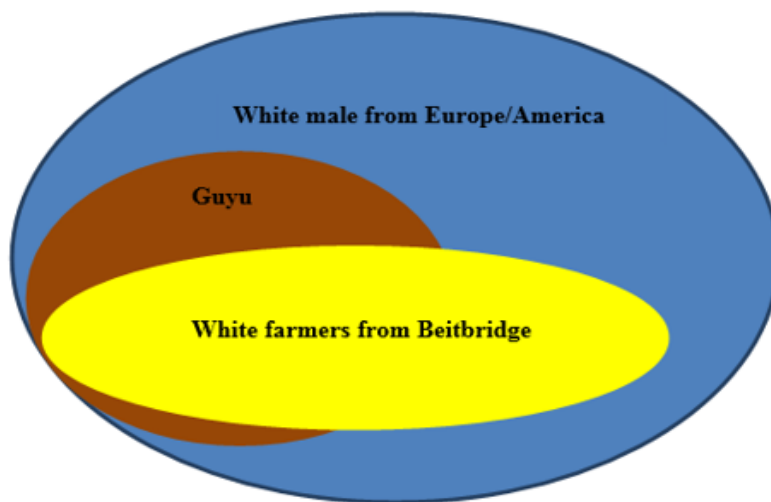
To understand the formulation of attitudes towards Cff by the community of rural Gwanda district, it is essential to consider the names that the community have given the plant. These names reflect an attitude rooted in the characteristics, events and activities associated with the plant. Table 9 explains the meaning of the names given to Cff by the community based on key informant interviews and group discussion results. As shown in the Table 9, the prominent names given to Cff suggest an evil plant associated with un-natural action and witchcraft.

A number of perspectives exist apropos the origins of Cff amongst the study population. The origins map in the Figure 3 summarises the perceived origins of Cff in rural Gwanda district. As shown in Figure 3, the majority of the group discussion participants (represented by the blue colour) argued that the plant came to the area with a white male from either Europe/America/South Africa between 1970 and 1980 primarily for protection from snakes and ornamental purposes. Alternatively, a significant portion of the participants (represented by the brown colour) point to Guyu research station as the source of all the Cff plants in Gwanda district. A lesser portion of the participants (represented by the yellow colour) indicated that Cff originated from neighbouring South Africa through White farmers in bordering Beitbridge district.

Table 9: Meanings of names given to Cff

NAME (LANGUAGE)	TRANSLATION AND DERIVATION
<i>ISiqabaqaba</i> (Ndebele)	The extreme heathen (derived from the Ndebele word, <i>iQaba</i> meaning heathen. In this case the plant is likened to a double heathen <i>iQabaqaba</i>)
Magnet (English)	Derived from the plants ability to attach itself to humans and animals like a magnet does to iron
<i>UMajampela</i> , <i>UMayeqela</i> (Ndebele)	The jumper (derived from the <i>cholla's</i> ability to spring onto humans and animals)
<i>Mutabosawa</i> (Sotho)	One that pricks and won't come off (derived from experiences people have had once they have been pricked by the spines of the plant)
Rosea (English)	Name the EMA authorities use to call the plant

<i>Sithababaloyi</i> (Sotho)	That which pricks witches (derived from the night travel difficulties the plant has caused, hence it pricks witches who are the night travellers)
<i>Ugets</i> (Ndebele)	Electricity (derived from the motion action the plant takes when attaching itself to a victim, it is though it was powered by electricity)
<i>Sihlalosabathak athi</i> (Ndebele)	Chair of the witches (derived from the conviction that the plant glows in the dark and is used by evil people hence, only they can sit on it)
<i>Fulgida</i> (Partial scientific name)	Name the EMA authorities use to call the plant



Almost all residents believe Cff arrived with a white male (Blue)

A lesser percentage believe it arrived with a white male and was spread from Guyu (Brown)

The smallest percentage believe Cff arrived with a white farmer from Beitbridge (Yellow)

Figure 3: Origins map showing common perspective in accordance with sphere size

Qualitative data results and the incorrect information in the Table 8 show that in the study area, origins are not major determinants of attitudes towards plant species in the environment. Likewise, the participants revealed that origins of a plant were not significant so long as the plant contributed to their livelihoods. Notions captured in Box 3 show the non-significance of origins in rural Gwanda district. The results agree with findings by Fischer and Young, 2007 and Selge, Fischer and van der Wal, (2011) showing that origins did not have a significant effect on the attitudes that individuals developed towards certain species in the environment.

Box 3: The significance of plant origins

“It is not necessarily a bad thing to have plants that are alien to this place because traditional healers make use of them to heal people especially if the plant is known to have medicinal benefits in its native area.” **Group discussion participants.**

Source: Group discussion, Tshongwe village (2014)

Therefore, the findings suggest that the major determinants of attitudes towards species in the natural environments are attributes of that species particularly with respect to livelihoods. Palpably, the characteristics of Cff and the effects that it has on the livelihood capital mix have influenced the attitudes of the rural Gwanda population towards it.

CONCLUSIONS

The residents of rural Gwanda district hold both a conservation and utilisation conviction (syncretic view) towards the environment. However, the utilisation aspect outweighs conservation. These findings were similar to those realised by Corral-verdugo and Armendáriz (2000) in a rural Mexican community. In addition to the syncretic view, residents in rural Gwanda from the older age groups (above 35 years) are more inclined towards conservation in comparison to the youth. This revelation is in contrast with literature (primarily from developed countries) that focuses the conservation inclination within the younger members of the population (Van Liere and Dunlap; 1980; Mohai and Twight, 1987). This study disclosed that the primary reason for this contrast was the amalgamation of African tradition/religion and the natural environment.

Using the case of Cff in rural Gwanda district, the study divulged that the origin of a species in the natural environment was not much of an issue to the host community. However, the livelihood effects that species had (regardless of origins) are the major determinant of attitudes developed towards it. In, addition to considering attributes (in general) of a species as shown by Milfont and Duckitt, (2010), this study has revealed that in the case of rural Africa it is better to consider attributes in relation to livelihoods. Therefore, from a rural African perspective, the term 'alien species' increasingly becomes irrelevant in the face of the research findings. The invasiveness of a species and the impact of any species on livelihoods are clearly the significant issues.

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